Journal of the Air Transport Research Society 5 (2025) 100087

Contents lists available at ScienceDirect

Journal of the Air Transport Research Society

journal homepage: www.elsevier.com/locate/jatrs

Market reactions to ESG sanctions in the European airline industry

Shuvam Agarwal [a], Marina Efthymiou [b,*]

[a] Independent scholar, Ireland
[b] Dublin City University Business School, Dublin, Ireland

ARTICLE INFO

Keywords:
Airlines
Event study
Sustainable aviation
ESG
Aviation
Sanctions
Environment
Aviation finance

ABSTRACT

Environmental, Social, and Governance (ESG) concerns have gained centrality in the airline industry's strategic and regulatory landscape. While prior research has explored the effect of voluntary ESG disclosures on firm valuation, the market impact of regulatory ESG sanctions remains underexamined—particularly in sectors with high regulatory scrutiny like aviation. This study investigates stock market responses to 45 ESG-related enforcement actions issued by EU and UK regulators against 15 publicly listed airlines between 2000 and 2024. Using a standard event study methodology, we find significant negative abnormal returns, with cumulative losses exceeding -3.5 % in the [-5, +5] event window. Governance-related sanctions trigger the most severe investor responses, while social sanctions, though more frequent, have a more moderate impact. A clear temporal decay effect is also observed: the longer the delay between misconduct and public disclosure of the sanction, the smaller the market reaction—indicating information leakage and gradual price adjustment. This study adds new evidence on how ESG sanctions affect airline valuations, showing that compliance and transparency matter financially in a heavily regulated industry, like aviation.

1. Introduction

Environmental, Social, and Governance (ESG) considerations have become central to corporate strategy, regulatory oversight, and investment decision-making (Chai et al., 2025). Among high-profile and high-impact industries, aviation occupies a unique and challenging position. The sector is carbon-intensive, labour-dependent, and subject to complex regulatory regimes. Airlines face scrutiny not only for their contribution to greenhouse gas emissions (Efthymiou & Papatheodorou, 2019), but also for labour practices (Efthymiou et al., 2021; Turnbull et al., 2004), passenger rights (Martin-Domingo et al., 2024), and competition policies (Lykotrafiti, 2020; Starkie, 2016). In the European Union, this scrutiny is further institutionalized through an active and evolving regulatory landscape that addresses all three ESG dimensions. Consequently, airlines have increasingly found themselves subject to formal enforcement actions for breaches ranging from emissions underreporting and fuel dumping to anti-competitive practices and labour law violations. Only few prior aviation-ESG studies are published (e.g. Caraveo Gomez Llanos et al., 2024; Lee et al., 2023; Paraschi, 2022; Kweh et al., 2024).

Most prior studies have focused on how voluntary ESG disclosures influence firm value or investor sentiment (e.g., Friske et al., 2023; Krüger, 2015; Krueger et al., 2024; Serafeim & Yoon, 2023), with limited attention given to market responses following regulatory sanctions for ESG misconduct. Sanctions differ substantively from disclosures: they are not optional, are often unexpected, and carry legal and reputational consequences. While some evidence suggests that investors penalize firms for environmental violations or governance failures (Karpoff et al., 2005; Xia et al., 2024), little is known about how public markets specifically react to the full spectrum of E, S, and G sanctions imposed on airlines by European regulators, particularly given the sector's centrality to the EU's climate ambitions and social policy objectives. Despite the sector's heightened ESG exposure, the financial market implications of ESG enforcement actions in aviation remain underexplored.

In this study, we focus specifically on regulatory enforcement events where timing, magnitude, and legitimacy are externally validated by authorities. We distinguish three stages: (1) violation—the underlying act of misconduct; (2) revelation—the first public disclosure of potential misconduct; and (3) resolution—the formal announcement of penalties. This framework allows us to differentiate between the initial surprise of negative information and the subsequent confirmation of sanctions.

We examine market responses to ESG sanctions through three interconnected research streams. First, we analyse the European airline

* Corresponding author.
E-mail addresses: shuvama@gmail.com (S. Agarwal), marina.efthymiou@dcu.ie (M. Efthymiou).

https://doi.org/10.1016/j.jatrs.2025.100087
Received 3 July 2025; Received in revised form 27 August 2025; Accepted 8 September 2025
Available online 10 September 2025

industry's regulatory environment, highlighting the contrast between voluntary ESG disclosures and mandatory enforcement. Second, we apply the "revelation-versus-resolution" framework from the literature on corporate misconduct to capture the market's two-stage response. Finally, we investigate how information asymmetry and media scrutiny contribute to a decline in market reactions over time. By integrating these themes, we place our study at the intersection of corporate finance, regulatory economics, and aviation management, thereby clarifying our central hypotheses.

Our study aims to provide the first granular analysis of market reactions to ESG-related sanctions in the European airline industry. This involves constructing a novel dataset of 45 ESG sanctions imposed between 2000 and 2024 on 15 publicly traded EU & UK-jurisdiction airline companies. Employing event study methodology, we estimate cumulative abnormal returns (CARs) around sanction disclosure dates and assess how market responses vary across ESG violation categories and disclosure timing. We define "violation" as the act of breaking a rule, "enforcement action" as the authority's response, and "sanction" as the penalty imposed.

Our findings offer crucial insights for investors, managers, and regulators navigating the complex interplay between ESG performance and market value in one of the world's most scrutinized industries. This study makes three primary contributions to the literature:

1. **First Systematic Evidence:** We provide the first systematic evidence on the market reaction to specific ESG sanctions in the crucial European airline sector, demonstrating statistically and economically significant shareholder losses. This contrasts with some mixed findings in prior ESG disclosure literature.
2. **Granular Analysis of ESG Violation Types:** We systematically dissect and compare the market impact of environmental (E), social (S), and governance (G) sanctions. Our findings reveal that governance violations generate the strongest market reactions, underscoring investor sensitivity to signals of managerial failure and control weaknesses.
3. **Empirical Test of the 'Revelation versus Resolution' Hypothesis:** We are the first to empirically test the 'revelation versus resolution' hypothesis for ESG sanctions in aviation. Our analysis demonstrates that the market's negative reaction is almost entirely concentrated at the initial news of the investigation (revelation), rather than the eventual announcement of the penalty (resolution). This temporal decay effect in market reaction severity is consistent with partial information leakage reducing the surprise component of regulatory announcements.

The remainder of the paper is structured as follows: Section 2 reviews relevant ESG, airline, and event study literature. Section 3 details the dataset and methodological framework. Section 4 presents empirical findings and robustness checks. Section 5 concludes with implications for regulators, investors, and airline management.

2. Literature review

2.1. Enforcement over disclosure

Airlines operate under comprehensive regulatory oversight of environmental, social, and governance conduct (Efthymiou & Papatheodorou, 2019; Lykotrafiti, 2020). Regulations related to carbon emissions, passenger rights, and competition law create systematic exposure to regulatory enforcement—substantially greater than in most industries. This level of regulatory pressure contrasts sharply with many other industries, where such enforcement is often less consistent.

