

## The impact of ESG risk disagreements on stock returns and volatility in Europe

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### Abstract

This study examines the impact of Environmental, Social, and Governance risk disagreements on the annual average level and volatility of daily stock returns. By employing a proxy for rating disagreement based on ESG risk ratings from two leading providers, the analysis reveals that ESG disagreements significantly increase stock return volatility. This finding remains robust across different methods of measuring rating disagreement. Furthermore, industry-adjusted ESG rating disagreement is shown to exacerbate volatility. Addressing a gap in the literature regarding the effects of ESG risk disagreement on stock market behavior, this study enhances understanding of how inconsistencies among ESG rating agencies influence financial markets. The research utilizes a filtered sample of 1005 publicly listed firms with available ESG ratings, focusing on data from the most recent year. The methodology combines cross-sectional analysis and volatility modeling to ensure rigorous examination. The findings provide critical insights for investors, emphasizing the necessity of evaluating differences in ESG assessments when making investment decisions. These results also underscore the broader implications for asset pricing and risk management in financial markets.

**Keywords:** Asset pricing; ESG risk; rating disagreement; stock returns; volatility

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## 1. INTRODUCTION

With increasing concerns about sustainable development and climate change, companies have begun to prioritize environmental, social, and governance (ESG) issues. Investors are also placing greater emphasis on ESG factors in their investment decisions (Shakil, 2021). As such, investors are becoming more concerned with ESG risks, which can negatively affect share returns and increase volatility (Aouadi and Marsat, 2018). In response to this, various providers calculate ESG ratings, often using different methodologies and reporting on different scales (Dai & Wang, 2024). However, few providers focus specifically on ESG risk, with most evaluations centering on companies' ESG performance (Apicella et al., 2025).

The existing literature has explored the impact of ESG scores on companies, suggesting that firms benefit from investing in ESG initiatives. Studies indicate that companies with higher ESG scores tend to experience better stock returns (Hong and Kacperczyk, 2009; Edmans, 2011; Diaz et al., 2021; Ferrat et al., 2022; Li et al., 2023) and lower volatility (Jo and Na, 2012; Sassen et al., 2016; Shakil, 2021; Zhou and Zhou, 2022). Conversely, Tasnia et al. (2021) identified a direct relationship between ESG scores and stock price volatility. Additionally, Luo (2022) observed that companies with lower ESG scores tend to achieve higher returns compared to their higher-scoring counterparts. However, these studies predominantly focus on the analysis of a single rating provider, such as MSCI (Ferrat et al., 2022; Zhou and Zhou, 2022), KLD (Jo and Na, 2012), Refinitiv (Sassen et al., 2016; Tasnia et al., 2021; Shakil, 2021; Luo, 2022), and Wind (Li et al., 2023). Among the studies mentioned, only Shakil (2021) specifically examined the impact of ESG risk on volatility, finding that ESG controversies moderate the relationship between ESG performance and volatility. Similarly, Krüger (2015) found that investors tend to react negatively to adverse ESG news.

While the majority of the existing literature has focused on the impact of ESG performance on stock returns and volatility, only a few studies have investigated the effects of disagreements over ESG performance ratings (Gibson Brandon et al., 2021; Avramov et al., 2022; Berg et al., 2022; Tan and Pan, 2023). Gibson Brandon et al. (2021) explored the relationship between stock returns and ESG rating disagreements, concluding that stock returns are positively related to ESG rating disagreements. Avramov et al. (2022) demonstrated that rating disagreements contribute to higher perceived market risk, a larger market premium, and reduced investor demand. Furthermore, Tan and Pan (2023) found that ESG rating disagreement has a significantly inverse effect on both stock returns and volatility.

