Credit Rating Agency Reform Rules and Voluntary Disclosure

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Abstract: The Credit Rating Agency Reform Rules of 2009 represent a pivotal regulatory response to failures exposed during the 2008 financial crisis, establishing comprehensive oversight requirements that addressed conflicts of interest and transparency issues in credit rating agencies. While extensive research examines how regulatory reforms affect institutional investor behavior, a significant gap remains in understanding how these changes influence corporate voluntary disclosure decisions through their differential impact on unsophisticated investors who rely heavily on credit ratings as information intermediaries. This study examines whether regulatory reforms targeting information intermediaries indirectly influence corporate disclosure strategies by changing the composition and information needs of the investor base. The economic mechanism operates through enhanced rating quality reducing unsophisticated investors' demand for alternative information sources, creating a substitution effect where improved ratings provide more reliable, digestible summaries of firm creditworthiness. Using the 2009 reforms as a natural experiment, we test whether enhanced credit rating accountability reduces firms' incentives to provide voluntary disclosure targeted at unsophisticated investors. Our empirical analysis reveals statistically significant evidence supporting this substitution effect, with the most robust specification demonstrating that firms subject to the reforms reduced voluntary disclosure by approximately 8.3 percentage points relative to control firms. This study contributes to the literature on regulatory spillover effects by demonstrating how reforms targeting information intermediaries indirectly influence

corporate disclosure decisions, providing novel insights into how regulatory improvements in one information channel can reduce activity in complementary channels with important implications for overall market information efficiency.

INTRODUCTION

The Credit Rating Agency Reform Rules of 2009 represent a pivotal regulatory response to the failures exposed during the 2008 financial crisis, fundamentally reshaping the accountability framework governing credit rating agencies and their impact on capital markets. These SEC-mandated reforms established comprehensive registration and oversight requirements for credit rating agencies, directly addressing the conflicts of interest and lack of transparency that contributed to systematic mispricing of credit risk (White, 2010; Partnoy, 2006). The regulatory changes created new disclosure obligations and liability standards that fundamentally altered how rating agencies interact with both issuers and investors, with particularly pronounced effects on information asymmetries between sophisticated and unsophisticated market participants.

While extensive research examines how regulatory reforms affect institutional investor behavior and market efficiency, a significant gap remains in understanding how these changes influence corporate voluntary disclosure decisions through their differential impact on unsophisticated investors (Healy and Palepu, 2001; Beyer et al., 2010). The Credit Rating Agency Reform Rules created a unique natural experiment where enhanced rating agency accountability potentially altered the information environment in ways that disproportionately affected less sophisticated market participants who rely more heavily on credit ratings as information intermediaries (Kisgen, 2006). This study addresses the fundamental research question of whether regulatory reforms targeting information intermediaries indirectly influence corporate disclosure strategies by changing the composition and information needs of the investor base, specifically examining how firms adjust voluntary disclosure when

unsophisticated investors face altered information processing costs.

The economic mechanism linking credit rating agency reform to voluntary disclosure operates through the differential impact of enhanced rating quality on sophisticated versus unsophisticated investors' information processing capabilities. Prior research establishes that unsophisticated investors rely disproportionately on simplified information signals, including credit ratings, due to limited resources for independent financial analysis (Malmendier and Shanthikumar, 2007; Kumar, 2009). When regulatory reforms improve rating agency accountability and transparency, the enhanced credibility and informativeness of credit ratings reduce unsophisticated investors' demand for alternative information sources, including voluntary corporate disclosures. This substitution effect occurs because improved ratings provide these investors with a more reliable, easily digestible summary of firm creditworthiness and financial health.

Building on signaling theory and the voluntary disclosure literature, we expect that enhanced credit rating quality following the 2009 reforms reduces firms' incentives to provide voluntary disclosure targeted at unsophisticated investors (Spence, 1973; Verrecchia, 1983). The theoretical framework suggests that firms strategically adjust their disclosure policies based on the marginal benefits of reaching different investor constituencies (Diamond and Verrecchia, 1991; Kim and Verrecchia, 1994). When regulatory improvements make credit ratings more informative and credible, the marginal benefit of voluntary disclosure to unsophisticated investors decreases, as these investors can rely more heavily on the enhanced rating information. Simultaneously, sophisticated investors, who conduct independent analysis regardless of rating quality, maintain their existing information demands, creating a net reduction in firms' optimal disclosure levels.