Research demonstrates that improved ESG performance is associated with higher firm value, greater efficiency (Yildiz et al., 2024), and positive market valuations (Abdi et al., 2022). However, airlines face significant implementation constraints. High capital intensity, thin profit margins, and long asset lifecycles hinder their ability to adopt these technologies quickly (Efthymiou & Ryley, 2022). These constraints are compounded by unreliable ESG performance metrics. Studies indicate no strong link between ESG ratings and actual emissions for airlines (Cregan et al., 2024). Ratings often vary significantly between agencies and frequently overlook key environmental factors, such as contrails (Caraveo Gomez Llanos et al., 2024).

These measurement issues highlight our study's central distinction: discretionary disclosure versus non-discretionary enforcement. Sanctions are not strategic choices; they are externally validated signals of failure with direct legal and financial consequences. Sanctions represent externally validated signals of failure with direct legal and financial consequences, eliminating strategic timing and content manipulation that affects voluntary disclosure studies (Krüger, 2015; Serafeim & Yoon, 2023) While prior work has valuably shown that markets penalize firms for ESG controversies (Krüger, 2015) and that the impact of news is conditioned by existing ratings (Serafeim & Yoon, 2023), these studies grapple with the discretionary nature of the information.

We sidestep this by focusing on reactive events—violations and sanctions—which convey forced, external validation of misconduct. These regulatory actions represent what Fama (1991) famously termed "clean" information events, where the timing and magnitude are set by an external authority, not the firm. This feature offers a robust research design to test market efficiency, eliminating endogeneity concerns that often affect disclosure studies. The aviation context is particularly well-suited for this analysis. Its comprehensive and standardized EU regulatory frameworks, high media visibility, and oligopolistic structure ensure that enforcement actions are material, transparent, and methodologically tractable events, building on a rich tradition of event studies in the sector (Akyildirim et al., 2020; Carter & Simkins, 2004; Ho et al., 2013; Kumari et al., 2023).

***H1 (Market Reaction Hypothesis)**: ESG-related violations by an airline are associated with negative abnormal returns.*

2.2. The revelation-versus-resolution framework

Market reactions to corporate misconduct follow a distinct temporal pattern. Seminal research in this area establishes a "revelation-versus-resolution" framework, which posits a distinct temporal pattern. The 'revelation-versus-resolution' framework shows that shareholder wealth destruction concentrates during initial wrongdoing revelation. At this point, the market reflects not only the direct costs but also the underlying signals of deeper organizational issues, resulting in a significant decline in the firm's value (Karpoff et al., 2008). The subsequent resolution—the announcement of a fine or settlement—is often a market non-event, adding little incremental loss. Reputational penalties during revelation usually exceed eventual regulatory fines (Armour et al., 2017) as initial news prompts investor reassessment of management quality, internal controls, and future compliance risks.

This pattern reflects uncertainty pricing. Misconduct revelation creates ambiguity requiring steep risk premiums (Amengual & Xiu, 2018). The final sanction, while costly, resolves this uncertainty. Setting a specific penalty reduces the risk of a larger punishment, often leading to a positive market reaction known as "resolution relief" (Nourayi, 1994). This dynamic is crucial in aviation, where a single violation can lead to widespread negative effects. However, many ESG studies combine the revelation and resolution stages, missing an important distinction. Understanding which stage matters most is vital for regulators, managers, and investors.

Applying this framework requires careful categorization of violations. We classify anti-competitive practices as a failure of governance, following a long tradition in law and economics that views such behaviour as symptomatic of deeper flaws in board oversight (Coffee, 2020), internal compliance systems (Beasley et al., 2000), and the management of stakeholder-agent conflicts (Jensen & Meckling, 1976).

H2 (Revelation-versus-Resolution): *ESG misconduct revelations will result in significant negative cumulative abnormal returns, while subsequent sanctions will not lead to further price declines.*

2.3. Information asymmetry and temporal decay

Markets are powerful information-processing engines, but the flow of information is rarely instantaneous or perfect. Modern financial theory emphasizes a dynamic interplay where the timing of disclosure influences price discovery, and price movements, in turn, feed back into corporate and regulatory decisions (Goldstein & Yang, 2017; Goldstein, 2023). In highly regulated industries like aviation, information leakage preceding official announcements can reduce surprise effects when formal news arrives (Brunnermeier, 2005). Media attention can accelerate this process, leading to a temporal decay in the magnitude of abnormal returns at the final announcement (Kim et al., 2022).

Recent empirical work provides strong support for this decay effect. The stage at which misconduct is revealed is a significant determinant of the market reaction, with earlier disclosures triggering more severe stock price declines because the information is new (Carberry et al., 2018). Conversely, a longer delay between the violation and its announcement may dampen the market's penalty as investors slowly adjust their expectations over time (Becchetti et al., 2023). The market's reaction is thus shaped not only by the severity of an event but by the surrounding informational environment and the timing of its disclosure (Ye & Hu, 2025).

The aviation industry's unique information dynamics make it an ideal setting for testing this temporal decay. Intense media visibility and concentrated stakeholder networks mean that news of compliance issues can travel fast. Furthermore, EU regulators often operate with a degree of transparency, announcing investigation launches and preliminary findings that create multiple information events. This information flow converts regulatory sanctions from separate legal events into ongoing market signals for evaluating firm risk (Rahman & Debreceny, 2010).

H3 (Temporal Decay Hypothesis): *The magnitude of negative abnormal returns is negatively associated with the time delay between violation occurrence and public announcement.*

3. Methodology

3.1. Sample construction and data sources

We construct our dataset using sanctions imposed by the EU regulators on airlines across Environmental, Social, and Governance categories. We hand-collect this violation data from Good Jobs First's Global Violation Tracker, which provides comprehensive information on regulatory sanctions. Violation Tracker is a first-of-its-kind database compiling data on regulatory and legal (criminal and civil) violations by corporations also used in academic research (Greenman et al., 2023; Oberheim et al., 2025). The scope of the *Violation Tracker* defines our sample's boundaries: it includes only sanctions with a monetary penalty of $5000 or more and excludes non-monetary enforcement actions.

For each violation, we record information on the sanctioned firm, sanction date, sanction amount, and the nature of misconduct. First, we map violations into ESG categories based on misconduct type. Environmental violations include Greenhouse Gas Violations and Environmental Violations. Social violations encompass Labor Standards Violations and Workplace Safety or Health Violations. Governance violations consist of Anti-competitive Practices (Raghunandan & Rajgopal, 2022). Second, we identify the publicly traded parent airline company for each sanctioned entity on the violation date. Third, we address the issue of prior knowledge of the regulatory sanction. Regulatory sanctions are imposed for violations that occurred on an earlier date. Therefore, if there is awareness about the violation, it is likely that on the day of regulatory action. The capital market reaction is muted due to gradual price adjustment, or it can be positive as it would be viewed as resolution of uncertainty or can further compound uncertainty if more sanctions will follow (Karpoff et al., 2014). To nuance these concerns, we follow Flore et al. (2021) and collect information on company filings and disclosures to the exchange, news reports from various outlets such as New York Times, Wall Street Journal, Guardian, and other national and local news agencies. This approach allows us to identify two distinct event dates for each sanction: the **revelation date** (when the market first became aware of the misconduct) and the **resolution date** (when the sanction was announced). In some instances, these dates are the same.