### 1.1. Purpose of study

This study examines the ESG ratings provided by two firms, Refinitiv and Sustainalytics, both of which assess ESG risks in addition to performance metrics. Refinitiv's ESG controversies score reflects a company's exposure to environmental, social, and governance controversies, as well as negative events reported in the media (Dobrick et al., 2025; Wang et al., 2024). On the other hand, Sustainalytics' ESG risk rating measures a company's exposure to industry-specific ESG risks. Given the differences in the calculation methods of these two ratings, this study investigates the impact of ESG risk disagreements on the annual average level and volatility of daily stock returns in European markets. Using the standard deviation of pairwise percentile rankings across Refinitiv and Sustainalytics as a proxy for rating disagreement, the analysis finds that ESG disagreements significantly influence stock return volatility. These results remain robust across different methods of measuring rating disagreement. Additionally, industry-adjusted ESG rating disagreement further amplifies volatility. This study contributes to the existing literature by examining the effects of ESG risk disagreements on stock return levels and volatility, distinguishing itself from prior studies that focus on ESG performance disagreements (Thompson, 2025; Gibson, Brandon et al., 2021; Avramov et al., 2022; Berg et al., 2022; Tan and Pan, 2023).

## 2. METHOD AND MATERIALS

### 2.1. Population and data

The original sample considered for the analysis consisted of all European-listed companies that were included in both the Refinitiv and Sustainalytics databases. After data filtration, the sample has 1005 companies with available ESG scores. The baseline year for this analysis is 2022, which is the most recent year.

Table 1, the geographical distribution of companies, shows that the sample is predominantly from Germany, France, Sweden, and Switzerland, with almost 50% of the companies headquartered there.

**Table 1**

*Classification of companies by country*

Country	Freq.	Percent
Austria	30	2.99
Belgium	43	4.28
Cyprus	1	0.10
Czech Republic	3	0.30
Denmark	39	3.88
Finland	33	3.28
France	123	12.24
Germany	138	13.73
Greece	22	2.19
Hungary	5	0.50
Ireland	43	4.28
Italy	74	7.36
Luxembourg	20	1.99
Malta	3	0.30
Netherlands	63	6.27
Norway	37	3.68
Poland	32	3.18
Portugal	11	1.09
Romania	1	0.10
Spain	60	5.97
Sweden	115	11.44
Switzerland	109	10.85
Total	1005	100.00

Source: Authors' research

From Table 2, the top three industries represented were Industrials, Financials, and Consumer Cyclical, which together comprised almost 50% of the observations.

**Table 2**

*Classification of companies by industry*

Industry	Freq.	Percent
Academic & Educational Services	1	0.10
Basic Materials	92	9.15
Consumer Cyclical	142	14.13
Consumer non-cyclical	72	7.16
Energy	41	4.08
Financials	147	14.63
Healthcare	91	9.05
Industrials	202	20.10
Real Estate	58	5.77
Technology	118	11.74
Utilities	41	4.08
Total	1005	100.00

Source: Authors' research

## 2.2. Data analysis

The ESG data sample is based on two rating providers, namely Refinitiv and Sustainalytics. The Refinitiv ESG Controversies Score is calculated based on 23 ESG controversy topics. During the year, if a scandal occurs in the media, the company involved is penalized, and this affects grading. The Sustainalytics ESG risk rating

measures a company's exposure to industry-specific ESG risks and how well a company manages these risks. The Sustainalytics ESG Risk Ratings are categorized across five risk levels: negligible (0-10), low (10-20), medium (20-30), high (30-40), and severe (40+), whereas Refinitiv applies a scale from 0 to 100. Therefore, the lack of a common methodology determined the creation of a proxy for rating disagreement between these two rating providers.

Following the measurement of Avramov et al. (2022) and Tan and Pan (2023), the disagreement over the ESG rating was calculated using the standard deviation of the pairwise percentile ranking among the rater pairs. First, all companies were sorted according to the original rating covered by both providers and the percentile rank. Then, for each company, the pairwise rating was calculated as  $\frac{|r_{i,A} - r_{i,B}|}{\sqrt{2}}$ , where  $r_{i,A}$  and  $r_{i,B}$  denote the ESG rank for company  $i$  from raters A (Refinitiv) and B (Sustainalytics), respectively. All variables used in the study are defined in Table 3, with symbols and descriptions.

