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Article

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ESG REPORTING AND SYSTEMIC RISK: EVIDENCE FROM EUROPEAN MARKETS

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Abstract

This study examined the relationship between Environmental, Social, and Governance (ESG) reporting quality and systemic financial risk in European equity markets. A novel index was developed to evaluate reporting quality, combining three dimensions: the scope of disclosures, the extent of exposure to reputational controversies, and the degree of alignment between sustainability scores and reputational risk indicators. Using daily return data for 600 companies listed in the STOXX Europe 600 index between 2010 and 2023, systemic risk was assessed through conditional value-at-risk differentials, capturing each firm's contribution to broader financial system vulnerabilities. The analysis adopted a comparative approach by grouping firms annually into high and low ESG reporting quality categories and comparing their average conditional value-at-risk contributions. Statistical tests consistently revealed that firms in the top index quartile exhibit significantly lower systemic risk contributions than those in the bottom quartile, particularly during market stress, such as the COVID-19 crisis and the Ukraine invasion. Quantile regression results further suggested that this mitigating effect was strongest in the upper tail of the risk distribution. The findings underscored the importance of credible reporting in improving financial stability and supporting regulatory initiatives that standardise disclosures across European capital markets, such as the Corporate Sustainability Reporting Directive and Sustainable Finance Disclosure Regulation frameworks.

Keywords: ESG reporting; ESG transparency; systemic risk; financial stability; controversies.

JEL Classification: G15, G32, M14, Q56

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Introduction

The increasing prominence of Environmental, Social, and Governance (ESG) factors in financial markets has reshaped investment strategies, corporate decision-making, and regulatory policies. Firms with stronger ESG profiles are often perceived as more resilient to long-term risks, including regulatory pressures, reputational damage, and climate-related financial shocks. Systemic risk, defined as the transmission of financial distress from individual institutions to the broader system, has gained increasing prominence in academic and policy discourse, particularly in response to the vulnerabilities exposed by the 2008 global financial crisis.

The growing relevance of ESG reporting in financial markets is reinforced by evolving regulatory frameworks across Europe, such as the European Union Sustainable Finance Disclosure Regulation (SFDR) and the Corporate Sustainability Reporting Directive (CSRD). Although ESG reporting standardisation initiatives aim to increase transparency, their impact on systemic risk remains ambiguous. On the one hand, enhanced disclosures may reduce information asymmetries and facilitate more accurate risk assessment; on the other hand, they may also expose hidden vulnerabilities, particularly in firms with negative ESG track records.

However, the extent to which ESG reporting quality rather than ESG performance alone affects systemic risk remains an open question. Existing studies primarily focus on ESG scores and financial performance (Friede and Bassen, 2015; Fatemi, Glaum and Kaiser, 2018), with some evidence suggesting that firms with more substantial ESG performance exhibit lower idiosyncratic risk and higher resilience during market downturns (Albuquerque, Koskinen and Zhang, 2019).

Most existing research focuses on the impact of ESG scores on firm-specific risk (Benlemlih et al., 2018; Ferriani and Natoli, 2021) on the relationship between sustainability practices and stock market volatility. However, systemic risk differs from firm-specific risk, as it captures an institution's contribution to broader financial instability (Acharya et al., 2017). While some studies suggest that firms with better ESG performance may be more resilient during crises (Ding et al., 2021), they often fail to distinguish between ESG performance and ESG disclosure quality, leaving unanswered whether transparency in ESG reporting mitigates or exacerbates systemic spillovers. Furthermore, prior research typically relies on aggregated ESG scores, which may obscure the individual effects of disclosure scope, controversy exposure, and reporting quality on financial stability (Gibson, Brandon and Schmidt, 2021).

The systemic risk dimension associated with ESG controversies remains underexplored, although existing evidence points to significant adverse effects on firms' market value, legal exposure, and reputation (Dyck et al., 2019; Liang and Renneboog, 2021). The systemic impact remains uncertain, although increased transparency may help reduce risk by enabling a more effective assessment of ESG-related risks (Grewal, Hauptmann and Serafeim, 2021); others suggest that firms with high ESG disclosure but low ESG performance may experience greater market instability due to investor backlash when discrepancies are revealed (Christensen, Hail and Leuz, 2021). Conversely, recent research has highlighted that greater ESG transparency can reduce information asymmetry and enhance investor confidence (Grewal, Hauptmann and Serafeim, 2021). However, concerns remain that increased disclosure can amplify market reactions and volatility, mainly when

ESG controversies are involved (Flammer, 2021). Furthermore, systemic risk and sustainability studies have primarily examined aggregate ESG scores rather than the quality of ESG reporting (Engle et al., 2020), leaving a significant gap in understanding how ESG disclosure impacts systemic financial stability.

The study investigates the relationship between ESG reporting quality and systemic risk, proposing a novel indicator, the ESG Reporting Quality Index (ERQI), which integrates dimensions such as transparency, controversies, and disclosure breadth. Using Delta CoVaR and data on companies listed in the STOXX Europe 600 index, the analysis assesses the impact of reporting quality on firms' contribution to systemic financial stress, with robust checks of empirical validity.

Building on the academic literature on ESG transparency, systemic risk measurement, and the signalling function of credible disclosures, we formulate the following working hypotheses:

H1: Firms with higher-quality ESG reporting contribute significantly less to systemic financial risk than those with low-quality reporting.

H2: The negative relationship between ESG reporting quality and systemic risk becomes more pronounced during elevated financial market stress periods.

To ensure a coherent analysis, the paper is organised as follows: the first section reviews the economic literature on ESG factors, systemic risk, and ESG reporting; the second section describes the data and methodology used in the analysis; the third section presents the empirical results along with the corresponding interpretations; and the final section summarises the main conclusions and research implications.

