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Stock Market Reaction to the Recurring Incidents at Boeing: An Event Study Analysis

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ABSTRACT

This paper examines the short-term market reaction of aircraft commercial manufacturers and airline industry for eight Boeing aircraft incidents occurred in the first semester of 2024. Using an event study, we observe a negative and statistically significant stock price reaction for Boeing around the dates of the aircraft incidents and positive statistically significant abnormal returns to its rivals Airbus and Embraer. The competitive effect explains this result. As for the airline industry, the results do not show the existence of statistically significant effects on share prices. The absence of fatalities associated with these events helps to explain the lack of statistical significance for airline industry. However, a more detailed analysis of the sample reveals different patterns of behaviour of airline share prices—a negative and statistically significant abnormal return for airline firms with a fleet with a high weight of Boeing aircraft, for low-cost carriers and for airlines with a poor safety record. Since all of these airlines use Boeing aircrafts, it seems there is a 'guilt by association' effect. These reactions are also reinforced or mitigated by airline-specific characteristics such as size, leverage, and firm age. Practical implications of our findings are provided.

1 | Introduction

Airline safety reputation as perceived by passengers plays a substantial role in airline choices (e.g., Siomkos 2000). Recently, there has been frequent news of incidents involving Boeing aircrafts, which, despite not causing fatal accidents[1], have raised fears about travelling on these aircrafts and led to the postponement and cancellation of new purchase orders by airline firms[2]. For example, in the case of Ryanair, whose aircraft fleet is entirely made up of Boeing aircrafts, recent incidents with Boeing aircrafts led to the postponement of the delivery of 30% of the aircrafts ordered and thus a reduction in planned flights[3].

The cancellation of routes due to the inspection of Boeing aircrafts and the reduction in the pace of deliveries leads many airlines, especially low-cost carriers, to question whether the option for Boeing 737-Max planes has been the best strategic option. The Boeing 737-Max was created for the ultra-competitive environment of the airline industry and, as Boeing claims, can provide fuel savings of 15%–20% and a 14% reduction in CO_2 when compared with its predecessors, a substantial saving for airlines[4]. For these reasons, the Boeing 737-Max was identified as a future operational game-changer in a highly competitive market. The recent incidents involving Boeing aircrafts call into question these potential gains for the airline industry.

In this study, we investigate the short-term market reaction of aircraft commercial manufacturers and the airline industry to eight Boeing aircraft incidents that occurred in the first semester of 2024. We have three main contributions. First, to our best knowledge, this study is the first attempt to investigate the impact of airline incidents that occurred within a short period of time (one semester), which did not cause fatalities and relate to a single aircraft commercial manufacturer (Boeing). Second, this study enhances the literature on accident causes. Due to safety underinvestment leading to reported safety failures, we introduce manufacturing (in)safety as a factor contributing to these incidents, in addition to the factors identified by Boyd (2015). This also allows us to understand the shift of managerial approach from engineering and safety to financial risk-averse and cost-cutting (Mukunda 2014). Third, since aviation accidents/incidents are new information about firms, this work makes valuable contributions through three main strands of literature. On the one hand, as in Kaplanski and Levy (2010), we assess the impact of investor sentiment on stock prices, particularly how accidents can provoke negative emotions such as a bad mood, increased anxiety, and fear. These feelings often lead to a pessimistic outlook regarding future risks and returns. In this context, media coverage of disasters often amplifies negative emotions, adversely affecting company share prices. Ho et al. (2013) conclude that airline accidents with higher fatalities attract more attention from media coverage (and also social media with malicious and misinformation, as suggested by Akyildirim et al. 2020). This leads to greater public attention and anxiety with adverse effects on share prices. The way investors perceive recurring accidents is influenced by their ability to pay attention and assimilate information. Due to their limited capacity to process information, this can negatively affect how promptly they understand data regarding aircraft accidents. In contrast, our article differs in focusing on aviation incidents without fatalities. Although studies with fatalities have a negative impact on abnormal returns (e.g., Ho et al. 2013), the recurring effect of accidents in our study can also attract greater media attention and raise awareness among less attentive investors, which can lead to a negative effect similar to the first. We also address the effects of the accident severity, which seems to have undesirable effects on investor sentiment. On the other hand, we study the potential indirect effects of aviation disasters on Boeing's reputation. A poor safety reputation can negatively affect both airlines and manufacturers. Travellers may switch airlines, impacting revenue, and question aircraft choices based on safety. Based on Ni et al. (2014), if they blame airlines for not choosing compliant manufacturers, they expect revenue loss for the airline. But if they see airlines following the rules, they may blame the manufacturer instead, anticipating revenue declines for them. Negative perceptions of their aircraft can adversely affect their demand and future cash flows. Also, this study adds new insights into the reputational contagion effect on their competitors and airline companies (Cioroianu et al. 2021). Finally, given that accidents involving Boeing not only lead to direct and indirect costs for the firm but also affect its manufacturing rivals and the airline industry, our study improves the understanding of how incidents involving Boeing affect the stock prices of both aircraft manufacturers and airline companies, examining whether they benefit from a competitive effect or suffer from a contagion or spillover effect (Lang and Stulz 1992; Fang et al. 2024).

