Economics Bulletin

Volume 45, Issue 3

ESG practices and corporate financial performance: Evidence from the airline industry during the Russian-Ukrainian war

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Abstract

This paper investigates the impact of Environmental, Social, and Governance (ESG) performance on airlines' financial outcomes during the Russian–Ukrainian war, employing a Difference-in-Differences (DiD) approach. We focus on the airline industry due to its competitiveness and pronounced exposure to geopolitical risks. Our DiD analysis reveals that European airlines, which are more directly affected by the conflict, experienced significantly greater post-war losses than their non-European counterparts. However, firms with higher ESG scores exhibited stronger resilience, mitigating the war's adverse effects. These findings offer novel evidence that robust ESG practices can help firms and investors navigate non-hedgeable geopolitical crises.

Citation: Yao Xie and Sang Baum Kang and Jialin Zhao, (2025) "ESG practices and corporate financial performance: Evidence from the airline industry during the Russian-Ukrainian war", *Economics Bulletin*, Volume 45, Issue 3, pages 1421-1430
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Submitted: April 03, 2025. **Published:** September 30, 2025.

1. INTRODUCTION

Environmental, Social, and Governance (ESG) investing considers environmental, social, and governance factors in investment decision-making. It has gained significant traction, resulting in assets under management totaling $8.4 trillion, 13% of the U.S. market ($66.6 trillion) (US SIF 2022). However, recent criticism questions whether resource-intensive ESG initiatives enhance financial performance and, if so, through what mechanisms. For instance, retirement funds using ESG screening have sparked heated political debates, especially regarding their impact on investment returns and fiduciary responsibilities. In March 2023, President Biden rejected a Congress proposal aimed at overturning a Labor Department rule enabling retirement fund managers to consider ESG factors. In January 2024, President Trump started his second term as President of the United States, marking the start of an administration characterized by significant shifts in trade, immigration, and foreign policy. These changes have sparked extensive national and international debate, potentially including the nature of ESG investing.

Such a debate critically depends on the relationship between corporate social responsibility (CSR) and corporate financial performance (CFP). Scholarly investigations on this topic have reported a positive relationship (Friede et al., 2015; Lee et al., 2016; Nollet et al., 2016), a negative relationship (Duque-Grisales and Aguilera-Caracuel, 2021; Wang and Sarkis, 2017), and an inconclusive result (Galema et al., 2008; Horváthová, 2010; Soana, 2011). The absence of a strong consensus underscores the need for fresh empirical insights into this discourse. In addition, researchers express concerns about the limited understanding of the mechanisms by which ESG commitments affect firm performance (Rahman et al., 2022; Vishwanathan et al., 2020; Wang and Bansal, 2012; Whelan et al., 2021). Consequently, lawmakers and regulators maintain valid skepticism regarding the utilization of ESG criteria in investment decisions.

In recent years, a growing body of research has emerged to explore the underlying mechanisms that influence the relationship between ESG practices and firm performance (Abdi et al., 2022; Chen and Xie, 2022; Fatemi et al., 2018; Leite and Uysal, 2023; Naseem et al., 2020; Rahman et al., 2023; Resende et al., 2024). Abdi et al. (2022) investigate the impact of ESG practice disclosures on financial performance and examine whether a firm's size and age influence these effects. Chen and Xie (2022) document that ESG disclosures attract ESG investors, who positively moderate the relationship between ESG ratings and financial performance. Leite and Uysal (2023) find that firms with high ESG scores experience a more significant positive reaction in stock prices to credit rating updates. Rahman, Zahid, and Al-Faryan (2023) explore the moderating roles of sustainability strategy and top management commitment in the relationship between ESG and firm performance.

This paper offers a novel contribution to the ongoing debate. Our research question is motivated by the interplay of two lines of thought established in existing literature. First, companies that proactively address societal and environmental concerns gain a competitive edge in recognizing and mitigating risks (Waddock and Graves, 1997). Active stakeholder engagement promotes transparent disclosure of business practices, which in turn reduces the propensity for management to take excessive risks and increases stakeholders' trust and cooperation during crises, resulting in the "insurance effect" (Lins et al., 2017; Shiu and Yang, 2017). Second, financial theories assert that financial hedging affects firm performance by diminishing bankruptcy costs (Mayers and Smith, 1990; Smith and Stulz, 1985), addressing the underinvestment problems (Froot, Scharfstein, and Stein, 1993), and curbing anticipated tax liabilities (Smith and Stulz, 1985). A