1. Review of the scientific literature

The relationship between *ESG factors and financial performance* has been extensively studied, although the findings remain mixed. Some studies suggest that ESG performance improves financial outcomes by reducing risk exposure, increasing investor confidence, and improving efficiency (Friede and Bassen, 2015; Flammer, 2021). Conversely, others argue ESG initiatives impose additional costs, potentially reducing short-term profitability, especially in industries facing significant compliance burdens (Hong and Kacperczyk, 2009). The theoretical foundation relies mainly on stakeholder theory, proposing firms aligning strategies with stakeholder interests to benefit financially long-term (Freeman, 1984). Agency theory, however, suggests that ESG investments could reflect managerial overreach, diverting resources from value-maximising activities (Krüger, 2015).

Meta-analyses generally indicate a positive correlation between ESG and financial performance, although the magnitude varies by industry and region. Friede and Bassen (2015) concluded that approximately 90% of the studies reported positive or neutral ESG-financial performance relationships. Similarly, (Khan, Serafeim and Yoon, 2016) found that industry-specific ESG factors positively correlate with higher returns and valuations, emphasising targeted sustainability strategies. Furthermore, ESG-oriented firms often experience lower capital costs, enhanced liquidity, and reduced volatility (Giese et al., 2019; Albuquerque, Koskinen and Zhang, 2019). Nevertheless, Barber, Morse and Yasuda (2021) found that ESG-driven funds might underperform in uncertain macroeconomic environments, indicating that ESG benefits depend on context and market conditions.

ESG controversies such as environmental violations, governance failures, or labour disputes significantly affect financial outcomes through stock price declines and reputational damage (Dyck et al., 2019; Liang and Renneboog, 2021). Firms in environmentally sensitive industries in developed economies are particularly vulnerable to ESG-related controversies, highlighting the critical importance of managing sustainability risks (Jucá et al., 2024).

The temporal dimension of ESG initiatives indicates that benefits often materialise in the long-term rather than immediate returns (Eccles, Ioannou and Serafeim, 2014) demonstrated firms prioritising employee satisfaction – a critical ESG factor – outperformed peers in the long run, reinforcing ESG's role in sustainable value creation.

Systemic risk, defined as the distress of a single firm affecting broader financial stability, became a central concern post-2008 financial crisis (Adrian and Brunnermeier, 2016; Acharya et al., 2017). Traditional risk measures, such as firm-specific volatility and idiosyncratic risk, fail to capture systemic spillovers, leading to the development of metrics like CoVaR (Conditional Value at Risk) and Delta CoVaR, which quantify an institution's contribution to systemic risk (Adrian and Brunnermeier, 2016). Studies indicate firms with strong ESG policies exhibit more stable cash flows and reduced exposure to tail-risk events, potentially lowering systemic impact (Engle et al., 2020). However, Benoit et al. (2017) caution that increasing ESG alignment among institutional investors may amplify systemic risk through herding behaviour.

The quality of ESG disclosure, rather than ESG scores alone, significantly impacts systemic risk. Gibson, Brandon and Schmidt (2021) noted inconsistent ESG ratings can increase financial volatility, emphasising the importance of credible ESG transparency. ESG controversies further amplify systemic risk, with affected firms experiencing heightened market volatility and sensitivity to shocks (Bang, Ryu and Webb, 2023; Jo and Na, 2012). Particularly in the financial sector, ESG engagement can reduce default probabilities and stabilise firms during crises, though traditional ESG ratings often inadequately capture these nuanced risks (Chiaromonte et al., 2022).

ESG reporting and the associated transparency raise challenges related to data evaluation and comparability, prompting increased efforts toward regulation and standardisation. The academic literature has demonstrated that ESG high-quality corporate reporting, both financial and ESG-related, reduces information asymmetry, enhancing market stability and investor confidence (Healy and Palepu, 2001; Bushman and Smith, 2005; Christensen, Hail and Leuz, 2021). Comprehensive ESG disclosures correlate with lower stock volatility, tighter bid-ask spreads, and greater liquidity, suggesting transparency improves market efficiency (Lins, Servaes and Tamayo, 2017; Krueger et al., 2024). However, transparency also exposes firms to increased market scrutiny, particularly when disclosed ESG performance is poor or inconsistent (Gibson Brandon and Schmidt, 2021).

Measurement challenges, including inconsistency in ESG ratings across providers, complicate assessing ESG impacts accurately (Berg, Kölbel and Rigobon, 2022). ESG scores frequently fail to capture genuine ESG reporting quality, allowing firms to engage in selective disclosure or greenwashing, thereby inflating their sustainability profiles without substantive improvements (Christensen, Hail and Leuz, 2021). These challenges underscore the importance of standardised reporting frameworks, such as the EU's Sustainable Finance Disclosure Regulation (SFDR) and Corporate Sustainability Reporting Directive (CSRD),

aimed at enhancing ESG transparency. Regulatory frameworks, notably the SFDR and CSRD, play a crucial role in standardising ESG disclosures, reducing selective reporting, and mitigating market distortions and herding behaviour (Amel-Zadeh and Serafeim, 2017, Christensen, Hail and Leuz, 2021). However, critics argue that mandatory ESG reporting might encourage compliance-driven disclosures rather than genuine sustainability improvements (Ioannou and Serafeim, 2017).

In summary, high-quality ESG reporting can enhance market stability by improving transparency and reducing systemic risk, but its effectiveness is influenced by industry context, regulatory environment, and the credibility of disclosures.