The results indicate a negative and statistically significant stock price reaction for Boeing around the dates of the aircraft incidents and positive statistically significant abnormal returns to its rivals Airbus and Embraer. These results indicate the prevalence of the competitive effect over the contagion effect. The results also seem to show a negative reputational effect of safety on Boeing and a positive reputational effect on its rivals. However, regarding the airline industry, we did not find empirical evidence of the existence of statistically significant abnormal returns. The absence of fatalities associated with these aircraft incidents helps to explain the lack of statistical significance for the airline industry. Thus, in reputational terms, investors seem to blame the manufacturer, which may be associated with expectations of reduced cash flows and demand for Airlines to satisfy the interests of their consumers/travellers (as explained by Ni et al. 2014).

We also evaluate the influence of airline fleet composition (weight of Boeing aircraft), the influence of the business model (low-cost vs full-service carriers) and the impact of airline safety record on the cumulative average abnormal returns. Our results reveal a negative and statistically significant abnormal return for airline firms with a high weight of Boeing aircrafts in its fleet, for low-cost carriers, and for airlines with a poor safety record. These negative abnormal returns are reported in airlines using aircraft from the same incident manufacturer. Airlines with a high weight of Boeing aircraft in their fleet are exposed to the risks arising from aircraft Boeing incidents, as they absorb the reputational risk of Boeing in the process, without a clear option to hedge or diversify, except by purchasing different aircrafts or cancelling orders. The low-cost carriers, with their focus on a single type of aircraft for cost minimisation purposes and not having a strong perceived reputation with consumers for safety and reliability when compared with legacy flag carriers, are more exposed to the negative effects caused by these airline incidents. Airline safety is an important aspect of product quality (e.g., Rose 1992), where the results reveal that airlines with a poor safety record have worse stock market performance around airline incidents. Finally, our results also show that these reactions are reinforced or mitigated by airline-specific characteristics such as size, leverage, and firm age.

The remainder of this paper is organised as follows. Section 2 reviews the relevant related literature. Section 3 provides the testable research hypotheses. Section 4 presents the data and the event study methodology. In Section 5 we present and discuss our main findings. Section 6 concludes.

2 | Literature Revision

2.1 | Boeing Safety Incidents: A Brief Analysis

Boeing was under financial pressure to compete with the Airbus 320 neo aircraft and subsequently increased the pressure on the 737-Max program to compete. Most airlines, especially low-cost carriers, are very sensitive to fuel costs, and as such they try to avoid fuel-inefficient aircrafts, to which the Boeing 737-Max was identified as a future operational game-changer in a highly competitive market. This resulted in an extensive effort to cut costs, maintain the 737-Max program schedule, and not slow down the 737-Max production line (e.g., Cioroianu et al. 2021).

In this way, decisions at Boeing have been made based on cost and maintaining market share. The exogenous pressures placed on the firm by management resulted in decisions being made for financial purposes as opposed to regulatory purposes, including actively working to ensure that the engineering solutions would be minimised to ensure regulatory compliance. However, the recent recurring incidents with Boeing aircrafts resulted in a safety concern, inducing fear in flying for airlines with Max or large numbers of similar in name and appearance Boeing 737 aircrafts, with subsequently hurt in load factors of these airlines.

A recent report from National Transportation Safety Board (NTSB) for Federal Aviation Administration (FAA) reveals the existence of quality control failures on the part of Boeing[5]. The FAA gave Boeing 90 days to present a plan to resolve the 'systemic quality control issues'. The audit carried out on the production of the 737-Max revealed 33 failures in 89 tests and 97 cases of alleged non-compliance. Boeing's alleged acts, omissions, and errors occurred across multiple stages and areas of the development and certification of the 737-Max.

Indeed, for most of its history, Boeing had a product-centred corporate culture, and power within the firm was in the hands of engineers. However, in 1997, Boeing merged with McDonnell Douglas and shifted its strategy to reduce production costs. As a result, hundreds of aircraft parts are now manufactured by various subcontractors, and subcontracting can entail challenges in ensuring quality controls at every stage. This fact, combined with the reduction in workforce, lack of skills (technicians and safety inspectors) and crises in the supply chain that followed COVID-19, contributed to the increase in safety failures. Mukunda (2014) argues that McDonnell Douglas' culture came to dominate Boeing's and that the cost-cutting that followed, ensured that the high-quality engineering that an aircraft demand could not be maintained. He also refers to the existence of significant differences in the managerial approaches of Boeing and McDonnell Douglas. The former's approach was that of 'engineering' whereas McDonnell Douglas was 'risk-averse and focused on cost-cutting and financial performance'. Over time the McDonnell Douglas culture came to dominate. This helps explain why Boeing has become focused on costs and competitiveness and has recently neglected safety issues.

