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Trends in ESG Rating Changes Following Corporate Risk Incidents

CARISSA GAYLE
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Reviewed and approved* by the following:

Samuel Bonsall
Professor of Accounting
Thesis Supervisor

Brian Davis
Professor of Finance
Honors Adviser

* Electronic approvals are on file.

ABSTRACT

The purpose of this research is to understand how ESG ratings have evolved over the past decade. To explore the proposed research question, this thesis will discuss the history of ESG, determine the current state of ESG ratings, and study the change in the ratings over the past decade. Through an analysis of ESG rating changes following a corporate risk incident, this paper will determine if ESG ratings have become more sensitive to risk incidents over the past eight years. Increased emphasis on the topic has led to an increase in public awareness about the importance of ESG. Based on the research, it has been found that ESG ratings have become more sensitive to corporate risk incidents in recent years, as larger changes in ESG ratings have been found following these risk incidents.

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Chapter 1

Introduction

Background of ESG

Over the past decade, the importance of firms' ESG (environmental, social, and governance) performance has grown across society. Businesses are expected to implement intricate ESG initiatives and thrive in doing so. Consumers look to ESG-friendly companies and tend to prioritize those who succeed. Investors, too, incorporate ESG elements into their investment decisions. Primarily, ESG is a framework used by stakeholders to help them understand what risks and opportunities are present within an organization related to the three factors. According to Peterdy (2022), environmental "refers to an organization's environmental impacts and risk practices," while social "refers to an organization's relationships with stakeholders." For example, these categories may incorporate a company's gas emissions or their impact on the communities in which they operate. Finally, governance "refers to how an organization is led and managed" and may include insight into a company's transparency and accountability. These are the pillars of a company's overall corporate social responsibility (CSR). According to Marmon (2021), corporate social responsibility is another business framework that focuses on generating profit while also having positive social impact through company policies and practices. As consumers and investors prioritize CSR and ESG in their decisions, ESG investing was coined. ESG investing focuses on environmental, social, and governance throughout the investment process and sets a standard for company behavior.

Investors use these factors to screen a company before investing. From this, rating agencies began to produce ESG ratings. The ratings are intended to provide investors with reliable ESG information to base their investment decisions on.

Top ESG rating agencies include Bloomberg ESG Ratings, Morgan Stanley Capital International (MSCI) ESG Ratings, Refinitiv ESG Scores, S&P Global ESG Scores, and Sustainalytics ESG Risk Ratings. These ratings do not concentrate on any specific measurements or information about a firm. The rating varies with each agency, as they use different methodologies. However, based on Emerick (2021), some key focus areas that these ratings may incorporate include carbon emissions, energy consumption, waste production, supplier assessments, employee diversity and discrimination, supplier diversity, pay ratios, and executive compensation. These elements serve as the foundation of the score. Typically, a score above 70 is considered good, while a score below 50 is considered poor. However, given the difference in the methodology between rating agencies, this may vary.

The scores help determine the company's initiatives within ESG and, therefore, serve as a critical resource for multiple parties. As discussed by FinSMEs (2022), an ESG concentration provides many benefits. It can improve a company's long-term value while also addressing risks within the areas of environmental, social, and governance performance. ESG brings awareness to many climate change issues and pushes businesses to adopt more environmentally friendly practices. It also encourages innovation, which helps expand opportunities and increase job openings. Furthermore, it improves the relationship between company employees and shareholders, while prioritizing health and safety. The ratings themselves also prove to be an important resource for ESG investors, as they rely on the ratings for investment decisions. Larcker et al. (2022) found that 88 percent of professional investors rely on ESG ratings from

third parties. While many investors rely on these ratings today, ESG was not always as prominent in our society and investing world.

History of ESG

The idea of ESG has become increasingly important in the 21st century. Atkins (2020) discussed that the term was first publicized in 2004 in a United Nations report, *Who Cares Who Wins*, which focused on better incorporation of ESG factors into analysis, asset management, and brokerage. According to Pollman (2022), the term was originally created to address issues that needed to be considered in financial analysis. However, ESG really stemmed from even earlier concepts of corporate governance and corporate social responsibility (CSR). The term, CSR, began to be used in the late 20th century. As corporate social responsibility has evolved over the past century, the development of ESG surfaced. Once the UN released the 2004 report, the concept really began to grow. Other organizations created groups, like the Principles for Responsible Investment (PRI), to increase understanding of ESG. Ultimately, the UN played a large role in increasing the awareness and development of ESG. Eventually, asset management companies began to incorporate ESG and created ESG funds. From here, investors also began to prioritize ESG, which brought about the need for ESG ratings. With this, we can further see the importance of ESG and how it affects investors, consumers, and firms directly.