2. Research methodology

The study relies on the daily closing prices of stocks from companies listed in the STOXX Europe 600 index (2010–2023), obtained from the Refinitiv (Reuters Eikon) database. These prices allow for the calculation of daily logarithmic returns, which are used to estimate Delta CoVaR, an indicator of the marginal contribution to systemic financial risk:

$$r_{i,t} = \ln \left(\frac{P_{i,t-1}}{P_{i,t}} \right) \quad (1)$$

where $r_{i,t}$ represents the log-return for firm i on day t , and $P_{i,t}$ is the closing price on day t . These return series estimate the Value at Risk (VaR) and Conditional Value at Risk (CoVaR) as inputs for the Delta CoVaR framework.

The daily log-returns across the STOXX 600 stocks between 2010 and 2023 exhibit typical financial market characteristics, including non-normality, volatility clustering, and pronounced fat-tail behaviour. Returns have an average near zero (ranging from approximately -0.0001 at the 5th percentile to 0.0007 at the 95th percentile), with median values consistently around zero. Standard deviations range from about 1.16% to 2.59%, reflecting variability across firms and time. Extreme negative returns reached as low as -34.62%, while the highest positive returns approached 27.14%, underscoring significant tail risk relevant for systemic risk assessment.

To capture corporate sustainability practices and transparency, this study incorporates three annual ESG indicators for each firm in the STOXX 600, covering the period from 2010 to 2023. The data were obtained from Refinitiv (Reuters Eikon), which provides standardised and widely used ESG metrics across firms and time. The three indicators used are the ESG Score, the ESG Controversies Score, and the ESG Reporting Scope. Each is measured on a 0 to 100 scale, where higher values represent better performance, lower controversy exposure, or more comprehensive disclosure.

The ESG Score is a composite indicator that reflects the firm's overall sustainability performance based on its environmental, social, and governance policies and outcomes. The ESG Controversies Score captures the firm's exposure to negative events, such as environmental fines, labour disputes, or governance failures, with higher scores indicating fewer or less severe controversies. The ESG Reporting Scope measures the breadth and transparency of a company's ESG disclosures, reflecting the quantity and coverage of reported data points across key ESG themes.

The data analysed indicate an upward trend in the average and median ESG scores after 2015, suggesting a general improvement in sustainable performance among European firms, possibly influenced by increasingly stringent regulations and growing investor pressure. At the same time, the interquartile range's stability highlights the persistence of inter-firm variation. The ESG controversy scores remain, on average, at a high level with a notable dispersion, reflecting significant heterogeneity in reputational and compliance-related risks. Slight decreases in the average scores in 2017 and 2023 may indicate either an increase in reported incidents or a tightening of evaluation criteria. ESG reporting scores remain consistently high, with values concentrated at the upper end of the scale, suggesting a convergence of reporting practices, likely driven by the intensification of European regulatory efforts. However, extreme values signal persistent discrepancies in the quality and scope of disclosures.

These three ESG indicators form the basis for constructing the ESG Reporting Quality Index (ERQI). While each variable captures a different aspect of ESG performance or transparency, their joint distribution reveals trends in sustainability behaviour across European firms over the past decade. Annual ESG data complements the high-frequency financial data used to estimate systemic risk, enabling a comprehensive analysis of how long-term ESG practices relate to short-term financial stability.

The study applies a calendar-year alignment method to address the frequency mismatch between daily financial data and annual ESG indicators. Thus, the ESG data are matched with the daily financial observations corresponding to the same fiscal year, resulting in a coherent panel structure for integrated analysis.

Under this approach, a firm's ESG indicators for year t , namely the ESG Score, ESG Controversies Score, and ESG Reporting Scope, are matched to its daily log-returns and Delta CoVaR estimates over the entire calendar year t . This allows for contemporaneous analysis of how ESG reporting quality may influence a firm's contribution to systemic risk during the same year, based on the assumption that investors incorporate ESG-related information into market prices throughout the year as it becomes available. This matching approach is common in the ESG literature and is particularly well-suited to studies involving risk measures that evolve continuously over time.

Firm-level Delta CoVaR values for the 2010–2023 period reveal significant variation in contributions to systemic risk over time, with notable spikes in the upper tail of the distribution during crisis periods, particularly in 2020 (COVID-19 pandemic) and 2022 (Ukraine invasion). This suggests that firms' exposure to systemic risk is highly sensitive to macro-financial stress and underscores the importance of examining the hypothesis that ESG reporting quality may moderate this sensitivity. The contemporaneous alignment of the ESG data with the Delta CoVaR distributions allows a relevant estimation of the relationship between ESG transparency, exposure to controversies, and systemic risk in different markets.

As part of the robustness checks, an alternative alignment strategy is considered, in which ESG data from year t is applied to financial data from year $t+1$. This lagged structure accounts for the possibility that ESG reports, typically released after the fiscal year ends, may impact market expectations with a delay. However, the same-year matching is adopted for the baseline analysis, which aligns with the assumption that investor sentiment and systemic vulnerability evolve contemporaneously with ESG disclosure levels.

Construction of ESG Reporting Quality Index (ERQI)

To capture the multidimensional nature of ESG transparency and its potential influence on systemic risk, this study constructs a composite indicator called the ESG Reporting Quality Index (ERQI). The index is designed to reflect both the scope of ESG disclosures and the credibility of reporting, particularly about controversy exposure and overall ESG performance. The ERQI synthesises three components: the ESG Reporting Scope, the ESG Controversies Score, and the ESG Score, using a structured weighting and normalisation methodology.