2.2 | Stock Market Impact of Airline Incidents

In this subsection, we will analyse the impact that airline accidents/incidents tend to have on aircraft commercial manufacturers, their rivals, and their customers (airline industry) based on three main strands of literature.

The first driver of price reaction is based on investor sentiment. Kaplanski and Levy (2010) analyse the influence of airline accidents on stock prices while considering the role of sentiment. The authors emphasise that airline accidents could cause negative sentiment due to bad moods and anxieties and may in turn affect the stock prices of airlines. Goodell et al. (2023) explain that adverse events, such as disasters, capture investors' attention, catalyse emotions and lead to changes in stock prices.

Investor sentiment is related to their beliefs about future cash flows and risks, which may not always align with the actual facts (Baker and Wurgler 2007), and negative feelings from accidents can lead investors to adopt pessimistic outlooks on future risks and returns. Additionally, media coverage of disasters amplifies those negative feelings. Ho et al. (2013) conclude that airline accidents with higher fatalities tend to receive more media coverage and attract greater public attention and anxiety, which can adversely affect stock prices. Also, social media seems to spread malicious information and misinformation, which can further harm market sentiment (Akyildirim et al. 2020).

To understand investing sentiment, it is crucial to recognise how investors process information about incidents. Based on the limited cognitive resources of investors, Peng and Xiong (2006) emphasise the allocation of attention among investors important to the capital market. Besides media coverage, investors' perceptions of the impact of recurring accidents also rely on how they assimilate publicly available information about these events.

Firms often delay sharing negative news, such as safety issues, until necessary. However, recurring aircraft accidents provide valuable information insights. Investors have different levels of attention due to their limited capacity for processing information (Hirshleifer and Teoh 2003). This leads to underreaction to public announcements, as investors tend to focus only on certain information, reflecting their cognitive limitations. Peng and Xiong (2006) show that limited investor attention leads investors to look more at market and sector-wide information than firm-specific information. We conjecture that the recurrent accidents contain information regarding the aircraft accidents and their financial consequences. Because of market inefficiencies caused by investors' limited attention (Peng and Xiong 2006; Mbanga et al. 2019), the market generally fails to process the information contained in these aircraft accidents in a timely manner. Due to investors' limited attention, Gokalp et al. (2020) find that general investors and general mutual funds fail to understand the information contained in auto customer complaints to get profit, but mutual funds that focus on the target industry appear to pay more attention to that negative event before the recall event. This study suggests that different investors pick up different information from the publicly available information on recalled products, which they reflect in their investment decisions. In the aviation industry, despite several 'Services bulletins' with information on aircraft safety, maintenance, or product improvement, which help to understand and realise potential flaws in aircraft[6], incidents/accidents that can provoke negative feelings or sentiments in investors continue to occur. Due to investors' limited attention to these aircraft recurrent incidents with no fatalities and very low media coverage, we expect investors not to have a significant reaction to the incidents. However, since Boeing shareholders are mainly informed institutional shareholders, it could also be expected that they can use the accident event information to trade consistently.

In this context, it is also important to realise the severity of the problem associated with the incident/accident, since there is greater severity when there are severe injuries and deaths than when there are no fatalities. The literature associated with product recall finds that problem safety severity is negatively related to the firm's stock price (e.g., Ni et al. 2014; Martins and Pires 2025).

Second, since travellers highly value safety reputation when choosing airlines (Siomkos 2000) and flights (Molin et al. 2017), aviation accidents/incidents have important indirect costs related to reputation, which could lead to decreased demand, profits, and cash flows. Accidents/incidents provide insights into the companies involved and create negative signals about future performance (Akyildirim et al. 2025), increasing reputational damage. Airlines' shares are greatly affected by reputational damage, while engine manufacturers initially don't seem to suffer the same influence (Akyildirim et al. 2021). Therefore, it is important to analyse the reputational effect on both manufacturers and their rivals (intra-industry reputational spillover), as well as the potential reputational contagion effect on third-party clients. Thus, Boeing-related incidents are likely to negatively affect associated airlines.