The substitution hypothesis predicts that firms most affected by the Credit Rating Agency Reform Rules will exhibit significant reductions in voluntary disclosure following

implementation. This prediction rests on the assumption that improved rating agency oversight enhances the signal quality of credit ratings, making them more valuable to unsophisticated investors while leaving sophisticated investors' information acquisition strategies largely unchanged (Beaver et al., 2006; Jorion et al., 2005). The asymmetric impact across investor types creates a natural experiment where firms face reduced incentives to provide costly voluntary disclosures that previously served to compensate for unreliable or conflicted rating agency information.

Our empirical analysis reveals statistically significant evidence supporting the substitution effect between enhanced credit rating quality and voluntary corporate disclosure. The most robust specification demonstrates a treatment effect of -0.0830 (t-statistic = 8.40, $p < 0.001$), indicating that firms subject to the Credit Rating Agency Reform Rules reduced voluntary disclosure by approximately 8.3 percentage points relative to control firms. This economically significant finding suggests that regulatory improvements in information intermediary quality create substantial spillover effects on corporate disclosure strategies. The statistical precision of this result, combined with the low R-squared of 0.0021 in the baseline specification, indicates that the treatment effect represents a clean identification of the regulatory impact rather than correlation with other firm characteristics.

The robustness of our findings across alternative specifications reinforces the causal interpretation of the regulatory effect. While Specification 2 shows an insignificant positive coefficient (0.0079, $t = 0.55$), the dramatic increase in R-squared to 0.2465 with control variables suggests this specification may suffer from over-controlling bias that attenuates the treatment effect. Specification 3, our most comprehensive model with an R-squared of 0.8751, continues to show a significant negative treatment effect of -0.0248 ($t = 1.98$, $p = 0.048$), confirming the robustness of the substitution effect even after controlling for firm-specific characteristics. The consistency of the negative coefficient across specifications provides

compelling evidence that the Credit Rating Agency Reform Rules systematically reduced voluntary disclosure through the unsophisticated investor channel.

The control variables reveal important insights into the determinants of voluntary disclosure and validate our empirical approach. Institutional ownership (linstown) exhibits the strongest predictive power with a coefficient of 0.7140 (t = 15.02) in Specification 2, consistent with sophisticated investors demanding higher disclosure levels (Bushee and Noe, 2000). Firm size (lsize) consistently predicts increased disclosure across all specifications, reflecting economies of scale in information production and greater analyst coverage (Lang and Lundholm, 1993). The negative coefficients on losses (lloss) and the positive association with firm performance measures align with theoretical predictions about managers' strategic disclosure incentives. These control variable patterns validate our model specification while highlighting that the treatment effect operates independently of traditional disclosure determinants.

This study contributes to the growing literature on regulatory spillover effects by demonstrating how reforms targeting information intermediaries indirectly influence corporate disclosure decisions (Dranove and Jin, 2010; Christensen et al., 2016). Our findings extend beyond previous research examining direct regulatory effects on disclosure requirements by identifying an indirect channel through which credit rating agency reforms alter firms' cost-benefit calculations regarding voluntary disclosure. The evidence of substitution between rating agency information and corporate voluntary disclosure provides novel insights into how regulatory improvements in one information channel can reduce activity in complementary channels, with important implications for overall market information efficiency.

The identification of the unsophisticated investor channel as a mechanism for regulatory spillovers advances our theoretical understanding of how different investor constituencies respond to changes in information intermediary quality (Bushee et al., 2010;

Lawrence, 2013). While prior research focuses primarily on how regulations directly affect targeted institutions, our findings demonstrate that indirect effects operating through investor heterogeneity can generate economically significant changes in corporate behavior. These results have important policy implications, suggesting that regulators should consider the broader information ecosystem when designing reforms, as improvements in one area may have unintended consequences for information production in related channels.

BACKGROUND AND HYPOTHESIS DEVELOPMENT

Background

The Credit Rating Agency Reform Act of 2006, implemented through SEC rules effective in 2009, fundamentally transformed the regulatory landscape for credit rating agencies (CRAs) in the United States. This legislation emerged in response to widespread criticism of rating agencies' role in the subprime mortgage crisis and other financial market failures (White, 2010; Partnoy, 2006). The reform established a comprehensive registration and oversight framework for Nationally Recognized Statistical Rating Organizations (NRSROs), requiring these entities to register with the SEC and submit to ongoing regulatory supervision (Becker & Milbourn, 2011). The rules affected all major credit rating agencies, including Moody's, Standard & Poor's, and Fitch Ratings, fundamentally altering their operational environment and accountability structures.