The ERQI is defined for each firm i in year t as follows:

$$ERQI_{i,t} = w_1 \times ReportingScope_{i,t} + w_2 \times ControversiesScore_{i,t} + w_3 \times (ESGScore_{i,t} - ControversiesScore_{i,t}) \quad (2)$$

This specification is constructed to capture three core aspects:

- *ReportingScope_{i,t}*: reflects the breadth and transparency of ESG disclosures. Higher values imply a greater willingness to share detailed ESG information.
- *ControversiesScore_{i,t}*: measures exposure to ESG controversies. Higher values indicate fewer controversies, contributing positively to reporting quality.
- *ESGScore_{i,t} – ControversiesScore_{i,t}*: represents a discrepancy between reported ESG performance and controversy exposure. A sizeable positive gap could signal potential greenwashing; strong ESG claims undermined by controversy, which should reduce perceived reporting quality.

The term *ESGScore – ControversiesScore*) is subtracted from the index to penalise firms that report high ESG performance but face material controversies, reflecting a possible misalignment between sustainability narratives and actual practices.

To ensure comparability across firms and over time, each component is normalised using min-max normalisation, rescaling the raw scores to a [0,1] interval:

$$Normalized(X_{i,t}) = \frac{\max(X_t) - \min(X_t)}{X_{i,t} - \min(X_t)} \quad (3)$$

This normalisation is applied year-by-year, ensuring that the ERQI reflects relative ESG reporting quality each year. This is particularly important given the evolving standards and practices in ESG disclosure over the sample period.

Regarding weights, the baseline specification assigns equal importance to each component, setting $w_1 = w_2 = w_3 = 1/3$. This choice reflects a neutral, data-driven starting point and aligns with common practice in ESG composite index construction (Khan, Serafeim and Yoon, 2016; Giese et al., 2019). Alternative weighting schemes are explored in the robustness checks, including specifications that emphasise controversy scores or penalise greenwashing more heavily.

The resulting ERQI values are between 0 and 1, with higher values indicating greater ESG transparency, fewer controversies, and alignment between ESG claims and actual conduct. This index is used as the primary explanatory variable in the regression models linking ESG reporting quality to systemic risk and is also analysed descriptively over time and across sectors.

Table no. 1 illustrates the evolution and dispersion of the ESG Reporting Quality Index (ERQI) across STOXX 600 firms from 2010 to 2023. ERQI values, normalised between 0 and 1, reflect disclosure comprehensiveness, controversy exposure, and consistency between ESG performance and reputation. Median ERQI scores remain relatively stable around 0.56–0.58 throughout the period, indicating consistently moderate to high reporting quality among most firms. However, post-2018, the lower tails of the distribution become increasingly pronounced, suggesting a growing subset of firms persistently underperforming due to minimal disclosure or persistent ESG controversies. Furthermore, the upper quartile values remain stable (around 0.60 – 0.62), signalling convergence among top performers. In contrast, the increasing spread in the lower quartile and the negative minimum values highlight possible greenwashing behaviours captured by the ERQI.

Table no. 1. Summary statistics of the ERQI index for the 2010–2023 period

| Year | Mean | Standard deviation | Minimum | Percentile 25 | Median | Percentile 75 | Maximum |
|------|--------|--------------------|---------|---------------|--------|---------------|---------|
| 2010 | 0.4701 | 0.1705 | -0.0143 | 0.3493 | 0.5662 | 0.5978 | 0.6737 |
| 2011 | 0.4834 | 0.1528 | -0.0250 | 0.3905 | 0.5486 | 0.5990 | 0.6753 |
| 2012 | 0.4857 | 0.1537 | -0.0407 | 0.4095 | 0.5547 | 0.6002 | 0.6751 |
| 2013 | 0.4993 | 0.1502 | 0.0590 | 0.4237 | 0.5685 | 0.6064 | 0.6835 |
| 2014 | 0.5134 | 0.1380 | 0.0460 | 0.4574 | 0.5685 | 0.6052 | 0.6712 |
| 2015 | 0.5337 | 0.1220 | 0.0704 | 0.4861 | 0.5786 | 0.6093 | 0.6792 |
| 2016 | 0.4974 | 0.1469 | 0.0227 | 0.4287 | 0.5640 | 0.6031 | 0.6653 |
| 2017 | 0.5069 | 0.1458 | -0.0431 | 0.4419 | 0.5726 | 0.6064 | 0.6762 |
| 2018 | 0.4934 | 0.1560 | -0.0929 | 0.4145 | 0.5663 | 0.6026 | 0.6728 |
| 2019 | 0.4804 | 0.1651 | -0.0907 | 0.3808 | 0.5664 | 0.6002 | 0.6676 |
| 2020 | 0.4895 | 0.1593 | -0.1019 | 0.4046 | 0.5717 | 0.6009 | 0.6712 |
| 2021 | 0.5176 | 0.1507 | 0.0759 | 0.4301 | 0.5975 | 0.6230 | 0.7000 |
| 2022 | 0.4992 | 0.1576 | -0.0968 | 0.4088 | 0.5815 | 0.6094 | 0.6838 |
| 2023 | 0.4767 | 0.1811 | -0.1509 | 0.3227 | 0.5651 | 0.6220 | 0.7000 |

Source: Authors' calculations

In summary, the ERQI demonstrates temporal variation, cross-sectional dispersion, and responsiveness to changes in ESG conduct and disclosure. It validates its use as a central variable in examining the link between ESG reporting quality and systemic financial risk. The subsequent empirical analysis investigates whether firms with higher ERQI values contribute less to systemic risk, as measured by Delta CoVaR.

Empirical Analysis

We adopt a group-based comparative approach to investigate the relationship between ESG reporting quality and systemic risk without relying on firm-level panel regressions. This method is intuitive and transparent, allowing us to test whether companies with higher-quality ESG reporting (as measured by the ERQI index) exhibit significantly lower systemic risk contributions, as measured by Delta CoVaR.