A poor safety reputation can negatively affect the airline or the aircraft manufacturer, or both. Travellers can alter their travel decisions and change the airline they use for their trips, directly affecting their cash flows. Airlines also tend to rethink their investments in purchasing aircraft from other manufacturers. Thus, the decisions of travellers/consumers can directly affect airlines and indirectly affect aircraft manufacturers. In a similar way to that defined in Ni et al. (2014) for product recall announcements, travellers/consumers can attribute the issue of aircraft safety to airlines or aircraft manufacturers. Thus, on the one hand, travellers/consumers may believe that the airline should choose aircraft suppliers that are able to comply with product safety standards, establish an effective inspection plan, or ensure that product safety standards are met. In these cases, investors expect a significant reduction in future revenues from the airline when an incident/accident has occurred. On the other hand, if travellers/consumers believe that there are few alternatives in the aircraft manufacturer's market and that the airline has followed all regulations regarding aircraft use, they are likely to react negatively towards the manufacturer. In this case, the travellers/consumers are not blind and can see that the fault lies not with airlines using the aircraft but with the manufacturers who produce them. As a result, investors should not anticipate a decrease in future revenues for the airline involved in the incident, but rather for the manufacturer itself.

Third, the direction of the financial impact of airline accidents/incidents on rivals' financial values depends on the interaction of two competing effects—the contagion effect and competitive effect (e.g., Lang and Stulz 1992; Ahmed et al. 2002). The negative spillover effect or contagion effect arises when the airline accidents/incidents news also influences the business of the whole industry, with consumers showing concerns about air-travel safety, which results in a decline in overall air travel demand. Furthermore, after airline accidents/incidents, investors may anticipate upward industry-wide insurance rate adjustments (e.g., Mitchell and Maloney 1989) and tightened industrial regulations (e.g., Chance and Ferris 1987). Such increased operating costs reduce expected cash flows, possibly leading to stock price decreases for all firms in the industry.

The opposing effect is the competitive effect, whereby rivals may benefit from negative information due to consumers' switching behaviour from the products involved in negative events to close substitutes. This is the switch effect, as explained by Ho et al. (2013).

The impact of negative information as a result of an aircraft accident/incident on rivals' stock prices is largely a combination of both the positive competitive effect and the negative spillover effect, and the overall impact highly depends on which effect dominates in different situations. As explained by Fang et al. (2024), when the stock markets perceive that the negative effect is only associated with a particular airline, the competitive effect may dominate, and rivals will benefit from the transfer value of the airline involved in the negative accident/incident. In contrast, when the negative effect heightens the risk perception of the entire industry, the negative spillover effect is likely to occur and all airlines in the industry may suffer. The extent of negative impact is largely dependent upon the similarity or dissimilarity of the rivals to the target firm. Greater similarity to the target firm generates more substantial loss for the rivals—'guilt by association' effect (e.g., Roehm and Tybout 2006).

These two competing effects can also be used to explain the expected impact in terms of market value of the recent incidents involving 737-Max aircrafts, on the firm that produces them, Boeing, and on its rivals. According to the product recall literature (e.g., Liu and Varki 2021; Fang et al. 2024), if investors believe that the airline safety issues with Boeing aircrafts are unique, idiosyncratic, only limited to Boeing, and consumers (airline industry) may switch from Boeing aircrafts to other close substitutes (essentially Airbus and Embraer), we expect that rivals will benefit from such a switching demand and experience positive financial returns upon the Boeing aircraft incidents (i.e., a positive competitive effect). Thus, as the severity of the hazard associated with the Boeing aircraft recall increases, so do the positive abnormal returns for the rivals (e.g., Fang et al. 2024).

In contrast, if investors are concerned that the Boeing safety problems may infiltrate the whole industry and consumers may reduce their demand for airlines temporarily or permanently, Boeing rivals will suffer financial losses as well (i.e., a contagion effect) (e.g., Liu and Varki 2021).

There is a set of stylized facts in the literature relating to the effects of airline disasters on airlines, their rivals, and aircraft commercial manufacturers' stocks. Borenstein and Zimmerman (1988) and Mitchell and Maloney (1989) examined the changes in equity value following accidents and found evidence that airlines which experienced fatal accidents were subsequently penalised by profitability declines. Walker et al. (2005) employing a sample of 138 airline accidents involving US carriers, between July 1962 and December 2003, find an average stock price drop of 2.8% within one trading after the corresponding news announcement, while aircraft manufacturers experienced a stock price drop of only 0.8% during that period. Ho et al. (2013) examine the stock market impact of airline accidents on market value of the airlines that encountered a crash together with their rival carriers. They found that the afflicted airlines experienced deeper negative abnormal returns as the degree of the fatality increases. However, stock prices of rivals' airlines also suffer in large-scale disasters but benefit somewhat from the disasters when the fatality is minor. The explanation given by the authors for the domain of the ‘switch’ effect in small-scale airline disasters is that low fatality airline accidents receive less attention from the public and concerns about air travel safety. On the contrary, large-scale airline accidents tend to attract more attention from the media. Intensive and constant follow-up reports in the media for such devastating accidents reinforce greater fears and anxieties from the public than less serious ones. As a result, the non-crash airlines may also suffer as the bad news creates a contagion of fear of air travelling that spreads through the public. More recently, Akyildirim et al. (2020) reveal the existence of high levels of share price volatility in the aftermath of airline accidents. They observe that share price volatility appears to be significantly influenced by the scale of the disaster in terms of the fatalities generated, with evidence suggesting the existence of significant contagion and information flow effects upon the broad aviation industry.