more recent study by Pandher and Sun (2023) argues that the adoption of risk management practices, including financial hedging, operational hedging, and strategic hedging, can lead to a more right-skewed earnings distribution for firms. This statistical shift, they contend, enhances the firm's average financial performance and overall value. Connecting these two facets, we hypothesize that firms with higher ESG ratings tend to perform better during the crises. The airline sector is particularly suitable for this study due to its vulnerability to geopolitical risks, such as those presented by the Russian-Ukrainian war. Additionally, with highly price-sensitive customers, airlines face challenges in passing on price increases. To test this hypothesis, we employ Difference-in-Differences (DiD) models to analyze the financial performance of 16 publicly traded airline companies from 12 countries during the Russian-Ukrainian war. The DiD models are one of the most commonly used econometric techniques to address omitted variable bias and mitigate unobserved confounders.

Our paper contributes to the literature in two ways. Firstly, our paper addresses a critical knowledge gap identified by researchers regarding the mechanisms linking ESG practices to financial performance (Rahman et al., 2022; Vishwanathan et al., 2020; Whelan et al., 2021). This gap has hindered the broader adoption of ESG principles by firms and investors. In response, our study provides empirical evidence demonstrating ESG's positive role in mitigating losses during crises—a particularly relevant insight amid rising geopolitical conflicts. Secondly, we contribute to the literature of financial risk management in the airline industry by examining the integration of ESG practices and financial performance during the war, joining a line of literature including Carter et al. (2017) and Cao and Conlon (2023).

The remainder of this article is organized as follows. Section 2 summarizes the data and research design. Section 3 reports and discusses the results. Finally, Section 4 concludes.

2. DATA AND RESEARCH DESIGN

2.1 Data

Table 1 lists the airline firms ultimately selected for analysis in this study. Further details on the selection process are provided in Section 2.2. The sample period spans 13 years, from 2011 to 2023, resulting in a total of 208 firm-year observations. ESG scores for these airlines were obtained from Morningstar Sustainalytics. To evaluate the impact of ESG practices on firm performance, particularly on cash flows and balance sheets, we use Return on Assets (*RoA*) as our firm performance measure. Additionally, we include control variables such as Leverage Ratio (*LEV*), Firm Size (*SIZE*), and GDP Growth (*GDP*). Definitions and measurement details for all variables are provided in Table 2.

Table 3 provides descriptive statistics for the variables employed in this study. Notably, *RoA* has an average of 0.00, spanning a range from -0.44 to 0.23. This observation aligns with the anticipated impact of the COVID-19 pandemic on the industry. The airline industry boasts an average ESG score of 60.15, suggesting a relatively higher performance compared to other sectors.

Table 1: Airlines.

Note: Our analysis involves 16 publicly traded airline firms representing 12 countries. Our original dataset includes a larger number of airlines. The final selection of 16 airlines was based on paring non-European with European firms using propensity score matching. Further details on the pairing process are provided in Section 2.2. Firms with negative equity are excluded.

Name	Country
Delta Air Lines Inc	United States
Air France-KLM	France
United Airlines Holdings Inc	United States
Southwest Airlines Co	United States
Japan Airlines Co Ltd	Japan
Norwegian Air Shuttle ASA	Norway
Wizz Air Holdings PLC	Hungary
Ryanair Holdings PLC ADR	Ireland
Deutsche Lufthansa AG	Germany
ANA Holdings Inc	Japan
Cathay Pacific Airways Ltd	Hong Kong
International Consolidated Airlines Group SA	Spain
JetBlue Airways Corp	United States
Qantas Airways Ltd	Australia
Singapore Airlines Ltd	Singapore
easyJet PLC	United Kingdom

Table 2: Variables Definitions.

Note: Data are collected from 2011 to 2023.

Variable	Measure	Definition	Source
Panel A. Dependent Variable			
Corporate Financial Performance	*RoA*	Return on Assets and Return on Equity	Compustat
Panel B. Explanatory Variables			
ESG Scores	*ESG*	Environmental, Social and Governance Score	Sustainalytics
Panel C. Control Variables			
Leverage Ratio	*LEV*	The ratio of total debts to total assets	Compustat
Firm Size	*SIZE*	Natural logarithm of Market Capitalization	Compustat
GDP growth	*GDP*	The growth rates of GDP	FRED

Table 3: Descriptive Statistics

Note: This table summarizes corporate finance performance (*RoA*), ESG performance (*ESG*), and control variables (*LEV*, *SIZE*, and *GDP*).