For each year from 2010 to 2023, firms were classified into High ERQI and Low ERQI groups based on their position in the top and bottom quartiles of the ERQI distribution, respectively. Firms falling in the middle 50% of the distribution were excluded from this comparison to maximise contrast and focus on firms with clearly differentiated ESG reporting quality.

Daily firm-level Delta CoVaR values were aggregated to annual averages and merged with the ERQI classification for year-by-year comparisons. We then computed descriptive statistics for each group, including means, medians, and standard deviations, and conducted two-sample t-tests (assuming unequal variances) and non-parametric Mann–Whitney U-tests to assess whether differences in Delta CoVaR between high and low ERQI groups are statistically significant.

The annual comparisons of average systemic risk contributions (Delta CoVaR) between firms classified as High ERQI (top quartile) and Low ERQI (bottom quartile) reveal a consistent pattern from 2010 to 2023. Firms with higher ESG reporting quality (High ERQI) consistently exhibit significantly lower systemic risk than those with lower reporting quality (Low ERQI). This difference is notably pronounced during periods of heightened market stress, such as the COVID-19 crisis in 2020 and geopolitical tensions in 2022, with statistical tests (t-tests and Mann-Whitney U-tests) confirming the significance of these differences across the entire period (p-values < 0.01). While variations occur in magnitude, the clear and persistent divergence underscores ESG reporting quality's mitigating effect on systemic financial vulnerabilities.

The magnitude of the difference between groups is particularly notable during years of elevated financial stress. For example, in 2020, marked by the COVID-19 market shock, firms in the Low ERQI group exhibited a mean Delta CoVaR of 0.0133, compared to 0.0105 for the High ERQI group. A similar pattern is observed in 2022, coinciding with the onset of the Ukraine invasion, where systemic risk contributions among low-reporting-quality firms again outpaced those of their high-quality peers. These results suggest that ESG transparency and credibility may enhance firms' resilience during heightened market volatility.

Statistical testing further substantiates the observed differences. In multiple years, including 2011, 2015, 2020, and 2022, the two-sample t-tests and Mann–Whitney U-tests yield statistically significant results, rejecting the null hypothesis of equal means or distributions across the two ERQI groups. This reinforces the conclusion that the differences are not purely random, but likely reflect structural disparities in how firms with differing ESG reporting quality contribute to systemic risk.

That said, the relationship is not uniform across all years. In certain periods, such as 2014 and 2018, the gap between the groups narrows, and the statistical tests fail to reject the null hypothesis. This indicates that the impact of ESG reporting quality on systemic risk may be context-dependent – potentially becoming more salient during episodes of macrofinancial stress. These results offer compelling evidence that higher-quality ESG disclosure, as captured by the ERQI, is associated with reduced systemic risk exposure and may play a stabilising role in volatile markets.

Across the study period, firms with high ESG reporting quality (High ERQI) consistently exhibit lower and more stable Delta CoVaR values compared to firms with low ESG reporting quality (Low ERQI). This persistent difference, clearly visible in Figure no. 1, indicates that firms characterised by transparency, fewer controversies, and consistent ESG performance have reduced systemic risk contributions. The divergence between High and Low ERQI groups is particularly notable during financial crises and periods of elevated market volatility, reinforcing ESG reporting quality as a stabilising factor in financial markets.

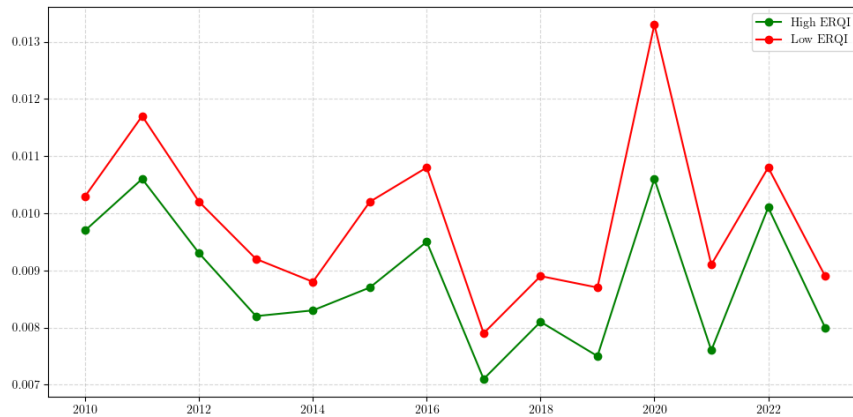


Figure no. 1. Average Delta CoVaR by ERQI Group

The resulted evidence supports the central hypothesis of this study: firms with higher ESG reporting quality, reflected in more transparent disclosures, fewer controversies, and alignment between sustainability claims and actual performance, tend to contribute less to systemic financial risk. This relationship is especially pronounced during periods of elevated market stress, suggesting that ESG transparency may function as a form of risk mitigation or reputational buffer in times of crisis.

In the following sections, we extend the analysis with sectoral decompositions and robustness checks to further examine the consistency of this relationship across industries and alternative specifications of the ERQI index.

Quantile Regression Analysis

To further investigate the relationship between ESG reporting quality (ERQI) and systemic risk, we complement the group-based comparison with a quantile regression analysis. Unlike traditional mean-based regressions, quantile regression allows us to examine how the effect of ERQI varies across different parts of the conditional distribution of Delta CoVaR, from lower to higher systemic risk exposures. This approach is especially well-suited for systemic risk analysis, which inherently focuses on the upper tail of risk distributions, where financial contagion and vulnerability are most concentrated.