Regarding the impact of airline accidents on the market returns of engine manufacturers (e.g., Akyildirim et al. 2021) and aircraft commercial manufacturers (e.g., Krieger and Chen 2015), the evidence reveals a decrease in the market value of aircraft manufacturing firms after an accident. Akyildirim et al. (2021) find a loss of 1.64% (average 1 day loss) in the immediate aftermath of airline accidents. The authors argue that when an airline accident occurs, there is widespread allocation of blame and responsibility, which has left engine manufacturers exposed until the true cause is identified. This can generate many issues with regard to reputational damage and the ability to obtain financing. They also obtain evidence that airline accidents tend to affect the profitability and financial structure of engine manufacture's, with net income falling sharply in the aftermath of the months following a major airline accident that involves an aircraft that utilises an engine created by one of the engine manufactures in their sample. Further, there is evidence of a dampening effect on financial leverage of the firm. As for the impact of airline accidents on aircraft commercial manufacturers’ stock prices, Krieger and Chen (2015) found a quick downturn of nearly 50 basis points of negative abnormal returns after an airline accident. Careful consideration of the cause of the accident, however, reveals a striking difference in market reaction based on the potential fault of the aircraft commercial manufacturers. Those airline accidents believed to have some potential link to the manufacturer see stock prices continue to drift significantly downward in the weeks following crashes. However, aircraft commercial manufacturers stock prices rebound significantly upward when no fault is linked to the manufacturer.

2.3 | Cross-Sectional Analysis of Market Impact

We evaluate the relation between the observed cumulative average abnormal returns and a set of airline-specific attributes found important in the literature. They include size, institutional ownership, leverage, profitability, firm age, airline safety index, weight of Boeing aircraft in airline fleet, and a dummy controlling low-cost carriers (e.g., Malighetti et al. 2011; Fardnia et al. 2021; Martins and Cró 2022, 2023).

Firm size is one of the firm-specific standard control variables. Literature shows that size affects the firm's market power advantage, economies of scale, and financial performance in the end (Titman and Wessels 1988). Empirical studies on the impact of airline accidents on airline's financial value reveal contradictory results. Walker et al. (2005) observe that airlines' abnormal returns are negatively related to firm size. However, Rose (1992) reveals the existence of a positive relationship between these two variables. According to the author several factors could make safety investment levels of large airlines less variable, thus providing guarantees of greater security: (i) better public information about underlying safety levels (reducing information asymmetries); (ii) a better access to capital markets or ‘deeper pockets’ for internal financing; (iii) a more closely examination by the regulator of larger airlines. Finally, the product recall literature shows that the firm size tends to mitigate the negative effects in firm's market value caused by the announcement of product recalls (e.g., Chen et al. 2009; Ni et al. 2016). Larger firms have greater resources and greater financial slack (Chen et al. 2009) sending a signal to the market that they have superior production technology and greater safety and quality of their products, compared to small firms (Ni et al. 2016).

Firms with high levels of debt tend to face constraints in terms of investments, with shareholders considering it a good policy to cut discretionary investments, such as quality ones, favouring increased current cash flows, in order to avoid immediate financial difficulties (e.g., Maksimovic and Titman 1991). Under an external shock, an increase in leverage tends to signal an increase in business risk. Kini et al. (2017) show that firms with high indebtedness tend to cut investments in quality and thus the probability of product recalls tends to increase.

Regarding the profitability variable, Kang and Stulz (1997) state that investors prefer firms with high ROA as this is an indicator of management efficiency. According to this perspective, since Pérez-Granja et al. (2024) also indicate that airlines with greater profitability are less likely to experience accidents, we expect a positive impact of profitability on airlines' stock market returns.

Following Boehmer and Kelley (2009) and La Porta et al. (2002), we include in the cross-sectional analysis a variable related to institutional ownership. Both studies state that institutional investors tend to be better informed than other market participants, and for them, value maximisation is pivotal. Given the focus on the profitability of institutional investors and the fact that airline incidents could affect the optimal investment portfolio strategy (Liu et al. 2003), it is to be expected that institutional investors temporarily interpret the aircraft incidents as a high-risk event and react to it negatively, reducing the weight of their investment in the airline industry, especially in the airlines involved in the incidents. In firms with large institutional ownership, Carpentier and Suret (2021) evidence not only that stock prices decrease more after destructive industrial accidents (that also include airplane crashes) but also that potentially nondestructive incidents provoke smaller negative stock price reactions.