More recently, ESG has become a controversial topic for large financial institutions like BlackRock and Vanguard. Rubin (2023) stated that, while both firms have been supportive of ESG investments in the past, recent losses have caused them to reconsider their ESG strategy. BlackRock, in particular, lost about \$4 billion in assets that were directly related to ESG

investments. This loss caused public officials to question the validity of tying investor funds to ESG initiatives, as the main goal is to generate profit rather than support ESG. Given this pressure, large investment firms are moving away from ESG investments, causing recent discontent towards the topic and its practicability. While BlackRock has become more mindful of their ESG focus, their CEO, Larry Fink, has continued to express his support, though with different messaging behind the concept. This has caused Blackrock to face additional scrutiny surrounding the topic from the Republican Party due to the firm's continued support of ESG-related initiatives. Geman (2023) explains backlash that the company faced in the recent Republican presidential debate about the firm's approach to oil investments and the effect on drilling by American energy companies. Randall (2023) described accusations of BlackRock's economic power being used to sway politics and promote left-wing agendas. This led to BlackRock's CEO publicly addressing the company's devotion to their clients. The debate also involved discussion surrounding anti-ESG policies, which would directly affect BlackRock and many other firms. Ultimately, these deliberations have resulted in the current skepticism surrounding ESG and ESG-related initiatives. However, looking at the proven benefits of ESG initiatives within firms, investors can expect long-term gains from companies that prioritize such initiatives. While ESG has evolved and become more important over the past two decades, it's important to understand its impact on companies and their bottom lines, as well.

Chapter 2

Literature Review

ROI Analysis

To invest in ESG, companies must understand how it impacts their company earnings and the return on investment (ROI). According to a study by McKinsey & Company, ESG can create value for a firm in five ways, per Henisz (2019). ESG initiatives can create top line growth by helping firms expand within existing markets, enter new markets, and gain trust and support from governing bodies. ESG can also help a company reduce operating costs. McKinsey research found that up to 60 percent of operating costs can be cut due to ESG initiatives. Additionally, by implementing ESG initiatives and protocols, companies can avoid regulatory and legal interventions. ESG can also improve worker efficiency and retention, as ESG initiatives aid in creating a positive and safe workspace. Finally, ESG can help companies optimize investments by pushing them in a more sustainable direction that avoids future ESG risks. With each of these five areas of value generation, the most efficient way to generate value from ESG is being able to recognize opportunities where ESG can be utilized.

Focusing more specifically on financial performance, there is some empirical evidence that ESG plays a role in improved performance. In a study conducted by Whelan et. al. (2021) and the NYU Stern Center for Sustainable Business, they analyzed over 1,000 research papers between 2015 and 2020 to understand the financial impact of ESG. Regarding corporate financial performance, 58 percent of studies showed there was a positive relationship between

ESG and financial performance, 13 percent were neutral, 21 percent had mixed results, and only 8 percent showed a negative relationship. Similarly, regarding investment financial performance, it was found that 59 percent of ESG investment studies resulted in similar or better financial performance, while only 14 percent had decreased performance. With this, we can see that ESG initiatives can generate improved financials for both corporations and investors. In regard to timing, ESG investments tend to see long-term returns, rather than short-term. Amling (2022) states that most ESG investments “will require near-term investments to produce long-term results”. With this, companies should focus on long-term ESG investments to help them generate increased corporate earnings. It was also found by Amling (2022) that consumers can have a huge impact on a company’s ROI from ESG investments. Considering this, the awareness and publicity behind ESG can play a huge role in the returns a company can achieve. Overall, there is evidence that ESG can provide benefits for companies and investors and help them increase their returns in the long-term. However, while ESG has potential to contribute to increased company earnings, it can be difficult for investors to fully understand a firm’s ESG value as ESG ratings face a multitude of shortcomings that prevent them from achieving its full purpose of disclosure.

Current Issues with ESG Ratings

As ESG ratings have increased in popularity, issues within the rating industry have become very apparent. Among their flaws, universal inconsistency dominates. The inconsistencies appear in both the individual ratings and among different rating agencies. ESG ratings demonstrate unreliability and inaccuracy due to poor quality of data used. Jonsdottir et al. (2022) conducted a study and found that ESG data lacks in the areas of materiality, accuracy,

reliability, and comparability. A deficiency in rating standardization leads to a difference in measures and metrics used in each rating. Inconsistency also stems from a lack of available information. Zumente and Lāce (2021) conducted a study that revealed 72 percent of companies do not have an external score available. A lack in information about a company certainly lowers the reliability of the company's ESG rating and potentially prevents a rating from being produced all together. As inconsistencies within the individual rating rise, it's apparent that issues are present in more than just the rating itself. Divergence can also be found among the rating agencies that produce the ratings, causing a broader discrepancy.