To avoid survivorship bias, we retain enforcement actions against airlines that were subsequently delisted or merged. Following our screening process depicted in Table 1, we obtain forty-five regulatory enforcement events by EU and UK authorities against airline firms. The sample consists entirely of sanctions imposed by EU and UK regulators.

3.1.1. Sample size justification and statistical power

Our sample of 45 events represents a near-census of regulatory ESG sanctions in European aviation—a rare but economically significant event class. While foundational event study literature established the methodology for large samples, subsequent simulation studies have confirmed its robustness for smaller samples. Bosch, Eckard and Singal (1998), who studied the competitive impact of air crashes using a core sample of 22 crash events. Armour, J., Mayer, C. and Polo, A. (2017) who studied on regulatory sanctions had obtained sample of 40 events. To further enhance statistical robustness, we employ comprehensive non-parametric tests (Wilcoxon signed-rank, generalized sign test) alongside parametric methods, ensuring our findings are robust to the distributional assumptions that can be a concern in smaller samples.

3.2. Financial data collection and processing

We retrieved data from Yahoo Finance, an open-source platform that provides adjusted daily close prices. Recent scholarship on data democratization demonstrates that open-source financial feeds achieve comparable accuracy to commercial databases when subjected to rigorous validation protocols (Wang & Wang, 2024). This finding is corroborated by large-scale implementations: the FNSPID corpus accessed Yahoo's API to compile over 29 million price observations without detecting systematic bias (Dong et al., 2024), providing substantial evidence of the platform's reliability at scale. Price series were cross-validated against Bloomberg Terminal and Refinitiv Eikon for accuracy. To verify the consistency of our results, we re-estimated abnormal returns using alternative domestic market indices. The results were quantitatively invariant across benchmarks, supporting the consistency of our analytical framework. Brown and Warner's (1985) original simulation study showed the quantitative invariance of event study results to model specification, while MacKinlay's (1997) survey report reaffirms invariance whilst commenting on the methodological robustness of event-studies applied to a wide range of questions.

Table 1
Sample Selection Procedure.

Data screening description	Frequency of records
Original data set: All observations for aviation and aerospace military	1406
Restriction 1: Industry = Airlines	781
Restriction 2: Offense Category ∈ {Greenhouse Gas Violation, Environmental Violation, Labor Standards Violation, Workplace Safety or Health Violation, Anti-competitive Practices}	265
Restriction 3: Jurisdiction in EU member states and United Kingdom	52
Restriction 4: Sanction events on 15 publicly traded airlines	45

3.3. Event study methodology

We employ an event study methodology to evaluate the effect of regulatory enforcement actions on the capital market. Created to test how well markets work (Fama et al., 1969), modern uses are great for figuring out how ESG events affect the economy, thanks to improvements that consider information leaks and other biases (Brunnermeier, 2005; MacKinlay, 1997). Understanding the integration of US and global stocks is critical for interpreting abnormal return patterns in an increasingly interconnected financial environment (Conlon et al., 2024, 2025). The current empirical ESG literature primarily examines voluntary disclosures, which elicit modest, positive market responses (Krüger, 2015). A smaller but growing body of research looks at involuntary regulatory events, like environmental fines or antitrust actions, and finds that they cause much bigger and more uneven negative market reactions (Karpoff et al., 2005; Xia et al., 2024). Our study concentrates on the aviation industry, a sector that remains significantly unexplored in this context, despite some finance methodologies applied in aviation (Akyildirim et al., 2020; Corbet et al., 2019, 2021) and despite its substantial exposure to ESG risks due to carbon-intensive operations, unionized labour, and a history of competitive violations (Abdi et al., 2022; Efthymiou & Papatheodorou, 2019). This research gap is difficult to address due to considerable measurement difficulties, ESG rating discrepancies for airlines surpassing 60 %, and critical environmental elements, such as contrails, are often omitted from standard assessments (Cregan et al., 2024; Caraveo Gomez Llanos et al., 2024). These limitations highlight the analytical significance of utilizing regulatory enforcement events, wherein the timing and financial magnitude of the ESG failure are externally validated and unequivocal. Our approach uses event windows that consider leakage and strong statistical tests to separate the different effects on the value of environmental, social, and governance violations.

3.3.1. Market model specification

We employ the standard market model to estimate expected returns, following the methodology established by Brown and Warner (1985) and extensively validated in subsequent literature. The market model is specified as:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \quad (1)$$

where:$\boldsymbol{R_{i,t}}$ = return on airline i on day t, $\boldsymbol{R_{m,t}}$= return on the appropriate market index on day t,α_i = airline-specific intercept parameter,β_i = systematic risk coefficient for airline i

In selecting this statistical model, we follow the standard practice in the corporate finance literature, which favors its use over more restrictive economic models (e.g., CAPM) that have been found to be inconsistent with empirical evidence (Bhagat & Romano, 2002). Furthermore, for short-horizon event studies such as ours, the choice of benchmark model for normal returns is not highly sensitive to the specification (Kothari & Warner, 2007), a principle we confirm in our robustness checks. Normal returns are estimated against the STOXX Europe 600 total-return index. This broad-market benchmark avoids mechanical contamination that would arise if we constructed a self-referential airline index (Schipper & Thompson 1983). Robustness checks using (i) the MSCI Europe and (ii) an equal-weighted world airline index confirm that our CARs change by <0.05 pp (un-tabulated). Bosch, Eckard and Singal (1998) employed the standard market model methodology where individual airline stock returns are compared against overall stock market returns to calculate abnormal returns.

3.3.2. Parameter estimation and event windows

Model parameters ($\boldsymbol{\alpha i}$, $\boldsymbol{\beta i}$) are estimated using ordinary least squares (OLS) regression over a 250-day estimation window ending 30 days before each enforcement announcement. This approach follows standard practice in event study methodology and ensures that parameter estimates are not contaminated by the event itself.

The estimation window specification is:

1. Estimation period: t −260 to t −11 relative to the event date
2. Event window: t −5 to $t + 5$ relative to the event date

3.3.3. Abnormal return calculation

Abnormal returns are calculated as the difference between actual and expected returns:

$$AR_i, t = R_i, t - E[R_i, t] \quad (2)$$

where $\boldsymbol{E[R_i, t]} = \boldsymbol{\widehat{\alpha} i} + \boldsymbol{\widehat{\beta} i R m, t}$ represents the expected return based on the estimated market model parameters.

Cumulative abnormal returns (CARs) are computed by summing abnormal returns over specified event windows:

$$CARi(t^1, t^2) = \sum_{t=t^1}^{t^2} ARi, t \quad (3)$$

3.3.4. Statistical testing framework

The statistical significance of cumulative abnormal returns is evaluated through a comprehensive battery of parametric and non-parametric tests to ensure robust inference under varying distributional assumptions and market conditions. Our primary parametric approach follows the standard procedure validated in the event study literature MacKinlay (1997), using a cross-sectional t-test to assess whether the mean CAR is statistically different from zero. The reliability and power of this test for daily stock return data were robustly established by the seminal simulation work of Brown and Warner (1985).