The analysis uses firm-day observations of Delta CoVaR, merged with the corresponding firm-year ERQI scores. We estimate quantile regression models at five different quantiles of the Delta CoVaR distribution: 0.25, 0.50 (median), 0.75, 0.90, and 0.95. This enables us to trace how the marginal effect of ERQI evolves as we move from firms with relatively low systemic risk to those at the upper end of systemic vulnerability. The model specification is given by:

$$Q_{\tau}(\text{DeltaCoVaR}_{i,t} | \text{ERQI}_{i,t}) = \alpha_{\tau} + \beta_{\tau} \cdot \text{ERQI}_{i,t} \quad (4)$$

where τ denotes the quantile level (e.g., 0.75), and β_{τ} is the coefficient capturing the effect of ERQI on Delta CoVaR at that quantile. A negative β_{τ} would imply that higher ESG reporting quality is associated with lower systemic risk contributions in that specific part of the distribution.

As shown in Figure no. 2, the estimated coefficients for ERQI are negative across all quantiles, suggesting that higher ESG reporting quality is generally associated with a lower systemic risk, consistent with earlier findings.

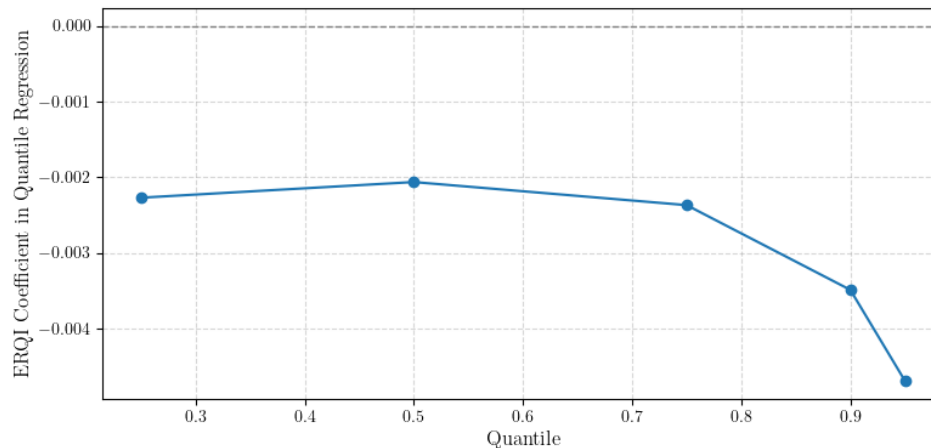


Figure no. 2. Coefficients of ERQI from Quantile Regressions across Delta CoVaR Quantiles

However, the magnitude of this negative relationship increases substantially at higher quantiles. At the 0.25 and 0.50 quantiles, the ERQI coefficient is modestly negative (around -0.002), indicating a slight dampening effect on systemic risk among lower-risk firms. In contrast, at the 0.90 and 0.95 quantiles, the ERQI coefficient becomes more strongly negative, reaching nearly -0.0045 at the 95th percentile. This pattern suggests that the mitigating effect of ESG reporting quality is especially pronounced among firms with the highest systemic risk contributions. In other words, while better ESG reporting benefits all firms, its impact is amplified in the upper tail of the Delta CoVaR distribution, precisely where systemic risk is most critical for financial stability. This result aligns with the notion that ESG transparency may serve as a reputational buffer or signal of risk governance, particularly effective in reducing tail-risk exposure.

The quantile regression results reinforce our previous findings: firms with stronger ESG reporting practices contribute less to systemic financial risk, and this relationship becomes even more important for firms at the most systemically fragile end of the market.

3. Results and discussion

The empirical results demonstrate a robust and meaningful relationship between ESG reporting quality (ERQI) and systemic financial risk. Firms in the top ERQI quartile consistently exhibit lower Delta CoVaR values than those in the bottom quartile, particularly during periods of financial stress such as the COVID-19 pandemic and geopolitical tensions in 2022. Statistical tests validate the significance of these findings, reinforcing that higher-quality ESG disclosure is associated with reduced systemic vulnerabilities.

Quantile regression analysis reveals that the mitigating effect of ESG transparency on systemic risk is significant in the upper quantiles of the Delta CoVaR distribution, indicating increased relevance for firms with high systemic vulnerability. The ERQI index,

with its multidimensional structure, effectively captures the credibility of ESG reporting by integrating exposure to controversies, transparency, and the consistency between reporting and actual practices. The results suggest that ESG reporting, beyond its symbolic role, actively contributes to market stability by reducing information asymmetry and improving investor confidence, thereby supporting the objectives of regulations such as CSRD and SFDR. However, this effect is context-dependent, more pronounced during periods of financial stress and varying across sectors and firm characteristics, which points to a rather countercyclical role of ESG transparency.

The results contribute to existing literature by shifting the emphasis from traditional ESG scores to reporting quality, highlighting the tangible impact of credible ESG disclosure on systemic financial stability. These insights support regulatory and corporate strategies prioritising accurate, comprehensive, and transparent sustainability reporting as central elements of risk governance.

Policy and managerial implications

The study's findings offer valuable implications for policymakers and corporate managers as ESG reporting increasingly transitions from voluntary to mandatory practice within the European Union. The demonstrated link between higher-quality ESG reporting and reduced systemic risk indicates that ESG transparency extends beyond compliance, significantly contributing to financial stability.

From a regulatory perspective, these results support initiatives like CSRD, SFDR, and the EU Taxonomy for Sustainable Activities, all aimed at standardising ESG disclosures. Such frameworks enhance transparency, comparability, and credibility, thereby mitigating systemic risk by discouraging selective reporting and greenwashing behaviours.