**Table 3**  
*Variable selection*

Variable	Symbol	Definition
Return	RETURN	Annual average of daily stock returns. Daily stock returns were calculated as the natural logarithm of the price on day $t$ over the price on day $t-1$
Volatility	VOL	Annual standard deviation of daily stock returns
ESG disagreement score	ESG	Standard deviation of the pairwise percentile ranking among the rater pairs
Dividend yield	DY	Dividend per share/price per share
Return on assets	ROA	Income after taxes/total assets
Leverage	LEV	Long-term debt/total assets
Size	SIZE	Natural logarithm of total assets
Market-to-book value of equity	MTB	Market value of equity/book value of equity

*Source: Authors' research*

The regression equation used in this study is as follows:

$$y_i = \alpha + \beta_1 \times ESGDIS_i + \beta_2 \times DY_i + \beta_3 \times ROA_i + \beta_4 \times LEV_i + \beta_5 \times SIZE_i + \beta_6 \times MTB_i + \varepsilon_i,$$

Where the dependent variable  $y_i$  is the annual average level and volatility of daily stock returns, ESGDIS is the ESG disagreement, DY is the dividend yield, ROA is the return on assets, LEV is the leverage, SIZE is size, and MTB is the market-to-book value of equity. Company-specific variables are selected according to previous studies (Jo and Na, 2012; Sassen et al., 2016; Tasnia et al., 2020; Shakil, 2021).

The descriptive statistics of the variables are shown in Table 4. The average return is 0.05%, and the average volatility is 35.2%. The average ESG disagreement score is 25.1. Regarding the control variables, the average dividend yield is 2.7%. The average ROA is 4.3%, and the average leverage is 20.8%. The size and market-to-book value of equity mean values are approximately 6.4 billion USD and 2.95, respectively.

**Table 4**  
*Descriptive statistics*

Variable	Obs	Mean	Std. Dev.	Min	Max
RETURN	1005	.0005	.001	-.012	.004
VOL	1005	.352	.175	.11	4.135
ESGDIS	1005	.251	.176	0	.67
DY	1005	.027	.068	0	.2
ROA	1005	.043	.101	-2.064	.379
LEV	1005	.208	.152	0	.999
SIZE	1005	22.582	2.175	.007	28.728
MTB	1005	2.95	3.558	.018	34.29

*Source: Authors' research, using Stata*

Additionally, the descriptive statistics of the rating providers are also relevant (Table 5). Considering the minimum and maximum values of the scores, it is evident that Refinitiv uses the scale from 0 to 100, compared to Sustainalytics, which stops at 50. The standard deviation of scores is highest for Refinitiv, implying a greater spread in these particular scores.

**Table 5**

*Descriptive statistics on rating providers*

Variable	Obs	Mean	Std. Dev.	Min	Max
Refinitiv	1005	89.548	23.78	.439	100
Sustainalytics	1005	20.382	7.239	4.8	49.7

Source: Authors' research, using Stata

### 3. RESULTS

Estimates of the impacts of ESG risk disagreement on the average level and volatility of stock returns are presented in Table 6. The analysis begins with an investigation of the relationships between a company's ESG risk disagreement and volatility. Column (1) displays estimates of the impact of ESG disagreement in the absence of company-specific variables. Therefore, the rating of ESG risk disagreement has a direct impact on the volatility of stock returns: when the rating of ESG risk disagreement increases by one unit, the volatility increases by 0.137 units. Column (2) investigates the impact of ESG disagreement with company-specific variables. Similarly, when the rating of ESG risk disagreement increases by one unit, volatility increases by 0.11 units. Additionally, return on assets and leverage have a significant and inverse impact on volatility. A higher ROA means a profitable company, which is associated with lower volatility, as in Jo and Na (2012). Leverage has an inverse effect on volatility, as in Tasnia et al. (2021).

Going further, the relationship between a company's ESG risk disagreement and average level of stock returns is presented in Columns (3) and (4). The results show an insignificant effect of the disagreement of ESG risk on stock returns. In conclusion, disagreement about ESG risks has a significant impact only on volatility. Tan and Pan (2023) found that rating disagreement about ESG performance has a significantly inverse influence on both stock returns and volatility. Compared to them, this study obtains a different result in the context of ESG risks.