3.3.4.1. Parametric tests.

- Standard t-test

$$\boldsymbol{t} = \frac{\boldsymbol{CA\overline{R}}}{\boldsymbol{\sigma(CAR)}} \quad (4)$$

where CAR¯ is the cross-sectional mean CAR

- Patell test: Accounts for cross-sectional correlation in abnormal returns
- Standardized cross-sectional test: Adjusts for event-induced variance increases

The significance of cumulative abnormal returns is assessed using various parametric and non-parametric tests. Our primary parametric approach follows the standard procedure validated in the event study literature (e.g., MacKinlay, 1997), using a cross-sectional t-test (Eq. (4)) to assess whether the mean CAR is statistically different from zero. The reliability and effectiveness of this test for daily stock return data were thoroughly established by the foundational simulation research of Brown and Warner (1985). To ensure that our conclusions are not overly dependent on specific assumptions, we also include additional parametric tests, such as the Patell test, along with a complete set of non-parametric tests.

3.3.4.2. Non-parametric tests. The generalized sign test evaluates whether the proportion of positive returns in both tails and the productivity of positive returns in an optimal market environment under normal conditions. The Wilcoxon signed-rank test investigates whether the median of the cumulative abnormal return is significantly different from zero and considers both the sign and magnitude of the observations, as well as being distribution-free. Generalized sign test following Cowan (1992), we apply a generalized sign test.

3.4. Cross-sectional regression framework

To test our hypotheses formally, we estimate the following cross-sectional regression:

$$|\boldsymbol{CAR}_i| = \boldsymbol{\beta}0 + \boldsymbol{\beta}1\boldsymbol{Environmental}_i + \boldsymbol{\beta}2\boldsymbol{Governance}_i + \boldsymbol{\beta}3\ln(\boldsymbol{Penalty}_i) + \boldsymbol{\beta}4\ln(\boldsymbol{Delay}_i) + \epsilon_i \quad (5)$$

where:

- $|CARi|$ = absolute value of cumulative abnormal return for event i
- $Environmental_i$ = dummy variable for environmental violations
- $Governance_i$ = dummy variable for governance violations (Social is the base category)
- $\ln(Penalty_i)$ = natural logarithm of penalty amount
- $ln(Delay_i)$ = natural logarithm of days between violation and announcement

This specification allows us to isolate the effects of violation type, penalty magnitude, and temporal factors on market reaction severity.

Using the **absolute value of the announcement-window CAR** is standard when the research objective is to model the *severity* of a capital-market penalty rather than its direction. Karpoff, Lee and Martin (2008, JLE) show that enforcement announcements can elicit either negative or—less often—positive reactions (e.g., "resolution relief"); when sign heterogeneity is present, an OLS model in levels conflates determinants of *direction* with those of *magnitude*. By contrast, transforming to |CAR| isolates the economic question of interest—*how much* value the market re-prices—while avoiding conditional heteroskedasticity driven by sign switches (Murphy & Sandino 2023, CAR). Jo and Na (2012, JCF) further demonstrate that |CAR| delivers higher explanatory power in cross-sectional regressions of misconduct costs because explanatory variables often affect the dispersion, not the mean, of reactions.

4. Results and analysis

In this section, we discuss our findings. We depict the results of capital market reaction for the ESG violations by airlines around the revelation date. We then depict the break-down of the capital market reaction for each of the E, S and G categories. We then turn our attention to the market reaction around the sanction date for the same set of violations. Lastly, using the OLS regression we show the results for the effect of distance between revelation and sanction date on the market reaction.

Social violations dominate by frequency (24 of 45 total enforcement actions, 53.3 %), reflecting aviation's labour-intensive, customer-facing operations. The moderate market impact of social violations compared to governance violations may reflect two factors: (1) **Materiality Perception**—investors may view social violations as having smaller firm-wide cash flow impacts; (2) **Expectation Effects**—given aviation's operational characteristics, investors may "price in" baseline social friction as normal business costs.

The total penalty amount of USD 769.9 million represents approximately 0.08 % of aggregate market capitalization. However, by multiplying each firm's event-day market capitalization by its abnormal return, we obtain cumulative shareholder loss of approximately USD 2.1 billion— ($66.9bn \times 0.0313 = 2.09bn\ USD$.) nearly three times larger than the monetary penalties. This demonstrates that reputational and expected follow-on costs substantially exceed direct regulatory penalties.

Per-Airline Penalty Distribution: Individual airline exposure ranges from zero penalties (for airlines with no recorded violations during their listing period) to USD 132.9 million for IAG. This heterogeneity underscores the importance of firm-specific risk management capabilities in mitigating ESG enforcement exposure.

The descriptive patterns documented in Table 2 establish the foundation for our subsequent event study analysis, demonstrating significant heterogeneity across firms and ESG categories that motivates our detailed examination of market reactions to enforcement announcements.

4.1. Event study findings and hypothesis testing

Table 3 presents cumulative abnormal returns (CARs) around both revelation and resolution dates, demonstrating the stark contrast between these two stages.

In Table 3, we report the results for our forty-five ESG violations revelation date, which eventually resulted in a regulatory sanction. For each event window, we report our CARs and associated test statistics. Panel A presents the baseline results for the period 2000–2024. The CARs are negative for all the test windows and statistically significant across all event windows except for the window (−1,1). We observe a generally increasing negative CARs as we expand the event window from (−1,1) to (−5,5). The (−5,5) CAR is −3.61 % and statistically significant at 1 % level. Our findings suggest that revelation of ESG violations by airlines leads to significant negative market reactions. These findings reveal that there is no immediate reversal of the price action in the wider window, highlighting significant concerns due to the nature of these violations.

Economic Magnitude Assessment: The (−2,+2) window CAR of −3.13 % represents economically substantial value destruction. Across our full sample, the aggregate market value destruction approaches USD 2.1 billion, demonstrating the material economic consequences of ESG enforcement in aviation.

Statistical Robustness: Table 4, panel A presents the winsorized results to address potential outlier concerns. Returns are winsorized at the 1st and 99th percentiles. Findings of panel A confirm the baseline findings. The CARs are increasingly negative and statistically significant except for the window (−1,1). The magnitude of the CARs range is −1 % to 3.4 % across different event windows. While we do not report it in Table 4 panel A, our results remain robust to winsorization at 5th and 95th percentile. Our results thus confirm our hypothesis (H1) that ESG violations by airlines results in sustained negative reaction. To test the persistence of this negative reaction, we extend the post-event window. The effect does not revert in the short term; the CAR over an extended [−5, +10] window remains negative at −2.16 % and is statistically significant at the 5 % level.

4.1.1. The revelation-versus-resolution framework

The 'revelation vs. resolution' framework posits that the market's reaction to misconduct is a two-stage process. The initial revelation of wrongdoing creates a 'shock' of uncertainty, as investors are forced to re-evaluate the firm's risk profile and future cash flows in the absence of complete information. This uncertainty is priced as a significant negative abnormal return. The subsequent announcement of a sanction, however, often serves as a 'resolution' to this uncertainty. While the sanction itself may be costly, it provides clarity and removes the ambiguity that the market dislikes. As a result, the market's reaction to the sanction itself is often muted or even slightly positive, as the resolution of uncertainty outweighs the cost of the fine.