The evidence emphasising the negative impact of inconsistent or low-quality ESG disclosures highlights the importance of third-party assurance mechanisms and auditable ESG reports. Regulators should encourage robust verification processes to ensure that ESG disclosures reflect actual corporate conduct.

The study highlights the strategic value of investing in high-quality ESG reporting, beyond mere legal compliance. Transparent and credible disclosures can signal effective governance and robust risk management, contributing to reduced capital costs and increased resilience in volatile environments. Integrating ESG reporting quality indicators into internal risk management enables a proactive approach to reputational risks and supports the practical alignment with sustainability commitments, thereby strengthening stakeholder trust during periods of uncertainty.

Institutional investors can leverage ESG transparency metrics like ERQI to construct resilient portfolios. In particular for long-term investors, credible ESG disclosures serve as proxies for lower systemic risk exposures, aligning with mandates focused on stability and sustainable value creation.

Conclusions

The study investigates the relationship between ESG reporting quality and systemic financial risk in European markets, based on a sample of 600 firms from the STOXX Europe 600 index (2010–2023). By developing a proprietary index, ERQI, that integrates dimensions such as transparency, controversies, and the consistency of ESG reporting, the

analysis goes beyond the limitations of traditional ESG scores. Using the Delta CoVaR indicator provides empirical evidence that firms with higher levels of reporting quality contribute less to systemic risk, highlighting the potential stabilising role of sustainable transparency.

Our group-based comparison shows that firms in the top quartile of the ERQI distribution exhibit consistently lower average Delta CoVaR values than those in the bottom quartile, particularly during market stress such as the COVID-19 crash and the Ukraine invasion. Statistical tests confirm the significance of these differences, and quantile regression analysis reveals that the mitigating effect of ESG reporting quality on systemic risk is more pronounced at the upper end of the Delta CoVaR distribution among firms most vulnerable to financial contagion.

These findings have important implications for financial market stability, regulatory policy, and corporate risk management. They suggest that high-quality ESG reporting is more than a reputational asset. It is a form of systemic risk mitigation. Transparency, alignment, and accountability in ESG communications reduce market uncertainty and firm-specific vulnerability, especially during heightened volatility.

Although the results are robust, the study is not without limitations. The annual frequency of ESG data restricts our ability to examine high-frequency dynamics or intra-year adjustments. Additionally, the ERQI relies on data from a single provider (Refinitiv), which may reflect specific methodological biases. Future research could extend this work by incorporating alternative ESG data sources, testing more granular controversy metrics, or evaluating the impact of ESG reporting during crisis events in real-time. After implementation, exploring the role of regulatory disclosures, such as those mandated by the European Union's CSRD, may also provide valuable insights into how standardised ESG reporting shapes market behaviour.

This paper contributes to the growing literature linking sustainability disclosure to financial risk by providing evidence that ESG reporting quality plays a stabilising role in European financial markets. As ESG reporting becomes more integrated into the financial system, its role in shaping systemic risk exposure will only grow in importance – for firms, investors, and regulators alike.

References

- Acharya, V.V., Pedersen, L.H., Philippon, T. and Richardson, M., 2017. Measuring Systemic Risk. *Review of Financial Studies*, 30(1), pp.2-47. <https://doi.org/10.1093/rfs/hhw088>.
- Adrian, T. and Brunnermeier, M.K., 2016. CoVaR. *American Economic Review*, 106(7), pp.1705-1741. <https://doi.org/10.1257/aer.20120555>.
- Albuquerque, R., Koskinen, Y. and Zhang, C., 2019. Corporate Social Responsibility and Firm Risk: Theory and Empirical Evidence. *Management Science*, 65(10), pp.4451-4469. <https://doi.org/10.1287/mnsc.2018.3043>.
- Amel-Zadeh, A. and Serafeim, G., 2018. *Why and How Investors Use ESG Information: Evidence from a Global Survey*. *Financial Analysts Journal*, 74(3), pp.87-103. <https://doi.org/10.2139/ssrn.2925310>.
- Bang, J., Ryu, D. and Webb, R.I., 2023. ESG controversy as a potential asset-pricing factor. *Finance Research Letters*, 58, p.104315. <https://doi.org/10.1016/j.frl.2023.104315>.