Divergence is seen between rating agencies and their ESG ratings, therefore leading to a further lack in comparability and consistency. Berg et al. (2022) found that ESG scores produced by different rating agencies greatly differ. The team studied six rating agencies, including KLD, Sustainalytics, Moody's ESG, S&P Global, Refinitiv, and MSCI. They found that the correlation between each agency's ESG rating ranges between 0.38 and 0.71. The root cause of the divergence is primarily due to a differentiation in scope, as well as dissimilar measurements utilized to calculate each rating. Based on this study, rating agencies take distinctive information into account causing a difficulty in pinpointing a single rating. Larcker et al. (2022) also displayed evidence that the main factor of the divergence is the inconsistency of information utilized to calculate the scores. For example, based on an article by Team IRIS CARBON (2023), the five top agencies each have a unique method to calculate their rating. Bloomberg collects data through CSR reports, annual reports, websites, public sources, and communication with the company. They use 120 indicators that include environmental, social, and governance factors like carbon emissions, climate change impact, pollution, waste disposal, renewable energy, resource depletion, supply chain, political contributions, discrimination, diversity,

community relations, human rights, cumulative voting, executive compensation, shareholder rights, takeover defense, staggered boards, and independent directors. They rate on a scale of 0-100. In another case, MSCI collects data from a variety of databases and focuses on 37 key ESG issues. They rate on a scale of AAA to CCC. Further, with Refinitiv's method, they use 630 ESG measures and focus on categories including emissions, environmental product innovation, human rights, and shareholders. The score reflects the company's ESG data framework, ESG performance, commitment, and effectiveness. They rate on a scale of A+ to F. On the other hand, S&P Global awards points based on the availability, quality, relevance, and performance of ESG, based on public metrics. They use a scale from 0-100. Finally, Sustainalytics, covers over 70 indicators focused on preparedness, disclosure, and performance. They use both quantitative and qualitative assessments and utilize a scale of 100. Based on this background, it's apparent that agencies are using important measures, but the information and its sources differ. This provides insight into why each rating agency produces different scores. However, Liu (2022) discovered that, as disclosure of ESG information increases, the divergence between the agencies' ESG ratings decreases. In other words, as the information available to the public increases, rating agencies can better analyze and incorporate information into their ratings. In a study conducted by Utz (2022), it was found that ESG ratings react to corporate scandals. The ratings drop following the event, but they quickly rebound. This study proves that more information can help improve the ratings, especially if a specific standard is set to measure the scandal in relation to the timeliness and extent of the rating adjustment. More information positively impacts the accuracy of ESG ratings.

The accuracy of ESG ratings in correctly reflecting a company's performance within environmental, social, and governance aspects is critical to achieve their intended outcome.

Inaccurate ESG ratings increase risk for investors and deter them from ESG investments.

Avramov et al. (2022) found that uncertainty in ESG ratings leads to a higher market risk, a higher market premium, and lower investor demand. With this, it suggests that investors are less likely to be involved in ESG investments and prioritize ESG in their portfolios if the ratings they rely upon are inconsistent and inaccurate.

Corporate Scandals

There are a multitude of studies showing that ESG ratings among different rating agencies face instances of inaccurate representations of a firm's ESG performance. Over the past few decades, a variety of companies have been involved in different ESG risk incidents. One of the most impactful ESG incidents was the Enron scandal in 2001, as this became a prime example for the pressing need of ESG recognition, support, and consistency. Devoid of appropriate governance, the company participated in accounting manipulation practices that resulted in an \$87.5 billion overstatement of revenue across four years. All the while, the company was actually on the brink of bankruptcy, therefore deceiving investors of Enron's actual performance. According to Stern (2022) and Flesher (2021), some more recent ESG risk incidents include the Volkswagen emissions scandal in 2015, Unilever's Fair & Lovely controversy in 2020, and H&M's greenwashing scandal in 2022. In 2015, the Environmental Protection Agency (EPA) found that Volkswagen was selling cars with defective devices that emitted pollutants 40 times above the legal limit. Unilever's incident involved discriminatory marketing among their whitening cream line "Fair & Lovely". Finally, in 2022, H&M was found to have misled consumers about the sustainability of their products.

The previous study by Utz (2022) utilizing data from 2004 to 2014 found that retrospective ESG assessments from Refinitiv (formerly ASSET4) have proven to appropriately reflect a firm's performance within ESG when it comes to their reaction to ESG risk incidents. However, since then, there have not been additional studies done to investigate whether ESG ratings have continued to develop and improve. Given the increase in the social and political presence of ESG, the ratings may react quite differently to risk incidents a decade later, as rating agencies should have adjusted their ratings to fit the evolving social perspective and public standards. ESG ratings are an important resource for investors and serve as a great incentive for large corporations, though it's important to recognize the lack of accuracy and needed standardization of these ratings. The study conducted by Utz (2022) provides a lot of valuable information to investors, however, given the ESG developments over past 10 years, the data must be updated to understand how these ratings have evolved. Accordingly, this paper will aim to address whether Refinitiv ESG scores have become more sensitive over the past decade to corporate ESG risk incidents by analyzing the Refinitiv ESG Combined Scores before and after an incident provided by RepRisk data.