	Mean	Min	Max	Std. Dev.	Skew	Excess Kurt.
RoA	0.00	-0.44	0.23	0.09	-1.65	5.36
ESG	60.15	38.00	77.12	8.24	-0.19	-0.63
LEV	0.38	0.00	0.92	0.18	0.07	-0.08
SIZE	16.73	14.25	20.39	3.87	-0.25	-0.89
GDP	2.32	-29.9	35.3	6.84	0.139	20.047

2.2 Difference-in-Differences Model

Improving ESG performance could potentially enhance a firm's financial success. Conversely, when a firm performs well financially, it may positively influence its ESG ratings, as the increased resources allow for additional investment in sustainable and responsible growth initiatives. Such a bi-directional association between ESG and firm performance calls for controlling endogeneity (Waddock and Graves, 1997; Zahid et al., 2020). The endogeneity concerns are addressed in this study by using DiD models. Provided the parallel trends assumption is satisfied (Roberts and Whited, 2013), the DiD approach estimates the causal effect of a treatment (intervention or exogenous event) by analyzing the difference in response variables before and after treatment in a treatment group relative to a control group.

In this article, we employ the DiD method to test our hypotheses in the context of the Russian-Ukraine war, a geopolitical event with significant economic implications for the airline industry. Although the Russian-Ukraine war has far-reaching consequences worldwide, it disproportionately affects European airlines on a larger scale. This study considers European airlines as the treatment group and non-European airlines as the control group. The comparison groups are formed using propensity score matching, which balances covariates to reduce the bias due to confounding variables. Specifically, first, we employ a probit regression model to estimate the propensity scores using firm-level observables, including ESG, LEV, $SIZE$, and GDP, from 2011 to January 2022, prior to the outbreak of the war in February 2022. Next, we match each European airline with one non-European airline with the closest propensity score in January 2022. Rematching occurs for the sequential years.

The parallel trend assumption is tested and satisfied, with results available upon request. Table 4 displays the mean covariate values for the treatment and control groups, showing that firm characteristics are relatively close between the two groups.

Table 4: Average Covariate for Treatment and Control Groups

Note: This table presents the average covariate values for the treatment group (i.e., European airlines) and the control group (i.e., non-European airlines).

	Treatment Group: European Airlines	Control Group: Non-European Airlines
ESG Score	65.747	67.424
LEV	0.474	0.485
SIZE	15.640	16.263
GDP	2.03	2.37
Number of Airlines	8	8

We expect the drop in profits following the war's outbreak to be more significant for European airlines than for non-European airlines. To test this hypothesis, we estimate the following model using data from 2021 to 2023, intentionally excluding the peak period of the COVID-19 pandemic. Given that the war began in early 2022, our selected sample encompasses observations from both pre-war and post-war periods.

$$RoA = \beta_{Euro} I_{Euro} + \beta_{war} I_{war} + \beta_{Euro,war} I_{Euro} I_{war} + Controls + \epsilon. \quad (M1)$$

where RoA stands for Return of Asset; $I_{Euro} \equiv 1$ for European airlines and $I_{Euro} \equiv 0$ for non-European airlines; $I_{war} \equiv 1$ for years after the Russian-Ukraine war outbreak and $I_{war} \equiv 0$ otherwise; and $Controls$ include control variables LEV, $SIZE$, and GDP. In this DiD model, β_{Euro} quantifies the effect of European airlines' properties not captured by the control variables, β_{war} represents the effect of after-war periods, and $\beta_{Euro,war}$ shows the effect of war on the treatment group. If European airlines experience more profound losses after the war, the empirical analysis is expected to yield a negative $\beta_{Euro,war}$.