**Table 6**

*Regression results*

	(1) VOL	(2) VOL	(3) RETURN	(4) RETURN
ESGDIS	.137*** (.031)	.11*** (.03)	0 (0)	0 (0)
DY		-.085 (.078)		0 (.001)
ROA		-.384*** (.054)		0 (0)
LEV		.042 (.035)		-.002*** (0)
SIZE		-.01*** (.003)		0*** (0)
MTB		0 (.002)		0*** (0)
_cons	.318*** (.01)	.562*** (.062)	0 (0)	-.001*** (0)
Observations	1005	1005	1005	1005
R-squared	.019	.089	0	.07

Standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Source: Authors' research, using Stata.

Given that larger companies might be more complex, rating disagreements tend to be more frequent in large companies (Gibson, Brandon et al., 2021). As robustness checks, an interaction variable was introduced between ESG risk disagreement and the size of the company. The results remain robust in Table 7. The coefficient of the interaction term is statistically significant in both columns, indicating that the disagreement on the ESG risk rating increases volatility in larger companies.

**Table 7**

*Robustness checks (1)*

	(1) VOL	(2) VOL
ESGDIS*SIZE	.005*** (.001)	.004*** (.001)
DY		-.101 (.079)
ROA		-.398*** (.054)
LEV		.036 (.036)
MTB		.003* (.002)
_cons	.324*** (.009)	.333*** (.014)
Observations	1005	1005
R-squared	.013	.072

*Standard errors are in parentheses*  
\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

*Source: Authors' research, using Stata.*

Furthermore, Gibson Brandon et al. (2021) discovered that the correlations between ESG rating providers revealed significant industry variations and will be tested (Table 8). Thus, an industry-adjusted ESG rating disagreement was calculated. In this calculation, Thomson Reuters Business Classification (TRBC) was applied to sort the companies into 10 industries (Basic Materials, Consumer Cyclical, Consumer Non-Cyclical, Energy, Financials, Healthcare, Industrials, Real Estate, Technology, and Utilities). Only one company from the database provides Academic & Educational Services, so this industry is removed from the analysis.

For each of the 10 industries, the industry-specific disagreement rating was calculated as  $\sqrt{\frac{(r_{i,A} - \bar{r}_A)^2 + (r_{i,B} - \bar{r}_B)^2}{2}}$ , where  $r_{i,A}$  and  $r_{i,B}$  denote the ESG rank for company  $i$  from raters A (Refinitiv) and B (Sustainalytics), respectively, and  $\bar{r}_A$  and  $\bar{r}_B$  denote the industry average of the Refinitiv and Sustainalytics ranks. To obtain the industry-adjusted ESG rating disagreement, the industry-specific disagreement rating was subtracted from the company-specific disagreement rating calculated initially, as  $\frac{|r_{i,A} - r_{i,B}|}{\sqrt{2}}$ . The results remain robust, and the industry-adjusted rating of ESG risk disagreement has a direct impact on the volatility of stock returns.

**Table 8**

*Robustness checks (2)*

	(1) VOL	(2) VOL
ESGDIS adjusted	.138*** (.031)	.109*** (.031)
DY		-.085 (.078)
ROA		-.384*** (.054)
LEV		.042 (.035)
SIZE		-.01*** (.003)
MTB		0 (.002)
_cons	.318*** (.009)	.56*** (.062)
Observations	1004	1004
R-squared	.019	.089
<i>Standard errors are in parentheses</i>		
<i>*** p&lt;.01, ** p&lt;.05, * p&lt;.1</i>		

*Source: Authors' research, using Stata.*

#### 4. DISCUSSION

The analysis reveals that ESG risk disagreement significantly impacts stock return volatility. Specifically, the results show that when the level of ESG risk disagreement increases by one unit, the volatility of stock returns rises by 0.137 units in the baseline model. This relationship remains robust even when company-specific variables are incorporated, with the effect slightly decreasing to 0.11 units. This finding aligns with previous literature that highlights the role of ESG risk in influencing stock price volatility, especially when there is disagreement among ESG rating providers (Gibson Brandon et al., 2021; Avramov et al., 2022). The direct influence of ESG risk disagreement on volatility suggests that investors perceive greater uncertainty when ratings differ, amplifying stock price fluctuations.