Chapter 3

Methodology

To understand the evolution of ESG ratings and how they change following ESG risk incidents over the past decade, my study analyzes corporate scandals over an eight-year period and the company's ESG rating the year before and after the scandal. This study will test the

rating change from the year before and year after, analyzing if the change following the incidents becomes larger, and therefore more sensitive, in the latter years. The size of the scandal will be controlled by utilizing the changes in stock price before and after the scandal. More specifically, I will be utilizing the cumulative abnormal returns (CAR) as the control. This study is important in helping both investors and firms understand how ESG ratings have continued to evolve, improve, and more accurately reflect true ESG performance. For data collection, I will be utilizing RepRisk incident data and Refinitiv ESG Combined Scores. According to RepRisk, they specialize in ESG and business conduct risk incidents by collecting data about events and issues from a variety of public sources and stakeholders.

From RepRisk, I have collected 490 risk incidents between the years 2013 and 2021 from U.S. based, publicly traded companies. With these incidents, I only collected one scandal from each year. Some companies may have had multiple scandals in one year which may generate some noise in the data as my scandal size control utilized CAR. The following tables provide further insight into the sample I utilized in the study.

Table 1: Industry Count

Industry	Count of Industry
Construction	3
Finance, Insurance, and Real Estate	69
Manufacturing	163
Mining	20
Public Administration	9
Retail Trade	68
Services	45
Transportation, Communications, Electric, Gas, and Sanitary Services	97
Wholesale Trade	6
#N/A	9
Grand Total	489

Table 2: Average CAR by Industry

Industry	Average CAR
Construction	-0.397836149
Finance, Insurance, and Real Estate	0.23195329
Manufacturing	-0.085556531
Mining	0.557906384
Public Administration	-0.974360231
Retail Trade	-0.096351147
Services	-0.584662953
Transportation, Communications, Electric, Gas, and Sanitary Services	-0.140827733
Wholesale Trade	-0.128996884
#N/A	-1.613186123
(blank)	0.763152063
Grand Total	-0.116158684

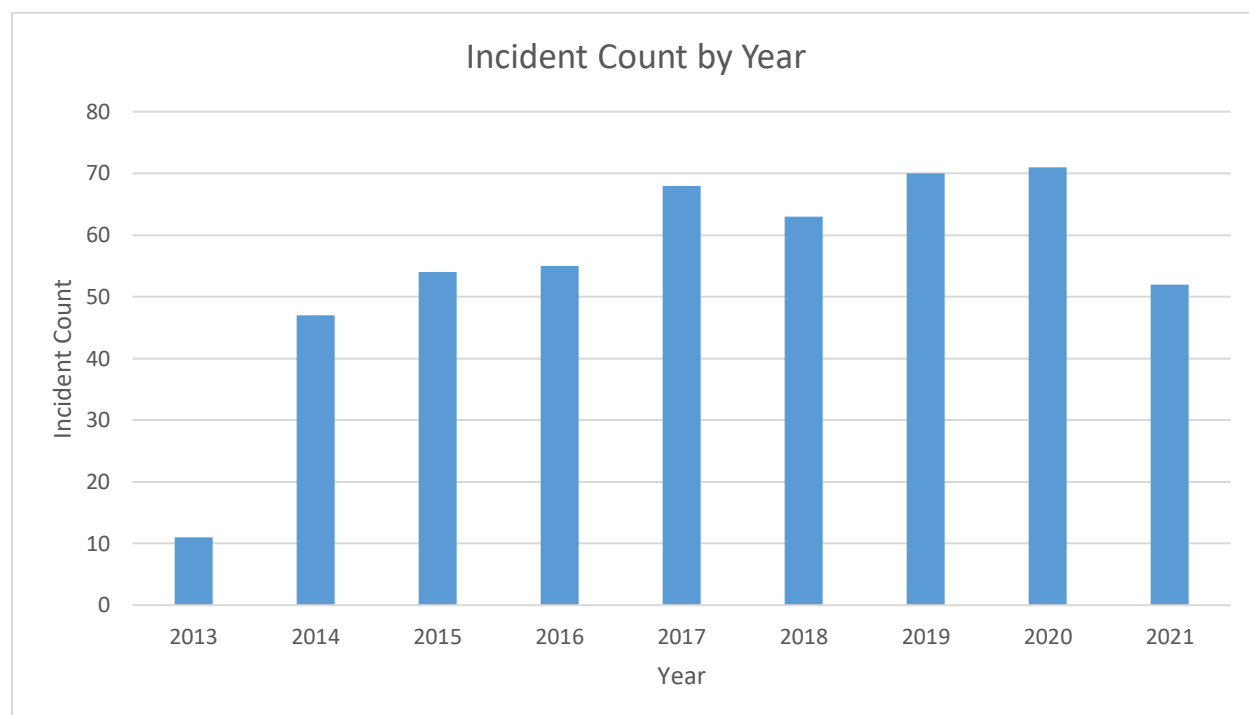


Figure 1: Incident Year Distribution

After collecting the incident data, I utilized Refinitiv to gather the ESG scores. According to LSEG, Refinitiv, which was acquired by LSEG in 2021, is a global financial markets