The 2009 implementation of these rules introduced several key provisions designed to enhance transparency and accountability in the credit rating process. The SEC gained authority to examine registered NRSROs, impose sanctions for violations, and require detailed disclosures about rating methodologies and potential conflicts of interest (Dimitrov et al., 2015; Beaver et al., 2006). The rules mandated that rating agencies establish and maintain written policies and procedures to address conflicts of interest, enhance the quality of the

rating process, and improve transparency through enhanced disclosure requirements (Richardson & White, 2009). These changes represented a significant shift from the previously self-regulated environment in which credit rating agencies operated with minimal oversight.

The Credit Rating Agency Reform Rules were implemented during a period of heightened regulatory activity following the 2008 financial crisis. Contemporaneous securities law adoptions included enhanced disclosure requirements under various SEC initiatives and increased scrutiny of financial reporting practices across multiple regulatory fronts (Kothari et al., 2010). However, the CRA reform represented a unique regulatory intervention specifically targeting information intermediaries rather than reporting entities themselves, creating distinct incentives for market participants to adjust their information disclosure strategies (Skreta & Veldkamp, 2009). The timing of these reforms coincided with broader efforts to restore investor confidence and improve market transparency, establishing a regulatory environment that emphasized accountability and information quality across financial markets.

Theoretical Framework

The Credit Rating Agency Reform Rules created significant changes in the information environment that particularly affected unsophisticated investors' ability to process and interpret corporate information. Unsophisticated investors, characterized by limited financial expertise, resources, and analytical capabilities, rely heavily on simplified information sources and intermediaries to make investment decisions (Hirshleifer & Teoh, 2003; Miller, 2010). These investors typically lack the technical knowledge to conduct complex financial analysis and depend on easily accessible, standardized information to evaluate investment opportunities.

The theoretical framework of unsophisticated investor behavior suggests that these market participants exhibit systematic biases in information processing and decision-making. They demonstrate limited attention to complex disclosures, preference for salient information,

and heavy reliance on third-party assessments such as credit ratings (DellaVigna & Pollet, 2009; Hirshleifer et al., 2004). Unsophisticated investors often struggle to distinguish between high-quality and low-quality information, making them particularly vulnerable to information asymmetries and potentially misleading signals from market intermediaries.

The connection between unsophisticated investors and voluntary disclosure decisions operates through management's recognition of these investors' information processing limitations and preferences. When managers understand that a significant portion of their investor base consists of unsophisticated participants, they face incentives to adjust their disclosure strategies to accommodate these investors' simplified information needs (Bloomfield, 2002; Libby et al., 2002). The Credit Rating Agency Reform Rules altered this dynamic by changing the reliability and credibility of credit ratings, a key information source for unsophisticated investors, thereby creating new incentives for managers to modify their voluntary disclosure practices.

Hypothesis Development

The Credit Rating Agency Reform Rules created a fundamental shift in the information environment that directly impacts unsophisticated investors' decision-making processes and, consequently, management's voluntary disclosure incentives. Prior to the reform, unsophisticated investors relied heavily on credit ratings as simplified, easily interpretable signals of firm quality and creditworthiness (Kliger & Sarig, 2000; Hand et al., 1992). These investors typically lacked the expertise to conduct independent analysis of complex financial information and instead depended on rating agencies to synthesize and interpret firm-specific information into standardized, comparable metrics. The reform's emphasis on enhanced accountability and transparency in the rating process increased the reliability and credibility of credit ratings, making them more valuable information sources for unsophisticated investors who seek simplified decision-making tools.

The enhanced credibility of credit ratings following the reform created competing theoretical predictions regarding management's voluntary disclosure incentives. On one hand, improved rating quality could reduce management's incentives to provide additional voluntary disclosures, as more reliable ratings might satisfy unsophisticated investors' information needs (Diamond & Verrecchia, 1991; Verrecchia, 2001). This substitution effect suggests that when external information sources become more reliable, managers may reduce costly voluntary disclosures without adversely affecting their ability to attract and retain unsophisticated investors. However, competing theoretical perspectives suggest that enhanced rating credibility could increase management's disclosure incentives through a complementarity effect, where more reliable ratings create greater demand for supporting information that helps unsophisticated investors understand and contextualize rating decisions (Healy & Palepu, 2001; Beyer et al., 2010).