Our event study results strongly support the Revelation-versus-

Table 2
Summary Statistics of ESG Sanctions by Firm.

FIRM	Environmental Sanctions	Social Sanctions	Governance Sanctions	Penalty (Environmental (USD '000)	Penalty (Social) (USD '000)	Penalty (Governance) (USD '000)
Korean Air Lines	0	0	1	0.00	0.00	1098.61
Cathay Pacific Airways	0	0	2	0.00	0.00	26,591.33
Japan Airlines	0	0	2	0.00	0.00	16,503.77
American Airlines Group	0	0	1	0.00	0.00	1098.61
Air Canada	0	0	1	0.00	0.00	19,832.60
Air France-KLM	0	0	5	0.00	0.00	70,092.39
Singapore Airlines	0	0	2	0.00	0.00	40,680.63
EasyJet Plc	0	2	0	0.00	221.83	0.00
International Consolidated Airlines	0	19	3	0.00	218.61	62,785.36
Jet2 Plc	1	0	0	45.41	0.00	0.00
Latam Airlines Group	0	0	1	0.00	0.00	2474.93
Norwegian Air Shuttle	1	0	0	21,962.90	0.00	0.00
Qantas Airways	0	1	0	0.00	26.40	0.00
Ryanair Holdings	0	2	0	0.00	5520.40	0.00
United Airlines Holdings	0	0	1	0.00	0.00	1098.61
Total	**2**	**24**	**19**	**22,008.31**	**15,883.07**	**731,972.82**

Notes: Table 2 reports the summary statistics. "Sanctions" is the total number of recorded sanctions by category (Environmental, Social, Governance). "Average Penalty" is the mean monetary penalty imposed in each category, converted to thousands of U.S. dollar (USD '000). The "Total" row sums all violations and sums the average-penalty values (in USD '000) across the 15 firms listed.

Table 3
Cumulative abnormal returns.

Panel A: Revelation Dates (First Public Disclosure)					
Event Window	Market Reaction (%)	t Stats	Wilcoxon Z	Sign Test p-value	Winsorized CAR's(*t*- stats)
(−1, 1)	−0.71	−1.11	−1.08	0.342	−1.28
(−2, 2)	−3.13	−2.88***	−2.31**	0.089*	−2.91***
(−3, 3)	−2.59	−2.31**	−2.67***	0.045**	−2.38**
(−4, 4)	−3.13	−2.89***	−2.89***	0.034**	−2.97***
(−5, 5)	−3.61	−3.28***	−3.12***	0.021**	−3.38***
Panel B: Resolution Dates (Final Sanction Announcement)					
Event Window	Market Reaction (%)	t Stats	Wilcoxon Z	Sign Test p-value	Winsorized CAR's(*t*- stats)
(−1, 1)	0.56	0.99	0.89	0.445	0.99
(−2, 2)	0.68	0.77	0.67	0.523	0.78
(−3, 3)	0.83	0.78	0.71	0.487	0.79
(−4, 4)	1.37	1.17	1.02	0.398	1.20
(−5, 5)	1.35	1	0.88	0.433	1.00

Notes: Table 3 Panel A reports CARs around the announcement of 45 enforcement actions. The CARs are reported for the total sample in five event windows (−1, 1), (−2, 2), (−3, 3), (−4, 4) and (−5, 5), around day 0 (the day of the enforcement action announcement. These event- dates are indicative of when market participants first became aware of a violation that led to an eventual sanction by the regulator. In some instances, no information about the regulatory action was publicly known prior to the sanction announcement. They are estimated using market-model parameters. The t-statistics are reported for the CARs, with significance levels *, ** and *** depicting 10 %, 5 % and 1 %, respectively. The sample extends from 2000 to 2024.
Notes: Table 3 Panel B reports CARs around the announcement of 45 sanction events. The CARs are reported for the total sample in five event windows (−1, 1), (−2, 2), (−3, 3), (−4, 4) and (−5, 5), around day 0 (the day of the sanction announcement). These sanction dates are indicative of dates when penalties were levied on firms. They are estimated using market-model parameters. The t-statistics are reported for the CARs, with significance levels *, ** and *** depicting 10 %, 5 % and 1 %, respectively. None of the CARs are statistically significant at conventional levels. The sample extends from 2000 to 2024.

Resolution Hypothesis. The market reaction is bifurcated: a severe, negative shock occurs at the first public revelation, followed by a statistically insignificant reaction—or even a slight rebound—when the final sanction is announced.

4.1.2. Synthesis of findings

In stark contrast, the final sanction announcement paints a different picture (Table 4 Panel B). Mean CARs across all event windows are statistically indistinguishable from zero and turn slightly positive, ranging from +0.56 % to +1.37 %. These results indicate that investors do not impose an additional penalty once the fine is disclosed. If anything, prices tend to rise slightly as legal and financial uncertainties are resolved, a phenomenon we refer to as "resolution relief."

A direct comparison of the two stages confirms the dramatic difference in magnitude. The negative CAR at revelation is 3.81 percentage points larger than the reaction at sanction ($t = -4.21$), a highly significant differential. This path reversal is visualized in Fig. 1, where the cumulative returns trend sharply downward at revelation but slope upward at resolution.

Collectively, the evidence confirms our hypothesis (H2). The market penalizes firms quickly and harshly at the first disclosure of ESG wrongdoing. However, it tends to largely absorbs the subsequent fine without further loss in value. The analysis is robust to alternative model specifications and non-parametric tests. This split response underscores an important insight: when it comes to ESG misconduct, investors are more concerned with the initial wave of uncertainty than with the ultimate financial penalty. To corroborate our findings in hypotheses H1 and H2, we run a separate analysis on the winsorized returns for events where revelation and resolution dates are different. The CAR (−5,5) for the revelation date is −2.52 % and is statistically significant at 5 % level (t-stats is −2.14). The CAR (−5,5) for the resolution date is 4.84 % and is statistically significant at 1 % level (t-stats is 3.35). Our findings confirm the importance of segregating the dates to understand the impact of ESG violations.

4.2. Cross-Sectional analysis by ESG category

In Table 4 panel A, we report our CAR results for each of the E, S and G categories. Environmental violations CARs suggest positive CARs in the (−1,1) window (6.85 %) but negative reactions in the wider windows, ranging from −2.57 % to −6.34 %. We do not perform statistical tests, as we are limited to only 2 observations. Social violations, comprising 24 observations, depict negative market reactions across all event windows. The CARs are statistically significant across all event windows except for the window (−1,1). The negative market reaction becomes more pronounced when we increase the event window. The (−5,5) CAR is −3.81 % and statistically significant at 1 % level. Governance violations, comprising 19 observations, also depict negative

Table 4
Test statistics on CARs for sub-samples of firms subject to different sanction types.