infrastructure and data provider. As discussed by Refinitiv, they calculate their ESG Scores using 10 different ESG topics. Under the Environmental category, they analyze resource use, emissions, and innovation. In the Social category, they focus on workforce, human rights, community, and product responsibility. Within Governance, they use management, shareholders, and CSR strategy. They utilize these 10 categories to calculate 630 ESG metrics at the company-level, then use the 186 most relevant metrics to compute the company's overall ESG score. From there, they also compute an ESG Combined Score that takes public ESG controversies into account by calculating the score "as the weighted average of the two component scores per fiscal period, with recent controversies reflected in the latest complete period".

I utilized their ESG Combined Scores, as well as the individual score for environmental, social, and governance, in the year prior to and following the stated incident. With this data, I faced some tradeoffs. Due to time constraints, I was only able to utilize the data from Refinitiv, therefore the results of this study will only apply to this specific rating agency. Given the ESG rating agency disagreement previously discussed in Chapter 2, the findings from this study may not accurately represent all ESG rating agencies, as each agency differs in rating approach and production. However, as found in Utz (2022), Refinitiv ESG Scores have been proven to accurately represent corporate scandals and a firm's ESG performance.

Following the data collection, I estimated a regression model using my data. In this regression model, I not only estimated time trends on changes in overall ESG ratings but also the various components of the ratings: environmental, social, and governance. Ultimately, time constraints limited my ability to control for all possible determinants of both changes in ESG ratings and economic trends, so I focused on controlling for the magnitude of the risk incident as

a summary measure. Accordingly, my model may not fully control for the effects of scandal size.

The following regressions were used in conducting an analysis of the study:

$$\Delta ESG = \beta_0 + \beta_1 Time + \beta_2 CAR + \varepsilon \quad (1)$$

where ΔESG represents the change in the Refinitiv ESG Combined Score, T represents the year of the incident (e.g., 2013, 2021), and CAR represents the cumulative abnormal return based on the stock prices before and after the ESG incident. In other words, the regression represents the change in ESG as a function of the passage of time and the stock market reaction to the ESG incident during year T .

$$\Delta E = \beta_0 + \beta_1 Time + \beta_2 CAR + \varepsilon \quad (2)$$

where ΔE represents the change in the individual Refinitiv Environmental Score. All other variables remain the same as Equation 1.

$$\Delta S = \beta_0 + \beta_1 Time + \beta_2 CAR + \varepsilon \quad (3)$$

where ΔS represents the change in the individual Refinitiv Social Score. All other variables remain the same as Equation 1.

$$\Delta G = \beta_0 + \beta_1 Time + \beta_2 CAR + \varepsilon \quad (4)$$

where ΔG represents the change in the individual Governance Environmental Score. All other variables remain the same as Equation 1.

$$\Delta ESG = \beta_0 + \beta_1 Time + \beta_2 CAR + \varepsilon \quad (5)$$

where the equation represents the same variables as Equation 1. However, the data utilized to run the regression was determined by the industries with the largest representation within the sample.

Chapter 4

Results

The first set of results describes the trend over time in the response of ESG ratings to corporate risk incidents. Table 3 reports the results from the estimation of my main regression model. The coefficient estimate on “Incident Year” captures the time trend in ESG rating changes and is negative with a statistically significant t statistic of -3.98. Based on this result, it appears that the overall ESG rating has become more sensitive to corporate risk incidents in more recent years, therefore experiencing larger fluctuations following an incident.

Table 3: The results of the change in ESG ratings as a function of the passage of time and the stock market reaction to the ESG incident in year T.

Overall ESG Rating Regression Results						
Dep. Variable:	chg_esg	R-squared:	0.032			
Model:	OLS	Adj. R-squared:	0.028			
Method:	Least Squares	F-statistic:	7.945			
No. Observations:	490	Prob (F-statistic):	0.000402			
Df Residuals:	487	Log-Likelihood:	-937.96			
Df Model:	2	AIC:	1882.			
Covariance Type:	nonrobust	BIC:	1894.			
	coef	std err	t	P> t	[0.025	0.975]
Intercept	264.7838	66.374	3.989	0.000	134.369	395.199
Q("Incident Year")	-0.1311	0.033	-3.984	0.000	-0.196	-0.066
car	-0.0011	0.024	-0.046	0.963	-0.047	0.045
Omnibus:	18.311	Durbin-Watson:	2.039			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	30.469			
Skew:	-0.261	Prob(JB):	2.42e-07			
Kurtosis:	4.104	Cond. No.	1.80e+06			

Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

[2] The condition number is large, 1.8e+06. This might indicate that there are strong multicollinearity or other numerical problems.