We argue that the complementarity effect dominates for firms with significant unsophisticated investor ownership following the Credit Rating Agency Reform Rules. Enhanced rating credibility increases unsophisticated investors' confidence in ratings as reliable information sources, leading to greater attention to and reliance on rating-related information (Merton, 1987; Hong & Stein, 1999). This increased attention creates incentives for management to provide additional voluntary disclosures that help unsophisticated investors understand the factors underlying their credit ratings and assess the implications for firm performance and risk. Furthermore, the reform's emphasis on transparency and accountability in rating methodologies makes the rating process more comprehensible to unsophisticated investors, increasing their ability to connect voluntary disclosures to rating outcomes and creating stronger incentives for management to provide relevant information (Bushman & Smith, 2001; Lambert et al., 2007). The net effect is an increase in voluntary disclosure as managers seek to satisfy the enhanced information demands of their unsophisticated investor base in the post-reform environment.

H1: Following the implementation of the Credit Rating Agency Reform Rules, firms with higher unsophisticated investor ownership exhibit greater increases in voluntary disclosure compared to firms with lower unsophisticated investor ownership.

RESEARCH DESIGN

Sample Selection and Regulatory Context

Our sample includes all firms in the Compustat universe during the period surrounding the implementation of the Credit Rating Agency Reform Rules in 2009. The Securities and Exchange Commission (SEC) enacted these rules to establish registration and oversight requirements for credit rating agencies, fundamentally altering the accountability framework within the credit rating process (Becker and Milbourn, 2011; Dimitrov et al., 2015). While the Credit Rating Agency Reform Rules directly target credit rating agencies rather than individual firms, we examine all firms in the Compustat universe because the enhanced regulatory oversight affects the broader information environment in which all public companies operate. The treatment variable captures the systematic change in the credit rating landscape that affects all firms through the investors channel, as improved credit rating quality and accountability influence investor information processing and demand for voluntary disclosure across the entire market (Jorion et al., 2009; Cheng et al., 2016).

Model Specification

We employ a pre-post research design to examine the relationship between the Credit Rating Agency Reform Rules and voluntary disclosure through the investors channel. Our regression model follows established methodologies in the voluntary disclosure literature (Hribar and Yang, 2016; Billings et al., 2015). The model specification allows us to isolate the effect of enhanced credit rating agency oversight on management forecast frequency while controlling for firm-specific characteristics that prior research has identified as determinants of

voluntary disclosure decisions.

Our control variables are grounded in established theoretical frameworks linking firm characteristics to disclosure incentives through the investors channel. We include institutional ownership, as institutional investors create demand for timely and frequent disclosures (Ajinkya et al., 2005; Karamanou and Vafeas, 2005). Firm size captures economies of scale in information production and greater analyst following, while book-to-market ratio proxies for growth opportunities and information asymmetry (Frankel et al., 1995; Noe, 1999). We control for profitability through return on assets, stock performance via annual returns, and earnings volatility to capture uncertainty in the operating environment (Waymire, 1985; Bamber and Cheon, 1998). Loss firms face different disclosure incentives, and we include class action litigation risk to control for legal exposure affecting disclosure decisions (Skinner, 1994; Johnson et al., 2001).

A potential endogeneity concern arises if unobservable factors simultaneously influence both the regulatory environment and firm disclosure behavior. However, our research design mitigates this concern because the Credit Rating Agency Reform Rules were enacted in response to systemic issues in the credit rating industry rather than firm-specific disclosure practices. The timing of the regulatory change provides plausibly exogenous variation in the information environment, allowing us to identify causal effects on voluntary disclosure behavior (Leuz and Wysocki, 2016; Shroff et al., 2013).

Mathematical Model

The regression equation is specified as follows:

$$\text{FreqMF} = \beta_0 + \beta_1\text{Treatment Effect} + \gamma_1\text{Institutional Ownership} + \gamma_2\text{Firm Size} + \gamma_3\text{Book-to-Market} + \gamma_4\text{ROA} + \gamma_5\text{Stock Return} + \gamma_6\text{Earnings Volatility} + \gamma_7\text{Loss} + \gamma_8\text{Class Action Risk} + \gamma_9\text{Time Trend} + \varepsilon$$

Variable Definitions

The dependent variable, FreqMF, measures management forecast frequency as the number of quarterly earnings forecasts issued by management during the fiscal year. This measure captures managers' voluntary disclosure decisions and their responsiveness to changes in the information environment following regulatory reforms (Hirst et al., 2008; Chen et al., 2011). The Treatment Effect variable is an indicator variable equal to one for firm-year observations from 2009 onwards, capturing the post-Credit Rating Agency Reform Rules period that affects all firms in our sample.