Like Martins and Cró (2022), we included in the cross-section analysis a dummy controlling the low-cost effect. Cioroianu et al. (2021) argue that low-cost airlines, with their focus on a single type of aircraft for cost minimisation purposes, absorb substantial reputational effects following aircraft incidents. As highlighted by the authors, the low-cost airlines in an attempt to obtain cost savings through the improved fuel efficiency of the 737-Max, inadvertently exposed themselves to the side effects of mutually exclusive production cost-cutting and development limitations imposed by Boeing management. Full-service airlines, as legacy flag carriers, have strong reputations with consumers for safety and reliability when compared with low-cost carriers. Furthermore, they tend to have more mixed fleets allowing a diversification of reputational effects in the aftermath of aircraft incidents (Cioroianu et al. 2021).

A firm's age is also considered as potential moderator of airline CAR's. Firm age plays a role in a way that represents the experience of a company. Experienced firms are more likely to learn about their abilities and about how to come up with strategies to survive better as they grow older (e.g., Baker and Kennedy 2002). However, it is also believed that older firms are not able to capture the value from entrepreneurial strategies as their younger counterparts are (e.g., Anderson and Eshima 2013). This is supported by other researchers such as Hannan and Freeman (1984) and Malighetti et al. (2011) who found that age can have adverse effects on performance and market valuation, respectively. Organisational rigidities and impaired firm's ability to perceive valuable signals explain the adverse results found by Hannan and Freeman (1984).

For air travellers, airline safety is an important aspect of product quality (e.g., Rose 1992). Rose (1992) using a direct measure of safety, finds that profitability is correlated with lower accident and incident rates. Fleischer et al. (2015) evidence that airline demand is affected by accidents, as it shows that travellers prefer to choose airlines with better safety rankings. More recently, Fardnia et al. (2021) documented an inverse relationship between an airline's profitability and their accident propensity.

Finally, we also directly control the effects caused by the (non) diversification of the fleet on airline stock market returns after an aircraft incident. We expect a negative spillover effect or contagion effect for airline firms with a high weight of Boeing aircraft in their fleet due to incidents involving Boeing aircrafts (e.g., Ahmed et al. 2002; Lang and Stulz 1992). For these airlines, it is expected that consumers concerned about aircraft safety reduce demand for their services, and thereby benefit the other airlines (competitive effect) who see an increase in its demand. Airline firms that are Boeing customers, thus tend to absorb Boeing's risk in the process ('Guilt by association', Roehm and Tybout 2006), without a clear option to hedge or diversify except by purchasing different aircrafts or cancelling orders.

3 | Research Hypotheses

This event study aims to examine whether announcements about incidents involving aircrafts produced by Boeing affect the stock market returns of Boeing, its industry competitors, and its consumers—the aviation industry. Bearing in mind the conducted literature review, we make an assumption that it does. Therefore, the first three research hypotheses might be described as follows:

H1a. *Incidents involving Boeing' aircrafts affect the short-term stock market returns of Boeing.*

The incidents that occurred in the first semester of 2024 with Boeing aircrafts, despite not having caused deaths, according to the literature on product recalls, tend to negatively affect Boeing's cash flows due to one or more of the following reasons: loss of sales of the product recalled; loss in goodwill that can affect current and future sales of other existing products; and the possibility of high litigation or new regulation costs (e.g., Ahmed et al. 2002). Therefore, it is generally expected that product recall has a negative impact on the financial values of the recalling firms.

H1b. *Incidents involving Boeing' aircrafts affect the short-term stock market returns of its industry competitors, in this case, Airbus and Embraer.*

According to the literature, the impact of these events on the market value of rival firms will depend on two competing effects: the negative spillover effect or contagion effect and competitive effect (e.g., Lang and Stulz 1992; Ahmed et al. 2002). The extent of each effect is largely dependent upon the similarity or dissimilarity of the rivals to the target firm (Boeing) in terms of various firm characteristics (firm size, target market, marketing strategy, …). Greater similarity to the target firm generates more substantial loss for the rivals-'guilt by association' effect identified in Roehm and Tybout (2006).

H1c. *Incidents involving Boeing' aircrafts affect the short-term stock market returns of its consumers, in this case, the aviation industry.*

According to Borenstein and Zimmerman (1988) the aircraft incidents may affect airline demand in two ways. On the one hand, if passengers perceive that air travel safety has declined system-wide, the aggregate demand for flights may decline as travellers use other modes of transportation, thus affecting all firms in the aviation industry. On the other hand, if passengers attribute the fault only to the airline firm that operated the crashed aircraft, or only to airlines that operate identical aircrafts, they may avoid flying with these airlines and switch to one of its competitors. This would leave aggregate demand unchanged but could cause intra-industry demand shifts away from the crashed airline to its rival firms.