The second set of results describes the trend over time in the response of the individual Environmental rating to corporate risk incidents. Table 4 reports the results from the estimation of my individual Environmental rating regression model. The coefficient estimate on "Incident

Year” captures the time trend in Environmental rating changes and is negative with a statistically insignificant t statistic of -0.078. Based on this result, it appears that I cannot make the conclusion that Environmental ratings have become more sensitive to corporate risk incidents in more recent years.

Table 4: The results of the change in Environmental ratings as a function of the passage of time and the stock market reaction to the ESG incident in year T.

Individual Environmental Rating Regression Results						
Dep. Variable:	chg_e	R-squared:	0.000			
Model:	OLS	Adj. R-squared:	-0.004			
Method:	Least Squares	F-statistic:	0.05625			
No. Observations:	490	Prob (F-statistic):	0.945			
Df Residuals:	487	Log-Likelihood:	-898.11			
Df Model:	2	AIC:	1802.			
Covariance Type:	nonrobust	BIC:	1815.			
	coef	std err	t	P> t	[0.025	0.975]
Intercept	5.3726	61.190	0.088	0.930	-114.857	125.602
Q(“Incident Year”)	-0.0024	0.030	-0.078	0.938	-0.062	0.057
car	0.0070	0.022	0.323	0.747	-0.036	0.050
Omnibus:	89.089	Durbin-Watson:	1.697			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	189.329			
Skew:	0.976	Prob(JB):	7.72e-42			
Kurtosis:	5.337	Cond. No.	1.80e+06			

Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

[2] The condition number is large, 1.8e+06. This might indicate that there are strong multicollinearity or other numerical problems.

The third set of results describes the trend over time in the response of the individual Social rating to corporate risk incidents. Table 5 reports the results from the estimation of my individual Social rating regression model. The coefficient estimate on “Incident Year” captures the time trend in Social rating changes and is negative with a statistically insignificant t statistic of -0.914. Based on this result, it appears that I cannot make the conclusion that Social ratings have become more sensitive to corporate risk incidents in more recent years.

Table 5: The results of the change in Social ratings as a function of the passage of time and the stock market reaction to the ESG incident in year T.

Individual Social Rating Regression Results						
Dep. Variable:	chg_s		R-squared:	0.003		
Model:	OLS		Adj. R-squared:	-0.002		
Method:	Least Squares		F-statistic:	0.6291		
No. Observations:	490		Prob (F-statistic):	0.534		
Df Residuals:	487		Log-Likelihood:	-791.66		
Df Model:	2		AIC:	1589.		
Covariance Type:	nonrobust		BIC:	1602.		
	coef	std err	t	P> t	[0.025	0.975]
Intercept	45.5379	49.241	0.925	0.356	-51.214	142.290
Q(“Incident Year”)	-0.0223	0.024	-0.914	0.361	-0.070	0.026
car	0.0106	0.017	0.610	0.542	-0.024	0.045
Omnibus:	58.522		Durbin-Watson:	1.833		
Prob(Omnibus):	0.000		Jarque-Bera (JB):	89.629		
Skew:	0.790		Prob(JB):	3.45e-20		
Kurtosis:	4.376		Cond. No.	1.80e+06		

Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

[2] The condition number is large, 1.8e+06. This might indicate that there are strong multicollinearity or other numerical problems.

The fourth set of results describes the trend over time in the response of the individual Governance rating to corporate risk incidents. Table 6 reports the results from the estimation of my individual Governance rating regression model. The coefficient estimate on “Incident Year” captures the time trend in Governance rating changes and is negative with a statistically insignificant t statistic of -1.282. Based on this result, it appears that I cannot make the conclusion that Governance ratings have become more sensitive to corporate risk incidents in more recent years.

Table 6: The results of the change in Governance ratings as a function of the passage of time and the stock market reaction to the ESG incident in year T.

Individual Governance Regression Results						
Dep. Variable:	chg_g	R-squared:	0.004			
Model:	OLS	Adj. R-squared:	-0.000			
Method:	Least Squares	F-statistic:	0.9758			
No. Observations:	490	Prob (F-statistic):	0.378			
Df Residuals:	487	Log-Likelihood:	-1023.9			
Df Model:	2	AIC:	2054.			
Covariance Type:	nonrobust	BIC:	2066.			
	coef	std err	t	P> t	[0.025	0.975]
Intercept	101.7058	79.098	1.286	0.199	-53.709	257.121
Q(“Incident Year”)	-0.0503	0.039	-1.282	0.200	-0.127	0.027
car	-0.0171	0.028	-0.611	0.542	-0.072	0.038

Omnibus:	31.086	Durbin-Watson:	1.978
Prob(Omnibus):	0.000	Jarque-Bera (JB):	73.073
Skew:	0.318	Prob(JB):	1.36e-16
Kurtosis:	4.782	Cond. No.	1.80e+06

Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

[2] The condition number is large, 1.8e+06. This might indicate that there are strong multicollinearity or other numerical problems.