In addition, we hypothesize that firms with high ESG scores are more likely to overcome hardship during crises. In such a case, the after-war performance drop of European airlines should be less pronounced for high-ESG firms than for low-ESG firms. The following 3-way DiD model tests this hypothesis.

$$RoA = \beta_{ESG} ESG + \left(\beta_{Euro} I_{Euro} + \beta_{Euro,ESG} I_{Euro} ESG\right) + \left(\beta_{war} I_{war} + \beta_{war,ESG} I_{war} ESG\right) + \left(\beta_{Euro,war} I_{Euro} I_{war} + \beta_{Euro,war,ESG} I_{Euro} I_{war} ESG\right) + Controls + \epsilon. \quad (M2)$$

here β_{ESG} quantifies the sensitivity of firm value to ESG performance, $\beta_{Euro,ESG}$ that to ESG for the treatment group, $\beta_{war,ESG}$ that to ESG after the war outbreak, and $\beta_{Euro,war,ESG}$ that to ESG for the treatment group after the war. If the after-war performance drop of the treatment is less pronounced for a high-ESG firm than for a low-ESG firm, we expect a positive $\beta_{Euro,war,ESG}$ in the empirical analysis.

3. RESULTS AND DISCUSSION

Table 5 reports the results. In the post-war period, all firms experienced a financial downturn, as indicated by the significantly negative β_{war} in both M1 (a DiD model not considering the role of

ESG) and M2 (a DiD model considering the role of ESG). Furthermore, we observe a significantly negative $\beta_{Euro,war}$ of -2.051 in M2, suggesting that European airlines (the treatment group) suffered greater losses following the onset of the Russian-Ukrainian war than non-European airlines (the control group).

Table 5: Hypothesis Tests using Difference-in-Differences

Note: This table presents the results of the DiD tests. Numbers in parentheses are standard errors. *, **, and *** represent significance at the 90%, 95%, and 99% confidence levels, respectively.

Slope (p-value)	M1	M2
β_{Euro}	0.027 (0.429)	-1.545** (0.020)
β_{war}	-0.164*** (0.017)	-2.294*** (0.007)
β_{ESG}		-0.029*** (0.001)
$\beta_{Euro,ESG}$		0.018*** (0.036)
$\beta_{war,ESG}$		0.034*** (0.005)
$\beta_{Euro,war}$	-0.004 (0.415)	-2.051*** (0.002)
$\beta_{Euro,war,ESG}$		0.034*** (0.020)
Intercept	(Included)	(Included)
Control Variables	(Included)	(Included)
N	48	48
Adjusted R^2	0.22	0.43

In the DiD model considering the role of ESG in connection with financial performance (M2), we find a significantly negative β_{ESG} of -0.029, implying that a high ESG score does not necessarily correspond to increased firm value in the airline industry with price-sensitive customers. In fact, ESG initiatives are costly. While the literature on the relationship between ESG scores and financial performance remains mixed, our findings align closely with Abdi et al. (2022), who report that both the Environmental (E) and Social (S) dimensions of ESG are negatively associated with firm value in the airline industry, and that only the Governance (G) dimension is positively associated. However, it is worth noting that we document a significantly positive $\beta_{war,ESG}$ of 0.034 in M2, suggesting that the sensitivity of firm value to ESG scores turns positive after the outbreak of the war. This finding joins a stream of literature documenting the changes in the financial markets due to the conflict (Umar et al., 2022).

Additionally, a significantly positive $\beta_{Euro,war,ESG}$ of 0.034 supports our hypothesis that high-ESG European airlines perform better than their low-ESG counterparts in response to the challenges posed by the Russian-Ukrainian war. This observation also motivates further studies

into the role of risk management as the mechanism through which ESG influences firms, addressing a research gap identified in a comprehensive study by Vishwanathan et al. (2020).

As a robustness check, we repeated the analysis using Return on Equity (*RoE*) as the measure of firm performance instead of Return on Assets (*RoA*). The findings remain consistent, and the results are available upon request.

4 CONCLUSION

This paper employs DiD models to examine the relationship between ESG practices and the financial performance of airline firms during a geopolitical crisis—the Russian-Ukrainian war. Using data from 16 publicly traded airline firms across 12 countries from 2011 to 2023, our analysis reveals that airlines with higher ESG scores demonstrated greater resilience, exhibiting smaller declines in performance. Our findings provide evidence from the airline industry—a sector particularly susceptible to global disruptions—that ESG practices can serve as a risk mitigation tool against non-hedgeable risks, such as those arising during geopolitical crises. These results contribute to the ongoing debate about the financial benefits of ESG integration and offer valuable insights for future research exploring the mechanisms linking ESG practices with firm financial performance.

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