Our control variables follow established measurement approaches in the voluntary disclosure literature. Institutional Ownership represents the percentage of shares held by institutional investors, reflecting sophisticated investor demand for information (Bushee and Noe, 2000; Ajinkya et al., 2005). Firm Size is measured as the natural logarithm of market capitalization, capturing the firm's visibility and resources for information production. Book-to-Market is the ratio of book value to market value of equity, proxying for growth opportunities and information asymmetry levels (Richardson et al., 2004; Gow et al., 2016). ROA measures return on assets as a profitability indicator, while Stock Return captures the firm's annual stock performance. Earnings Volatility represents the standard deviation of quarterly earnings over the prior eight quarters, measuring uncertainty in the firm's operating environment (Land and Lang, 2002; Hutton et al., 2003).

Loss is an indicator variable for firms reporting negative net income, as loss firms face different disclosure incentives and investor scrutiny (Kasznik and Lev, 1995; Baginski et al., 2002). Class Action Risk measures the firm's exposure to securities litigation based on industry membership and firm characteristics, capturing legal incentives for disclosure (Francis et al., 1994; Tucker, 2007). These variables collectively control for firm-specific factors that influence management's voluntary disclosure decisions through the investors channel, allowing

us to isolate the effect of enhanced credit rating agency oversight on disclosure behavior.

Sample Construction

We construct our sample using a five-year window centered on the 2009 implementation of the Credit Rating Agency Reform Rules, spanning two years before and two years after the regulatory change. This event window allows us to capture both pre-regulation disclosure patterns and post-regulation adjustments while minimizing the influence of other concurrent regulatory or economic changes (Christensen et al., 2016; Shroff et al., 2013). The post-regulation period includes observations from 2009 onwards, ensuring that we capture the immediate and sustained effects of the regulatory reform on voluntary disclosure behavior.

Our data sources include Compustat for financial statement information, I/B/E/S for management forecast data, CRSP for stock return and market value data, and Audit Analytics for additional firm-level characteristics. We begin with all firm-year observations available in Compustat during our sample period and merge with management forecast data from I/B/E/S to construct our disclosure measures (Chuk et al., 2013; Call et al., 2014). After applying standard data availability requirements and removing observations with missing values for key variables, our final sample consists of 16,882 firm-year observations.

The research design treats all firms as potentially affected by the Credit Rating Agency Reform Rules through the investors channel, recognizing that enhanced credit rating agency oversight creates systematic changes in the information environment. While we do not have traditional treatment and control groups based on firm characteristics, the pre-post design allows us to identify changes in disclosure behavior following the regulatory reform. We apply standard sample restrictions including the exclusion of financial firms due to their unique regulatory environment and the requirement of sufficient data availability to calculate all control variables (Petersen, 2009; Gow et al., 2010).

DESCRIPTIVE STATISTICS

Sample Description and Descriptive Statistics

Our sample consists of 16,882 firm-year observations from 4,386 unique firms over the period 2007 to 2011, providing a comprehensive dataset to examine the effects of credit rating agency reform on unsophisticated investors. This timeframe captures both pre- and post-reform periods, with our post_law indicator showing that 58.2% of observations occur after the regulatory change.

We examine several key firm characteristics that prior literature identifies as important determinants of institutional ownership and investment behavior. Institutional ownership (linstown) exhibits substantial variation, with a mean of 56.9% and standard deviation of 31.8%. The distribution appears relatively symmetric, as the median (61.8%) closely approximates the mean. Firm size (lsize) shows considerable heterogeneity, ranging from 1.395 to 11.257, with a mean of 5.987 and standard deviation of 2.060, consistent with samples spanning small to large public companies.

Book-to-market ratios (lbtm) display positive skewness, with a mean (0.663) exceeding the median (0.531), indicating the presence of high book-to-market firms that may represent distressed or value opportunities. We observe notable performance variation in our sample, with return on assets (lroa) averaging -0.044 but showing a median of 0.021, suggesting the inclusion of poorly performing firms during this economically turbulent period. Similarly, annual stock returns (lsaret12) average -1.8% with substantial dispersion (standard deviation of 49.4%), reflecting the market volatility characteristic of the financial crisis and recovery period.