The fifth set of results describes the trend over time in the response of ESG ratings to corporate risk incidents in the Manufacturing industry. Table 7 reports the results from the estimation of one of my industry-specific regression models. The coefficient estimate on “Incident Year” captures the time trend in ESG rating changes and is negative with a statistically significant t statistic of -2.689. Based on this result, it appears that ESG ratings in the Manufacturing industry have become more sensitive to corporate risk incidents in more recent years, therefore experiencing larger fluctuations following an incident.

Table 7: The results of the change in ESG ratings as a function of the passage of time and the stock market reaction to the ESG incident in year T in the Manufacturing industry.

Overall ESG Rating Regression Results in the Manufacturing industry						
Dep. Variable:	chg_esg	R-squared:	0.045			
Model:	OLS	Adj. R-squared:	0.033			
Method:	Least Squares	F-statistic:	3.755			
No. Observations:	162	Prob (F-statistic):	0.0255			
Df Residuals:	159	Log-Likelihood:	-320.74			
Df Model:	2	AIC:	647.5			
Covariance Type:	nonrobust	BIC:	656.7			
	coef	std err	t	P> t	[0.025	0.975]
Intercept	333.6078	123.911	2.692	0.008	88.884	578.332
Q("Incident Year")	-0.1652	0.061	-2.689	0.008	-0.286	-0.044
car	-0.0223	0.043	-0.520	0.604	-0.107	0.062
Omnibus:	9.776	Durbin-Watson:	2.055			
Prob(Omnibus):	0.008	Jarque-Bera (JB):	13.507			
Skew:	-0.360	Prob(JB):	0.00117			
Kurtosis:	4.218	Cond. No.	1.80e+06			

Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

[2] The condition number is large, 1.80e+06. This might indicate that there are strong multicollinearity or other numerical problems.

The sixth set of results describes the trend over time in the response of ESG ratings to corporate risk incidents in the Transportation, Communications, Electric, Gas, and Sanitary Services industry. Table 8 reports the results from the estimation of one of my industry-specific

regression models. The coefficient estimate on “Incident Year” captures the time trend in ESG rating changes and is negative with a statistically significant t statistic of -2.453. Based on this result, it appears that ESG ratings in the Transportation, Communications, Electric, Gas, and Sanitary Services industry have become more sensitive to corporate risk incidents in more recent years, therefore experiencing larger fluctuations following an incident.

Table 8: The results of the change in ESG ratings as a function of the passage of time and the stock market reaction to the ESG incident in year T in the Transportation, Communications, Electric, Gas, and Sanitary Services industry.

Overall ESG Rating Regression Results in the Transportation, Communications, Electric, Gas, and Sanitary Services industry						
Dep. Variable:	chg_esg	R-squared:	0.063			
Model:	OLS	Adj. R-squared:	0.043			
Method:	Least Squares	F-statistic:	3.139			
No. Observations:	97	Prob (F-statistic):	0.0479			
Df Residuals:	94	Log-Likelihood:	-174.60			
Df Model:	2	AIC:	355.2			
Covariance Type:	nonrobust	BIC:	362.9			
	coef	std err	t	P> t	[0.025	0.975]
Intercept	333.4838	135.902	2.454	0.016	63.647	603.321
Q(“Incident Year”)	-0.1652	0.067	-2.453	0.016	-0.299	-0.031
car	-0.0754	0.064	-1.173	0.244	-0.203	0.052
Omnibus:	21.803	Durbin-Watson:	1.686			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	31.415			
Skew:	-1.032	Prob(JB):	1.51e-07			
Kurtosis:	4.874	Cond. No.	1.82e+06			

Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

[2] The condition number is large, 1.82e+06. This might indicate that there are strong multicollinearity or other numerical problems.

The seventh set of results describes the trend over time in the response of ESG ratings to corporate risk incidents in the Finance, Insurance, and Real Estate industry. Table 9 reports the results from the estimation of one of my industry-specific regression models. The coefficient estimate on “Incident Year” captures the time trend in ESG rating changes and is negative with a statistically significant t statistic of -2.742. Based on this result, it appears that ESG ratings in the Finance, Insurance, and Real Estate industry have become more sensitive to corporate risk incidents in more recent years, therefore experiencing larger fluctuations following an incident.

Table 9: The results of the change in ESG ratings as a function of the passage of time and the stock market reaction to the ESG incident in year T in the Finance, Insurance, and Real Estate industry.