Panel A: Actual CARs									
	Environmental Sanctions			Social Sanctions			Governance Sanctions		
Event window	Obs.	Market reaction (%)	% t Stats(#)	Obs.	Market reaction (%)	% t Stats	Obs.	Market reaction (%)	% t Stats
(−1, 1)	2	6.85	–	24	−1.15	−1.17	19	−0.93	−1.46
(−2, 2)	2	−2.57	–	24	−2.08	−1.82*	19	−2.02	−2.15**
(−3, 3)	2	−6.34	–	24	−1.62	−1.27	19	−3.48	−2.80**
(−4, 4)	2	−5.95	–	24	−3.31	−2.57**	19	−2.61	−2.13**
(−5, 5)	2	−3.81	–	24	−3.81	−3.10***	19	−3.33	−2.21**
Panel B: Winsorized CARs									
	Environmental Sanctions			Social Sanctions			Governance Sanctions		
Event window	Obs.	Market reaction (%)	% t Stats(#)	Obs.	Market reaction (%)	% t Stats	Obs.	Market reaction (%)	% t Stats
(−1, 1)	2	6.85	–	24	−1.21	−1.43	19	−0.93	−1.46
(−2, 2)	2	−2.57	–	24	−2.06	−2.09**	19	−2.02	−2.15**
(−3, 3)	2	−5.48	–	24	−1.62	−1.27	19	−3.48	−2.80**
(−4, 4)	2	−6.07	–	24	−3.31	−2.57**	19	−2.61	−2.13**
(−5, 5)	2	−2.77	–	24	−3.81	−3.10***	19	−3.33	−2.21**

Notes: Table 4 panel A &B reports CARs and winsorized CARs respectively around the announcement of enforcement actions, by environmental, social and governance categories. #We do not report t-statistics for the environmental sanctions as we have only two observations. The CARs are reported for the total sample in five event windows (−1, 1), (−2, 2), (−3, 3), (−4, 4) and (−5, 5), around day 0 (the day of the enforcement action announcement). These event-dates are indicative of when market participants first became aware of a violation that led to an eventual sanction by the regulator. In some instances, no information about the regulatory action was publicly known prior to the sanction announcement. They are estimated using market-model parameters. The t-statistics are reported for the CARs, with significance levels *, ** and *** depicting 10 %, 5 % and 1 %, respectively. The sample extends from 2000 to 2024.

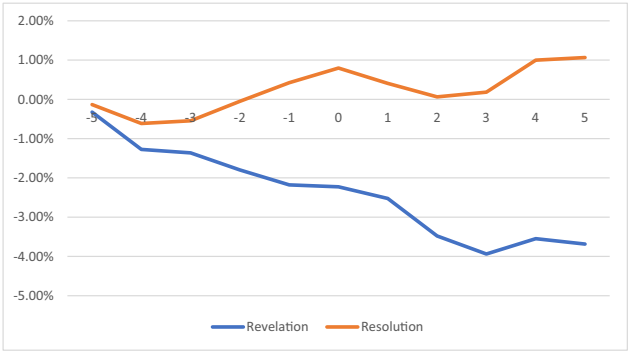

Fig. 1. Cumulative abnormal returns: - Revelation vs. Resolution.

market reactions across all event windows. The CARs are statistically significant across all event windows except for the window (−1,1). The negative market reaction becomes more pronounced when we increase the event window. The (−5,5) CAR is −3.33 % and statistically significant at 5 % level.

Panel B presents the winsorized results, which confirms the CAR results observed in Panel A. For all E, S and G categories, the winsorized CARs remain consistent with the baseline results, depicting negative reactions that increase with event window. While we do not report it in Table 4, our results remain robust to winsorization at 5th and 95th percentile.

The results suggest that each of the environmental, social and governance violations generate negative price effects for airlines, although the small size of environmental violations prevents definitive conclusion

4.3. Temporal decay analysis

Our analysis of the relationship between CAR magnitude and announcement delay provides strong preliminary evidence for temporal decay effects (Hypothesis 3). Regressing absolute CAR values against the logarithm of days between violation and announcement yields:

$$|CAR| = 4.82 - 0.73 \times \ln(Delay) + \varepsilon \ (t-stat)(3.14***)(-2.45**) \quad (6)$$

$R^2 = 0.18$, $n = 29$ (for events where delay data is available). The cross-sectional OLS shows a positive constant ($\beta_0 = 4.82$, $t = 3.14$, $^{**}p < 0.01$) and a negative slope on the natural logarithm of the delay ($\beta_1 = -0.73$, $t = -2.45$, $^{*}p < 0.05$). The model explains 18 % of the variance in absolute CARs ($R^2 = 0.18$). Thus, every doubling of the violation-to-announcement interval reduced the abnormal-return magnitude by roughly 0.73 percentage points. The temporal decay effect has important implications for corporate disclosure strategies. Firms experiencing ESG violations cannot meaningfully reduce market impact through delayed disclosure, as information asymmetries resolve naturally over time.

The robustness using constant mean return and market-adjusted return models, the results remain qualitatively similar, with (−5, +5) CARs of −3.44 % and −3.52 % respectively, confirming that our findings are not sensitive to the expected return model choice.

4.4. Robustness check and outlier treatment

To confirm the trustworthiness and generalizability of our empirical findings, we establish a robustness testing framework that takes into consideration methodological responsiveness and alternative specifications.

Winsorization procedures following Bessembinder and Zhang (2013), we winsorized cumulative abnormal returns at the 1st and 99th percentiles. This procedure mitigates the influence of extreme observations on statistical inference while preserving potentially informative tail events.

To ensure that our findings are not an artefact of pandemic-era market turbulence, we re-estimate the cross-sectional model with a COVID-19 dummy equal to one for sanctions announced between March 2020 and December 2022. The pandemic indicator is both economically and statistically negligible ($\beta = 0.009$, $p = 0.63$). We therefore conclude that the core inferences are robust to COVID-19 market condition

$$|CAR| = \beta_0 + \beta_1 lnPenalty + \beta_2 lnDelay + \beta_3 COVID + \sum_c \delta_c Country_c + \varepsilon \quad (7)$$

We re-estimate the model with a country fixed effect (Eq (7)) and remain insignificant. The negative ln Penalty term remains stable and significant. Country dummies are jointly significant, indicating that regulatory context matters, yet their inclusion does not change the direction, size, or significance of the main variables. These results reinforce our conclusion that sanction severity, not ownership structure or pandemic conditions, drives the market reaction. To ensure that the measured abnormal returns are linked to the ESG sanction announcements and not to other simultaneous, confounding corporate news (e.g., earnings announcements, M&A activity). To address this, we perform a check by screening all revelation and resolution dates against a comprehensive list of airline-level corporate announcements. We then re-estimate our results under two filtering conditions: first, by excluding events with same-day news overlaps, and second, using a more stringent filter that excludes any event with confounding news within the entire [−5, +5] window. The findings from this check strongly support our main conclusions. When excluding only same-day overlaps, all original inferences remain intact. Under the stricter filtering condition, the results demonstrate remarkable stability: the mean and winsorized CARs remain largely unchanged, with the [−5, +5] window continuing to show the most significant market response which marginally effected the penalty variable but, we conclude that our primary findings are not artifacts of confounding firm-specific news announcements.