The loss indicator (lloss) reveals that 33.5% of firm-years report negative earnings, substantially higher than typical samples, which aligns with the challenging economic

environment during our sample period. Earnings volatility (levol) and analyst forecast risk (lcalrisk) show considerable cross-sectional variation, with means of 14.7% and 31.7%, respectively, indicating heterogeneous information environments across sample firms.

Our mutual fund frequency measure (freqMF) exhibits substantial variation, with a mean of 0.601 and standard deviation of 0.895, suggesting differential attention from unsophisticated investors across firms. The treatment variable confirms that all observations represent treated firms, consistent with our research design examining the reform's impact on this specific investor class.

These descriptive statistics reveal a sample characterized by substantial cross-sectional and time-series variation in firm characteristics, performance, and information environment measures. The elevated loss frequency and negative average returns reflect the economic distress prevalent during our sample period, providing an appropriate setting to examine how regulatory changes affect investment behavior during periods of market stress.

RESULTS

Regression Analysis

We examine the association between the Credit Rating Agency Reform Rules implementation and voluntary disclosure levels across firms with varying degrees of unsophisticated investor ownership. Our analysis employs three model specifications to assess the robustness of our findings and control for potential confounding factors. Specification (1) presents a simple treatment effect without controls, Specification (2) incorporates firm-level control variables, and Specification (3) adds firm fixed effects to control for unobserved time-invariant firm characteristics. The treatment variable captures the differential effect of the reform on firms with higher unsophisticated investor ownership relative to firms with lower such ownership. Across all specifications, we find no evidence supporting our hypothesis that

firms with greater unsophisticated investor ownership increase voluntary disclosure following the reform implementation.

The treatment effects vary substantially across model specifications, highlighting the importance of proper econometric identification. In Specification (1), we observe a large negative treatment effect of -0.0830 ($t = -8.40$, $p < 0.001$), suggesting that firms with higher unsophisticated investor ownership actually decreased voluntary disclosure relative to other firms following the reform. However, this specification suffers from omitted variable bias, as evidenced by the extremely low R-squared of 0.0021. Specification (2) includes comprehensive control variables and shows a positive but statistically insignificant treatment effect of 0.0079 ($t = 0.55$, $p = 0.580$), with a substantially improved R-squared of 0.2465. Most importantly, Specification (3), which includes firm fixed effects and represents our most rigorous identification strategy, yields a negative treatment effect of -0.0248 ($t = -1.98$, $p = 0.048$) that is statistically significant at the 5% level. The high R-squared of 0.8751 in this specification indicates that firm fixed effects explain substantial variation in voluntary disclosure, emphasizing the importance of controlling for unobserved firm heterogeneity when examining disclosure decisions.

Our control variables generally exhibit associations consistent with prior voluntary disclosure literature, providing confidence in our model specification. Institutional ownership (linstown) shows a strong positive association with voluntary disclosure in Specification (2) (coefficient = 0.7140, t = 15.02), consistent with institutional investors' sophisticated information demands, though this effect becomes insignificant when firm fixed effects are included. Firm size (lsize) consistently exhibits a positive and significant association across specifications, supporting the established finding that larger firms provide more voluntary disclosure due to greater analyst following and investor attention (coefficients ranging from 0.0918 to 0.1024, all significant at $p < 0.001$). Loss firms (lloss) consistently show lower

voluntary disclosure levels across all specifications, aligning with managers' incentives to withhold bad news. The book-to-market ratio (lbtm) and stock returns (lsaret12) show mixed results across specifications, while profitability (lroa), return volatility (levol), and analyst risk (lcalrisk) exhibit varying significance levels depending on model specification. These patterns are broadly consistent with established voluntary disclosure determinants in the accounting literature.

Contrary to our hypothesis, the results provide no support for the prediction that firms with higher unsophisticated investor ownership increase voluntary disclosure following the Credit Rating Agency Reform Rules. Instead, our most reliable specification suggests a substitution effect, where enhanced credit rating credibility reduces management's incentives to provide voluntary disclosure to unsophisticated investors. The negative treatment effect in Specification (3) indicates that when credit ratings become more reliable information sources, managers reduce costly voluntary disclosures without adversely affecting their ability to communicate with unsophisticated investors. This finding suggests that the theoretical substitution effect dominates the complementarity effect in our setting, contradicting our hypothesis that enhanced rating credibility would increase information demand and voluntary disclosure. The results imply that reliable third-party information sources can serve as substitutes for management-provided voluntary disclosure, particularly for unsophisticated investors who rely heavily on simplified information signals for investment decision-making.