- Barber, B.M., Morse, A. and Yasuda, A., 2021. Impact investing. *Journal of Financial Economics*, 139(1), pp.162-185. <https://doi.org/10.1016/j.jfineco.2020.07.008>.
- Benlemlih, M., Shaukat, A., Qiu, Y. and Trojanowski, G., 2018. Environmental and Social Disclosures and Firm Risk. *Journal of Business Ethics*, 152(3), pp.613-626. <https://doi.org/10.1007/s10551-016-3285-5>.
- Benoit, S., Colliard, J.-E., Hurlin, C. and Pérignon, C., 2017. Where the Risks Lie: A Survey on Systemic Risk. *Review of Finance*, 21(1), pp.109-152. <https://doi.org/10.1093/rof/rfw026>.
- Berg, F., Kölbel, J.F. and Rigobon, R., 2022. Aggregate Confusion: The Divergence of ESG Ratings. *Review of Finance*, 26(6), pp.1315-1344. <https://doi.org/10.1093/rof/rfac033>.
- Bushman, R.M. and Smith, A.J., 2005. *Transparency, Financial Accounting Information, and Corporate Governance*. <https://papers.ssrn.com/abstract=795547> [Accessed 28 March 2025].
- Chiaramonte, L., Dreassi, Alberto, Girardone, Claudia and Piserà, S., 2022. Do ESG strategies enhance bank stability during financial turmoil? Evidence from Europe. *The European Journal of Finance*, 28(12), pp.1173-1211. <https://doi.org/10.1080/1351847X.2021.1964556>.
- Christensen, H.B., Hail, L. and Leuz, C., 2021. Mandatory CSR and sustainability reporting: economic analysis and literature review. *Review of Accounting Studies*, 26(3), pp.1176-1248. <https://doi.org/10.1007/s11142-021-09609-5>.
- Ding, W., Levine, R., Lin, C. and Xie, W., 2021. Corporate immunity to the COVID-19 pandemic. *Journal of Financial Economics*, 141(2), pp.802-830. <https://doi.org/10.1016/j.jfineco.2021.03.005>.
- Dyck, A., Lins, K.V., Roth, L. and Wagner, H.F., 2019. Do institutional investors drive corporate social responsibility? International evidence. *Journal of Financial Economics*, 131(3), pp.693-714. <https://doi.org/10.1016/j.jfineco.2018.08.013>.
- Eccles, R.G., Ioannou, I. and Serafeim, G., 2014. The Impact of Corporate Sustainability on Organizational Processes and Performance. *Management Science*, 60(11), pp.2835-2857. <https://doi.org/10.1287/mnsc.2014.1984>.
- Engle, R.F., Giglio, S., Kelly, B., Lee, H. and Stroebe, J., 2020. Hedging Climate Change News. *The Review of Financial Studies*, 33(3), pp.1184-1216. <https://doi.org/10.1093/rfs/hhz072>.
- Fatemi, A., Glaum, M. and Kaiser, S., 2018. ESG performance and firm value: The moderating role of disclosure. *Global Finance Journal*, 38, pp.45-64. <https://doi.org/10.1016/j.gfj.2017.03.001>.
- Ferriani, F. and Natoli, F., 2021. ESG risks in times of Covid-19. *Applied Economics Letters*, 28(18), pp.1537-1541. <https://doi.org/10.1080/13504851.2020.1830932>.
- Flammer, C., 2021. Corporate green bonds. *Journal of Financial Economics*, 142(2), pp.499-516. <https://doi.org/10.1016/j.jfineco.2021.01.010>.
- Freeman, R.E., 1984. *Strategic Management: A Stakeholder Approach*. Pitman.
- Friede, G., Busch, Timo and Bassen, A., 2015. ESG and financial performance: aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, 5(4), pp.210-233. <https://doi.org/10.1080/20430795.2015.1118917>.

- Gibson Brandon, R., Krueger, Philipp and and Schmidt, P.S., 2021. ESG Rating Disagreement and Stock Returns. *Financial Analysts Journal*, 77(4), pp.104-127. <https://doi.org/10.1080/0015198X.2021.1963186>.
- Giese, G., Lee, L.-E., Melas, D., Nagy, Z. and Nishikawa, L., 2019. Foundations of ESG Investing: How ESG Affects Equity Valuation, Risk, and Performance. *Journal of Portfolio Management*, 45(5), pp.69-83. <https://doi.org/10.3905/jpm.2019.45.5.069>.
- Grewal, J., Hauptmann, C. and Serafeim, G., 2021. Material Sustainability Information and Stock Price Informativeness. *Journal of Business Ethics*, 171(3), pp.513-544. <https://doi.org/10.1007/s10551-020-04451-2>.
- Healy, P.M. and Palepu, K.G., 2001. Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics*, 31(1), pp.405-440. [https://doi.org/10.1016/S0165-4101\(01\)00018-0](https://doi.org/10.1016/S0165-4101(01)00018-0).
- Hong, H. and Kacperczyk, M., 2009. The price of sin: The effects of social norms on markets. *Journal of Financial Economics*, 93(1), pp.15-36. <https://doi.org/10.1016/j.jfineco.2008.09.001>.
- Ioannou, I. and Serafeim, G., 2017. *The Consequences of Mandatory Corporate Sustainability Reporting*. <https://papers.ssrn.com/abstract=1799589> [Accessed 28 March 2025].
- Jo, H. and Na, H., 2012. Does CSR Reduce Firm Risk? Evidence from Controversial Industry Sectors. *Journal of Business Ethics*, 110(4), pp.441-456. <https://doi.org/10.1007/s10551-012-1492-2>.
- Jucá, M.N., Muren, P.D., Valentinčič, A. and Ichev, R., 2024. The impact of ESG controversies on the financial performance of firms: An analysis of industry and country clusters. *Borsa Istanbul Review*, 24(6), pp.1305-1315. <https://doi.org/10.1016/j.bir.2024.08.001>.
- Khan, M., Serafeim, G. and Yoon, A., 2016. Corporate Sustainability: First Evidence on Materiality. *The Accounting Review*, 91(6), pp.1697-1724.
- Krueger, P., Sautner, Z., Tang, D.Y. and Zhong, R., 2024. The Effects of Mandatory ESG Disclosure Around the World. *Journal of Accounting Research*, 62(5), pp.1795-1847. <https://doi.org/10.1111/1475-679X.12548>.
- Krüger, P., 2015. Corporate goodness and shareholder wealth. *Journal of Financial Economics*, 115(2), pp.304-329. <https://doi.org/10.1016/j.jfineco.2014.09.008>.
- Liang, H. and Renneboog, L., 2021. Corporate Social Responsibility and Sustainable Finance. *Oxford Research Encyclopedia of Economics and Finance*. Oxford University Press. <https://doi.org/10.1093/acrefore/9780190625979.013.592>.
- Lins, K.V., Servaes, H. and Tamayo, A., 2017. Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis. *The Journal of Finance*, 72(4), pp.1785-1824. <https://doi.org/10.1111/jofi.12505>.