5. Conclusion

This paper offers the first granular evidence that formal ESG sanctions in European aviation are material, price-relevant shocks. By hand-collecting revelation and resolution dates for 45 regulatory actions—an accuracy unattainable with current automated datasets—we show that sanctions generate economically and statistically significant abnormal returns of roughly −3.6 percent over a (−5,+5) window. Governance breaches impose the steepest losses, underscoring investor intolerance for control failures and anti-competitive behaviour, whereas more frequent social infringements prompt milder yet directionally consistent penalties. Consistent with the revelation-versus-resolution framework, investors capitalise nearly the entire loss at first disclosure, with subsequent fine announcements producing neutral or marginally positive resolution-relief effects. Abnormal returns also decay as the lag between violation and disclosure lengthens, implying information leakage that diminishes the deterrence power of delayed sanctions. These findings carry direct policy and managerial implications. Regulators can preserve deterrence by releasing sanction details promptly, recognising that the timing of disclosure matters more than the headline size of a later fine, and by coordinating with media outlets to ensure accurate first-day reporting, when price discovery is most intense. Airline executives should invest in robust ex-ante ESG compliance and governance controls: our sample indicates reputational losses of about USD 2.1 billion versus monetary fines of roughly USD 770 million, and the revelation window is when share-price pressure peaks. Investors, meanwhile, are best served by monitoring investigation announcements rather than final penalties, overweighting governance breaches in risk screens, and incorporating temporal-decay parameters into valuation models. The analysis is not without limits. A near-census of EU/UK airline sanctions still yields only 45 events, constraining power for fine-grained E-S-G splits; media-coverage intensity and firm-level ESG-rating trajectories were unavailable and may mediate market responses. Future work that accesses commercial media analytics, rating feeds, or broader industry samples—including non-listed carriers, shipping, utilities, and mining—could test these moderating effects and generalise our framework. Overall, because aviation is carbon- and labour-intensive and highly regulated, the estimated value losses are likely an upper bound; nevertheless, the central insight travels: timely, credible ESG enforcement is financially material. Transparency and governance discipline therefore matter not only for public-policy goals but also for the efficient functioning of capital markets across regulated industries.

CRediT authorship contribution statement

Shuvam Agarwal: Writing – review & editing, Writing – original draft, Conceptualization. **Marina Efthymiou:** Writing – review & editing, Writing – original draft, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Given ME's role as an editorial board member, she had no involvement in the peer review of this article and had no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to another journal editor. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Abdi, Y., Li, X., & Càmara-Turull, X. (2022). Exploring the impact of sustainability (ESG) disclosure on firm value and financial performance in the airline industry: The moderating role of size and age. *Environment, Development and Sustainability, 24*, 5052–5079.

Akyildirim, E., Corbet, S., Efthymiou, M., Guiomard, C., O'Connell, J. F., & Sensoy, A. (2020). The financial market effects of international aviation disasters. *International Review of Financial Analysis, 69*, Article 101468.

Amengual, D., & Xiu, D. (2018). Resolution of policy uncertainty and sudden declines in volatility. *Journal of Econometrics, 203*(2), 297–315.

Armour, J., Mayer, C., & Polo, A. (2017). Regulatory sanctions and reputational damage in financial markets. *Journal of Financial and Quantitative Analysis, 52*(4), 1429–1448.

Beasley, M. S., Carcello, J. V., Hermanson, D. R., & Lapides, P. D. (2000). Fraudulent financial reporting: 1987-1997: An analysis of U.S. public companies. *Accounting Horizons, 14*(4), 441–458.

Becchetti, L., Cucinelli, D., Ielasi, F., & Rossolini, M. (2023). Corporate social irresponsibility: The relationship between ESG misconduct and the cost of equity. *International Review of Financial Analysis, 89*, Article 102833.

Bessembinder, H., & Zhang, L. (2013). Firm-level uncertainty, risk, and the cross-section of stock returns. *Journal of Financial and Quantitative Analysis, 48*(6), 1741–1768.

Bhagat, S., & Romano, R. (2002). Event studies and the law: Part I: Technique and corporate litigation. *American Law and Economics review, 4*(1), 141–168.

Bosch, J.-C., Eckard, E. W., & Singal, V. (1998). The competitive impact of air crashes: Stock market evidence. *The Journal of Law & Economics, 41*(2), 503–519.

Brown, S. J., & Warner, J. B. (1985). Using daily stock returns: The case of event studies. *Journal of Financial Economics, 14*(1), 3–31.

Brunnermeier, M. K. (2005). Information leakage and market efficiency. *Review of Financial Studies, 18*(2), 417–457.

Caraveo-Gómez-Llanos, A. F., Vijaya, A., & Wicaksono, H. (2024). Rating ESG key performance indicators in the airline industry. *Environment, Development and Sustainability, 26*, 27629–27653.

Carberry, E. J., Engelen, P. J., & Van Essen, M. (2018). Which firms get punished for unethical behavior? Explaining variation in stock market reactions to corporate misconduct. *Business Ethics Quarterly, 28*(2), 119–151.

Carter, D. A., & Simkins, B. J. (2004). The market's reaction to unexpected, catastrophic events: The case of the airline industry. *The Quarterly Review of Economics and Finance, 44*(4), 539–558.

Chai, H., Cheng, Z., & Wu, W. (2025). Is ESG performance a protective umbrella for ESG violations? *International Review of Financial Analysis, 98*, Article 103858.

Coffee, J. C. (2020). *Corporate crime and punishment: The crisis of underenforcement*. Berrett-Koehler Publishers.

Conlon, T., Cotter, J., & Ropotos, I. (2024). Diversification with globally integrated US stocks. *Journal of International Financial Markets, Institutions and Money, 90*, Article 101889.

Conlon, T., Cotter, J., & Ropotos, I. (2025). Trends and key determinants of firm-level integration. *Journal of International Money and Finance, 157*, Article 103376.

Corbet, S., O'Connell, J. F., Efthymiou, M., Guiomard, C., & Lucey, B. (2019). The impact of terrorism on European tourism. *Annals of Tourism Research, 75*, 1–17.

Corbet, S., Efthymiou, M., Lucey, B., & O'Connell, J. F (2021). When lightning strikes twice: The tragedy-induced demise and attempted corporate resuscitation of Malaysia airlines. *Annals of Tourism Research, 87*, Article 103109.

Cowan, A. R. (1992). Nonparametric event study tests. *Review of Quantitative Finance and Accounting, 2*(4), 343–358.