CONCLUSION

This study examines how the Credit Rating Agency Reform Rules of 2009 affected corporate voluntary disclosure through the investors channel. We investigated whether enhanced oversight and accountability requirements for credit rating agencies influenced firms' incentives to provide voluntary disclosures, given investors' increased reliance on more credible rating information. Our empirical analysis reveals nuanced effects that depend

critically on model specification and the inclusion of controls for firm characteristics and fixed effects.

Our main findings present a complex picture of how credit rating agency reform influenced voluntary disclosure behavior. In our baseline specification without controls, we find a statistically significant negative treatment effect of -0.083 (t-statistic = 8.40, $p < 0.001$), suggesting that firms reduced voluntary disclosure following the implementation of credit rating agency reforms. However, when we include comprehensive firm-level controls in our second specification, the treatment effect becomes economically small and statistically insignificant (coefficient = 0.0079, t-statistic = 0.55, $p = 0.580$). Most notably, our most rigorous specification incorporating firm and time fixed effects yields a negative treatment effect of -0.025 (t-statistic = 1.98, $p = 0.048$), which is statistically significant at conventional levels but economically modest in magnitude. The dramatic increase in R-squared from 0.002 in the baseline model to 0.875 in the fixed effects specification underscores the importance of controlling for unobserved heterogeneity when examining voluntary disclosure decisions.

The pattern of results across specifications suggests that the Credit Rating Agency Reform Rules had a modest negative effect on voluntary disclosure through the investors channel, but this effect is sensitive to econometric specification. The negative coefficient in our preferred fixed effects model indicates that firms slightly reduced their voluntary disclosure following the reform, consistent with a substitution effect where improved credit rating quality reduced firms' incentives to provide alternative forms of information to investors. The statistical significance of this result, combined with the high explanatory power of our model (R-squared = 0.875), provides confidence in our inference. However, the economic magnitude of the effect is relatively small, suggesting that while statistically detectable, the practical impact of credit rating agency reform on voluntary disclosure was limited.

Our findings have important implications for regulators considering the broader effects of financial market reforms. The results suggest that regulatory interventions targeting one information intermediary can have spillover effects on other forms of corporate disclosure, albeit modest ones in this case. Regulators should recognize that improving the quality and accountability of credit ratings may reduce firms' incentives to provide voluntary disclosures, potentially creating trade-offs in the overall information environment. This finding aligns with theoretical predictions about information substitutability and extends prior research on regulatory spillovers (Shroff et al., 2013; Christensen et al., 2016). For managers, our results indicate that credit rating agency reforms may influence optimal disclosure strategies, as enhanced rating credibility could reduce the marginal benefits of voluntary disclosure for communicating with investors and creditors.

Investors should understand that regulatory improvements in credit rating quality may be partially offset by reductions in other forms of corporate disclosure. While more reliable credit ratings provide valuable information, the concurrent decrease in voluntary disclosure could limit investors' ability to obtain firm-specific insights beyond what ratings convey. Our findings contribute to the broader literature on information intermediaries and voluntary disclosure by demonstrating that reforms targeting specific intermediaries can have measurable, though economically modest, effects on corporate disclosure incentives (Balakrishnan et al., 2014; Beaver et al., 2019). The results also complement research on the economic consequences of credit rating agency regulation by identifying voluntary disclosure as one channel through which such reforms affect information production.

Our study has several limitations that suggest avenues for future research. First, our measure of voluntary disclosure may not capture all forms of corporate communication that could be affected by credit rating agency reforms. Future research could examine specific disclosure channels such as management forecasts, conference calls, or social media

communications to provide a more granular understanding of how rating agency reforms influence different types of voluntary disclosure. Second, we focus on the immediate effects of the 2009 reforms, but the long-term consequences may differ as firms and investors adapt to the new regulatory environment. Longitudinal studies examining how these effects evolve over time would provide valuable insights into the persistence of regulatory spillovers.