Overall ESG Rating Regression Results in the Finance, Insurance, and Real Estate industry						
Dep. Variable:	chg_esg	R-squared:	0.107			
Model:	OLS	Adj. R-squared:	0.080			
Method:	Least Squares	F-statistic:	3.973			
No. Observations:	69	Prob (F-statistic):	0.0235			
Df Residuals:	66	Log-Likelihood:	-123.25			
Df Model:	2	AIC:	252.5			
Covariance Type:	nonrobust	BIC:	259.2			
	coef	std err	t	P> t	[0.025	0.975]
Intercept	439.9727	160.264	2.745	0.008	119.996	759.949
Q(“Incident Year”)	-0.2179	0.079	-2.742	0.008	-0.376	-0.059
car	-0.0367	0.040	-0.922	0.360	-0.116	0.043

Omnibus:	1.445	Durbin-Watson:	2.290
Prob(Omnibus):	0.486	Jarque-Bera (JB):	0.789
Skew:	-0.125	Prob(JB):	0.674
Kurtosis:	3.460	Cond. No.	1.82e+06

Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

[2] The condition number is large, 1.82e+06. This might indicate that there are strong multicollinearity or other numerical problems.

The eighth set of results describes the trend over time in the response of ESG ratings to corporate risk incidents in the Retail Trade industry. Table 10 reports the results from the estimation of one of my industry-specific regression models. The coefficient estimate on “Incident Year” captures the time trend in ESG rating changes and is negative with a statistically insignificant t statistic of -1.515. Based on this result, it appears that I cannot make the conclusion that ESG ratings in the Retail Trade industry have become more sensitive to corporate risk incidents in more recent years.

Table 10: The results of the change in ESG ratings as a function of the passage of time and the stock market reaction to the ESG incident in year T in the Retail Trade industry.

Overall ESG Rating Regression Results in the Retail Trade industry						
Dep. Variable:	chg_esg	R-squared:	0.051			
Model:	OLS	Adj. R-squared:	0.022			
Method:	Least Squares	F-statistic:	1.743			
No. Observations:	68	Prob (F-statistic):	0.183			
Df Residuals:	65	Log-Likelihood:	-136.03			
Df Model:	2	AIC:	278.1			
Covariance Type:	nonrobust	BIC:	284.7			
	coef	std err	t	P> t	[0.025	0.975]
Intercept	335.9003	221.479	1.517	0.134	-106.424	778.225
Q("Incident Year")	-0.1663	0.110	-1.515	0.135	-0.386	0.053
car	0.0845	0.068	1.235	0.221	-0.052	0.221
Omnibus:	0.367	Durbin-Watson:	1.918			
Prob(Omnibus):	0.833	Jarque-Bera (JB):	0.084			
Skew:	-0.072	Prob(JB):	0.959			
Kurtosis:	3.095	Cond. No.	2.01e+06			

Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

[2] The condition number is large, 2.01e+06. This might indicate that there are strong multicollinearity or other numerical problems.

Based on the previously stated results of multiple regressions, it has been found the ESG ratings have become more sensitive to corporate risk incidents in more recent years. However, no conclusions can be made regarding the individual E, S, and G ratings. Regarding industry

specifics, ESG ratings were found to have become more sensitive to corporate risk incidents in more recent years in industries including 1) Manufacturing, (2) Transportation, Communications, Electric, Gas, and Sanitary Services, (3) Finance, Insurance, and Real Estate. The fourth industry, Retail Trade industry, did not have statistically significant results, therefore no conclusions can be made about the trend in ESG rating changes in that industry. Ultimately, the trend in ESG rating change in recent years has led to larger changes in ratings following a corporate risk incident.

Chapter 5

Conclusion

This study examines whether and to what extent ESG ratings have become more sensitive to corporate risk incidents in recent years. Previous studies have shown several benefits that result from ESG initiatives for firms. While the divergence of ratings between different agencies has created a lack in uniformity of these ratings for investors, the study has shown that an individual firm's rating, the Refinitiv Combine ESG Score, has become more sensitive to risk incidents in recent years, therefore providing more accurate insight into the specific firm. This result may be due to the increase in awareness surrounding ESG, which has led to an increased pressure on firms from consumers, investors, and the government for companies to hold ESG to a higher standard. There has also been an increase in political coverage on the topic which has led to increased awareness on the topic. Future studies can investigate the correlation between the type of publicity ESG is receiving and how the rating changes during that given period. Considering the divergence of ESG ratings from different rating agencies, future studies can also utilize similar approaches to understand how other ESG rating agencies' ratings have evolved in their reaction to corporate risk incidents. Future studies can also attach different variables to the regression, including the extent of the rating change based on the size of the scandal, as well as how fast the rating changes following an incident. The study exemplifies the evolution of ESG ratings over the past decade, as it has been proven that they have become more sensitive to

corporate risk incidents in more recent years. These results display the importance in understanding ESG rating evolution and its continued development.

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