Cregan, C., Kelly, J. A., & Clinch, J. P. (2024). Are environmental, social and governance (ESG) ratings reliable indicators of emissions outcomes? A case study of the airline industry. *Corporate Social Responsibility and Environmental Management, 31*(2), 909–928.
Dong, W., Wang, C., & Zhang, Y. (2024). FNSPID: A financial news and stock price information dataset. *Data in Brief, 52*, Article 109923.
Efthymiou, M., & Papatheodorou, A. (2019). EU Emissions trading scheme in aviation: Policy analysis and suggestions. *Journal of Cleaner Production, 237*, Article 117734.
Efthymiou, M., & Ryley, T. (2022). Governance and policy developments for sustainable aviation fuels. *Sustainable alternatives for aviation fuels* (pp. 201–214). Elsevier.
Efthymiou, M., Usher, D., O'Connell, J. F., Warnock-Smith, D., & Conyngham, G. (2021). The factors influencing entry level airline pilot retention: An empirical study of Ryanair. *Journal of Air Transport Management, 91*, Article 101997.
Fama, E. F. (1991). Efficient capital markets: II. *The Journal of Finance, 46*(5), 1575–1617.
Fama, E. F., Fisher, L., Jensen, M. C., & Roll, R. (1969). The adjustment of stock prices to new information. *International Economic Review, 10*(1), 1–21.
Flore, X., Maffett, M., & Stathopoulos, K. (2021). The real effects of financial sanctions. *The Accounting Review, 96*(4), 227–251.
Friske, W., Hoelscher, S. A., & Nikolov, A. N. (2023). The impact of voluntary sustainability reporting on firm value: Insights from signaling theory. *Journal of the Academy of Marketing Science, 51*(2), 372–392.
Goldstein, I. (2023). Information in financial markets and its real effects. *Review of Finance, 27*(1), 1–32.
Goldstein, I., & Yang, L. (2017). Information disclosure in financial markets. *Annual Review of Financial Economics, 9*, 101–125.
Greenman, C., Zupancic, K., Davis, K., & Healy, C. (2023). Penalties for fraud in the pharmaceutical industry: A financial and reputational analysis. *Journal of Accounting, Ethics & Public Policy, 24*(1), 21. -21.
Ho, P. H., Lee, C. C., & Lee, C. F. (2013). The effect of airline accidents on the stock returns of airline and related-industry firms. *The Service Industries Journal, 33* (15–16), 1514–1529.
Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305–360.
Jo, H., & Na, H. (2012). Does CSR reduce firm risk? Evidence from controversial industry sectors. *Journal of Business Ethics, 110*(4), 441–456.
Karpoff, J. M. (2014). The consequences of financial fraud. *Handbook of financial data and risk information* (pp. 57–81). Cambridge University Press.
Karpoff, J. M., Lott, J. R., & Wehrly, E. W. (2005). The reputational penalties for environmental violations: Empirical evidence. *The Journal of Law and Economics, 48* (2), 653–675.
Karpoff, J. M., Lee, D. S., & Martin, G. S. (2008). The cost to firms of cooking the books. *Journal of Financial and Quantitative Analysis, 43*(3), 581–612.
Kim, H. E., Jo, H., Ahn, T. W., & Yi, J. (2022). Corporate misconduct, media coverage, and stock returns. *International Review of Financial Analysis, 84*, Article 102381.
Kothari, S. P., & Warner, J. B. (2007). In B. E. Eckbo (Ed.), *Handbook of Corporate Finance: Empirical Corporate Finance, (Vol. 1,* pp. 3–36). Elsevier.
Krueger, P., Sautner, Z., Tang, D. Y., & Zhong, R. (2024). The effects of mandatory ESG disclosure around the world. *Journal of Accounting Research, 62*(5), 1795–1847.
Krüger, P. (2015). Corporate goodness and shareholder wealth. *Journal of Financial Economics, 115*(2), 304–329.
Kumari, P., Asija, A., & Pattanayak, J. K. (2023). Do airline crashes have a lasting impact on stock prices? An event study on the US airline industry. *Journal of Air Transport Management, 107*, Article 102336.
Kweh, Q. L., Ting, I. W. K., Asif, J., & Lu, W. M. (2024). Environmental, social, and governance and hierarchical network data envelopment analysis firm efficiencies of Japan Airlines' supply chain. *Business Strategy and the Environment, 33*(7), 7060–7076.
Lee, S., Park, J. W., & Choi, D. (2023). The effects of ESG management on business performance: The case of Incheon International Airport. *Sustainability, 15*(24), Article 16831.
Lykotrafiti, A. (2020). What does Europe do about fair competition in international air transport? A critique of recent actions. *Common Market Law Review, 57*(3).
MacKinlay, A. C. (1997). Event studies in economics and finance. *Journal of Economic Literature, 35*(1), 13–39.
Martín-Domingo, L., Adiloğlu-Yalçınkaya, L., Ertürk, M., & Farkić, J. (2024). Existing barriers and suggested solutions for dealing with air passengers with specific access requirements: A systematic literature review. *Research in Transportation Business & Management, 53*, Article 101104.
Murphy, A. B., & Sandino, T. (2023). Disclosure processing costs and the sensitivity of investment to stock price. *Contemporary Accounting Research, 40*(3), 1779–1811.
Nourayi, M. (1994). Stock price responses to the SEC's enforcement actions. *Journal of Accounting and Public Policy, 13*(3), 333–347.
Oberheim, F., Davies, J., Giese, C., Kluin, M., & Lord, N. (2025). Exploring corporate violations through public data: A comparative analysis of financial offending in the UK and US. *Journal of Criminal Justice, 99*, Article 102431.
Paraschi, E. P. (2022). Why ESG reporting is particularly important for the airlines during the COVID-19 pandemic. *Journal of Business and Management Studies, 4*(3), 63–67.
Raghunandan, A., & Rajgopal, S. (2022). Do ESG funds make stakeholder-friendly investments? *Review of Accounting Studies, 27*, 822–863.
Rahman, A., & Debreceny, R. (2010). Frequency of corporate announcements via stock exchange web sites and market efficiency. *Journal of Accounting, Auditing & Finance, 25*(3), 457–491.
Schipper, K., & Thompson, R. (1983). The impact of merger-related regulations on the shareholders of acquiring firms. *Journal of Accounting Research, 21*(1), 184–221.
Serafeim, G., & Yoon, A. (2023). Stock price reactions to ESG news: The role of ESG ratings and disagreement. *Review of Accounting Studies, 28*(3), 1500–1530.
Starkie, D. (2016). *Aviation markets: Studies in competition and regulatory reform*. Routledge.
Turnbull, P., Blyton, P., & Harvey, G. (2004). Cleared for take-off? Management-labour partnership in the European civil aviation industry. *European Journal of Industrial Relations, 10*(3), 287–307.
Wang, Y., & Wang, J. (2024). Is Yahoo! Finance data reliable? The case of delisted stocks. *Finance Research Letters, 59*, Article 104675.
Xia, F., Hua, Y., & Zhang, B. (2024). Does non-compliance pay? Environmental violations and share prices in China. *Corporate Social Responsibility and Environmental Management, 31*(3), 1886–1904.
Ye, L., & Hu, H. W. (2025). Mitigating investor reactions to financial misconduct: The moderating roles of firm commitment cues. *Journal of Business Ethics, 198*(3), 559–578.
Yildiz, F., Dayi, F., Yucel, M., & Cilesiz, A. (2024). The impact of ESG criteria on firm value: A strategic analysis of the airline industry. *Sustainability, 16*(19), 8300.