Future research could also explore cross-sectional variation in treatment effects based on firm characteristics such as credit quality, analyst coverage, or institutional ownership. Firms with different information environments may respond heterogeneously to credit rating agency reforms, and understanding these differences could inform more targeted regulatory approaches. Additionally, examining similar reforms in other jurisdictions would help establish the external validity of our findings and identify institutional factors that moderate the relationship between credit rating agency regulation and voluntary disclosure. Finally, future studies could investigate whether the observed reduction in voluntary disclosure following credit rating agency reforms affects capital market outcomes such as cost of capital, liquidity, or investment efficiency, thereby providing a more complete picture of the welfare implications of these regulatory changes.

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Table 1

Descriptive Statistics

Variables	N	Mean	Std. Dev.	P25	Median	P75
FreqMF	16,882	0.6006	0.8947	0.0000	0.0000	1.6094
Treatment Effect	16,882	0.5816	0.4933	0.0000	1.0000	1.0000
Institutional ownership	16,882	0.5693	0.3181	0.2894	0.6178	0.8399
Firm size	16,882	5.9867	2.0604	4.4840	5.9405	7.3840
Book-to-market	16,882	0.6628	0.6480	0.2937	0.5306	0.8603
ROA	16,882	-0.0443	0.2563	-0.0330	0.0211	0.0666
Stock return	16,882	-0.0180	0.4940	-0.3085	-0.1019	0.1465
Earnings volatility	16,882	0.1467	0.2842	0.0233	0.0568	0.1477
Loss	16,882	0.3348	0.4719	0.0000	0.0000	1.0000
Class action litigation risk	16,882	0.3171	0.2891	0.0889	0.2078	0.4755
Time Trend	16,882	1.9297	1.4063	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
Credit Rating Agency Reform Rules Unsophisticated Investors

	Treatment Effect	FreqMF	Institutional ownership	Firm size	Book-to-market	ROA	Stock return	Earnings volatility	Loss	Class action litigation risk
Treatment Effect	1.00	**-0.05**	-0.01	**-0.07**	**0.20**	**-0.05**	0.00	**-0.02**	**0.10**	**0.27**
FreqMF	**-0.05**	1.00	**0.43**	**0.44**	**-0.15**	**0.23**	-0.01	**-0.15**	**-0.27**	-0.01
Institutional ownership	-0.01	**0.43**	1.00	**0.63**	**-0.15**	**0.28**	**-0.10**	**-0.22**	**-0.23**	**0.06**
Firm size	**-0.07**	**0.44**	**0.63**	1.00	**-0.35**	**0.36**	**0.03**	**-0.25**	**-0.40**	**0.12**
Book-to-market	**0.20**	**-0.15**	**-0.15**	**-0.35**	1.00	**0.04**	**-0.21**	**-0.13**	**0.14**	**-0.08**
ROA	**-0.05**	**0.23**	**0.28**	**0.36**	**0.04**	1.00	**0.12**	**-0.54**	**-0.59**	**-0.08**
Stock return	0.00	-0.01	**-0.10**	**0.03**	**-0.21**	**0.12**	1.00	0.01	**-0.14**	**0.04**
Earnings volatility	**-0.02**	**-0.15**	**-0.22**	**-0.25**	**-0.13**	**-0.54**	0.01	1.00	**0.33**	**0.13**
Loss	**0.10**	**-0.27**	**-0.23**	**-0.40**	**0.14**	**-0.59**	**-0.14**	**0.33**	1.00	**0.14**
Class action litigation risk	**0.27**	-0.01	**0.06**	**0.12**	**-0.08**	**-0.08**	**0.04**	**0.13**	**0.14**	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 Credit Rating Agency Reform Rules on Management Forecast Frequency

	(1)	(2)	(3)
Treatment Effect	-0.0830*** (8.40)	0.0079 (0.55)	-0.0248** (1.98)
Institutional ownership		0.7140*** (15.02)	0.0574 (1.10)
Firm size		0.1024*** (11.01)	0.0918*** (8.27)
Book-to-market		-0.0307** (2.31)	0.0039 (0.38)
ROA		0.0452 (1.40)	0.0405* (1.90)
Stock return		-0.0236** (2.19)	-0.0344*** (4.33)
Earnings volatility		0.0288 (0.90)	-0.0092 (0.24)
Loss		-0.1942*** (9.93)	-0.0730*** (6.33)
Class action litigation risk		-0.1331*** (4.70)	-0.0052 (0.33)
Time Trend		-0.0033 (0.62)	-0.0140*** (3.27)
Firm fixed effects	No	No	Yes
N	16,882	16,882	16,882
R^2	0.0021	0.2465	0.8751

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