Furthermore, the study finds that company-specific variables, such as return on assets (ROA) and leverage, also play a significant role in moderating volatility. The negative relationship between ROA and volatility is consistent with prior research (Jo and Na, 2012), indicating that more profitable firms tend to exhibit lower volatility. Similarly, the inverse effect of leverage on volatility, as observed in this study, is consistent with findings by Tasnia et al. (2021), who suggest that firms with higher leverage may be viewed as more stable, leading to lower perceived risk and, consequently, lower volatility.

When the relationship between ESG risk disagreement and the average level of stock returns is examined, the results show an insignificant effect. This suggests that while ESG disagreements influence the variability of stock prices, they do not have a direct impact on the average level of returns. This finding contrasts with studies that have explored the impact of ESG performance disagreements on stock returns, which generally suggest a positive relationship between ESG scores and returns (Gibson, Brandon et al., 2021; Avramov et al., 2022). In this study, however, it is clear that ESG risk disagreement primarily affects volatility rather than returns.

The analysis also explores the role of company size in the relationship between ESG risk disagreement and volatility. Larger companies, which are typically more complex, exhibit stronger reactions to ESG risk



disagreement. This is in line with Gibson Brandon et al. (2021), who noted that larger companies are more likely to experience greater ESG rating disagreements due to their size and exposure to various ESG-related risks. The interaction between ESG risk disagreement and company size is statistically significant, indicating that disagreements have a more pronounced impact on volatility for larger firms. This finding underscores the notion that larger firms, with their higher complexity and more diverse operations, are more susceptible to the uncertainties associated with differing ESG risk ratings.

Finally, the robustness checks that account for industry-specific ESG risk disagreement confirm the initial findings. The results show that ESG risk disagreement, even when adjusted for industry-specific variations, continues to have a significant impact on volatility. This is consistent with Gibson Brandon et al. (2021), who found significant industry variations in ESG rating disagreements. The study further confirms that the influence of ESG risk disagreement on volatility is not confined to specific industries but is a generalizable phenomenon across various sectors.

In conclusion, the results provide strong evidence that ESG risk disagreement has a significant impact on stock return volatility, particularly in larger companies and across various industries. This finding contributes to the growing body of literature on ESG risk by emphasizing its role in enhancing market uncertainty, which in turn affects stock price fluctuations. While ESG risk disagreement does not appear to directly influence stock returns, its effect on volatility suggests that investors should pay closer attention to discrepancies in ESG ratings when evaluating risk. Moreover, policymakers and firms should consider the implications of ESG risk disagreement for market stability, particularly in the context of enhancing ESG disclosures and improving rating methodologies.

## 5. CONCLUSIONS

This article explored the impact of ESG risk disagreements on the annual average level and volatility of daily stock returns in Europe. Using a proxy for rating disagreement based on ESG risk ratings from Refinitiv and Sustainalytics, the study found that ESG disagreements have a significant direct influence on volatility. The findings showed that ESG risk rating disagreement increases the volatility of European companies.

The study findings enrich the academic literature in this field by adding further evidence on the influence of ESG risk disagreements on the annual average level and volatility of daily stock returns in the European context. Additionally, the results help investors pay attention to the ESG rating providers when making investment decisions. From the point of view of policymakers, the relevant policy departments should promote a standard reporting framework, as ESG rating disagreement affects the volatility of companies.

This research exhibits several limitations regarding the use of ESG risk ratings from only two rating providers. The ESG risk rating may vary across rating providers, and it will be useful to examine the impact of these differences on the annual average level and volatility of daily stock returns. These topics will be the subject of future research.

**Conflict of Interest:** The authors declare no conflict of interest.

**Ethical Approval:** The study adheres to the ethical guidelines for conducting research.

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