Furthermore, the reputational effects caused by incidents involving Boeing aircraft tend to be more pronounced in airline firms with a high weight of Boeing aircraft in their fleet (i.e., with a lack of diversification of its fleet) (e.g., Cioroianu et al. 2021), mostly low-cost firms and with a poor safety record, which leads to the following hypothesis:

H2. *Incidents with Boeing aircrafts affect more negatively the abnormal returns of airlines with a greater weight of Boeing aircrafts in its fleet and low-cost airlines.*

Finally, we extend the analysis to other airline-specific characteristics, namely, size, leverage, profitability, ownership, and firm age. Thus, our last research hypothesis is the following:

H3. *Abnormal returns around Boeing aircraft incidents announcements, vary across airlines and are driven by airline-specific characteristics.*

4 | Data Selection and the Event Study Methodology

4.1 | Data

We use the dates of eight Boeing aircraft incident events that occurred in the first semester of 2024, in which no fatalities were recorded: (i) the incident involving an Alaska Airlines 737 Max in which a door was ripped off mid-flight, which forced an emergency landing (January 5, 2024); (ii) National Transportation Safety Board (NTSB) Report referring to the existence of anomalies and serious technical problems in Boeing 737 MAX aircrafts (February 6, 2024); (iii) the incident involving an Alaska Airlines 737 Max in which the cargo hold door was found open just after landing (March 1, 2024); (iv) the incident involving a United Airlines 777 which forced an emergency landing in Los Angeles (March 7, 2024); (v) the incident involving a United Airlines 737 Max in which the landing gear broke shortly after landing at the Houston airport in Texas (March 8, 2024); (vi) the incident involving a LATAM 787 Dreamliner flying from Sydney to Auckland that suddenly nosedived over the Tasman Sea (March 11, 2024); (vii) the incident involving Southwest Airlines from Phoenix to Oakland that experienced a Dutch Roll (May 25, 2024); (viii) the incident involving a Korean Air 737 Max 8 departing from Incheon (South Korea) bound for Taiwan, that experienced a fault with the cabin pressurisation system, where 15 passengers reported injuries of hyperventilation and eardrum pain (June 23, 2024), as event dates to compute abnormal returns (ARs).

The data used in the event study is collected from different sources. Airline stock returns were obtained from Refinitiv Eikon. The list of 55 listed airlines considered in the analysis is presented in Appendix I. The US and China, with 11 and 6 listed airlines, respectively, are the most represented in the table, where more than 30% of airlines are listed in these two markets.

For the cross-section analysis, we use eight firm-specific variables: size, ownership concentration, leverage, ROA, firm age, airline safety record, a low-cost dummy, and the ratio of aircrafts produced by Boeing in the total airlines fleet. The first four variables are calculated from the most recent year-end accounting figures available and were obtained from Refinitiv Eikon. Firm age was calculated based on information collected from the airline's website. The JACDEC airline safety index is used as a proxy for the airline's safety record. The index is available here: https://www.jacdec.de/. The low-cost dummy variable was built based on information collected from the International Civil Aviation Organisation (ICAO)[7]. Finally, the last variable (weight of Boeing aircrafts in airlines fleet) was built based on information collected from each airline's websites about the composition of their aircraft fleet. Panel 10 of Table 3 provides control variables descriptive statistics from our dataset.

4.2 | Event Study Methodology

In the analysis of the short-term market impact of the Boeing aircraft incidents on Boeing, its industry competitors, and its consumers (airline firms) market values, we employ the event study methodology. This methodology has been the standard method to measure stock price reaction to some announcements or events since it was introduced by Fama et al. (1969). The literature shows that event studies have been used for two major reasons: (i) to test stock market efficiency and (ii) to examine the impact of some events on stock markets.

We use the standard abnormal returns technique based on the market model and the Fama and French (1993) three-factor model[8] to measure the stock market impact of the eight Boeing aircraft incidents in the first semester of 2024. The benchmark used to forecast expected airline returns $E(R)$ was the country's total return market index. The Fama–French factors SMB (small minus large market capitalization risk factor) and HML (high book-to-value minus low-book-to-value risk factor) are obtained from the homepage of Kenneth French at Dartmouth College[9]. We use the dates January 5th, February 6th, March 1st, 7th, 8th, and 11th, May 25th, and June 23th as event dates ($t=0$) to compute abnormal returns (ARs) of the eight events mentioned in the previous subsection, which are obtained by the difference between observed returns of stock i on day t and the expected return generated by the market model and Fama and French (1993) three-factor abnormal returns, as follows:

$$AR_{it} = R_{it} - E\left(R_{it}\right) \quad (1)$$

Usually, event studies geared to financial data employ an estimation window of roughly 30 to 100 days (Moser and Brauneis 2023). The use of an extended estimation window, given the temporal proximity of some of the analysed events, will tend to increase the number of overlapping event situations. For that reason, we choose an estimation window of 30 days. By cumulating the ARs over a particular time interval, we obtain the cumulative abnormal returns (CARs) as follows:

$$CAR\left[t_1, t_2\right] = \sum_{t_1}^{t_2} AR_t \quad (2)$$

In the present study $t_1 = -1$ and $t_2 = 1$ or 5. Therefore, two different time intervals for the CARs were considered—[−1, 1] and [−1, 5], in the analysis of the financial impact of the eight Boeing aircraft incidents in the first semester of 2024. Identical temporal windows were chosen by Martins and Cró (2022). Finally, by averaging the CARs across the eight Boeing aircraft incidents, it is possible to obtain the cumulative average abnormal returns (CAARs).

The literature on event-study hypothesis testing covers a wide range of tests. Generally, significance tests can be classified into parametric and nonparametric tests (e.g., Serra 2004). Parametric tests assume that the individual security's abnormal returns are normally distributed, whereas nonparametric tests do not rely on any such assumption. However, in event studies with overlapping event windows, cross-sectional correlation among security returns may lead to an estimation bias in conventional test statistics. This bias increases the likelihood of rejecting the null hypothesis of zero average abnormal returns. Therefore, in order to solve the existing problem of overlapping events in the sample, following Kolari and Pynnönen (2010, 2011) and Kolari et al. (2018), we employ the Adjusted Patell (Adj. Patell) and Kolari and Pynnönen (KP) test statistic to evaluate the statistical significance of our CAR estimates.

4.3 | Cross-Sectional Analysis

To estimate the impact of the airline-specific characteristics on the cross-sectional variation of cumulative average abnormal returns, we estimate the following equation by OLS:

$$CAAR_i = \beta_0 + \beta_1 \ln\left(SIZE_i\right) + \beta_2 OWN_i + \beta_3 TLEV_i + \beta_4 ROA_i + \beta_5 LCD_i + \beta_6 AGE_i + \beta_7 AS_i + \beta_8 BO\_F_i + \varepsilon_i \quad (3)$$

where, $CAAR_i$ are the cumulative average abnormal returns for the eight Boeing aircraft incidents of airline firm i, calculated using the Fama–French three-factor model; $SIZE_i$ is the total assets (natural logarithm of total assets, millions of euros) of airline firm i; OWN_i is the cumulated ownership of the three main shareholders (%) of airline firm i; $TLEV_i$ is the ratio of total debts to total assets (%) of airline firm i; ROA_i is the ratio of operating income to total average assets (%) of airline firm i; LCD_i is a dummy variable that takes the value 1 for low-cost carriers and 0 otherwise; AGE_i is the number of years since the airline i was founded; AS_i is the JACDEC airline safety index[10] of airline firm i; BO_F_i is the ratio of aircrafts produced by Boeing in the total fleet (%), and ε_i is the error term. The estimation of Equation (3) is carried out using country fixed effects. The reason for choosing these control variables and their expected effect on the stock market are explained in Section 2.3.

5 | Results

5.1 | Abnormal Return

Panels 1 to 8 of Tables 1 and 2 show the cumulative abnormal returns for commercial aircraft manufacturers around the eight incidents without fatalities with Boeing aircrafts, calculated using the market model and the Fama–French three-factor model, respectively. Panel 9 of Tables 1 and 2 presents the CAARs. Abnormal returns are very similar to the market model and the Fama–French three-factor model. The results show a negative and statistically significant stock price reaction for Boeing around the dates of the aircraft incidents and positive statistically significant abnormal returns to its rivals Airbus and Embraer. The Adjusted Patell (*Adj. Patell*) and Kolari and Pynnönen (*KP*) test statistic show that there is a level of statistical significance of at least 5%. The former negative reaction is aligned with the investor sentiment suggested by Kaplanski and Levy (2010). Investors seem informed about the impact of the accident and react accordingly. These results highlight the reputational damage to Boeing and the advantages its rivals can gain. These results, for both Boeing and its rivals, are consistent with the competitive effect (like in Fang et al. 2024, and Ho et al. 2013), which envisages a redistribution of wealth within the industry. Boeing, experiencing an unexpected decrease in demand due to a drop in production efficiency and/or its airlines, has become less attractive in relation to the competitors' products; this information is positive for the other firms in the industry because it represents opportunities for predatory actions of rival firms, which tend to result in increases in demand for these firms (Bolton and Scharfstein 1990; Lang and Stulz 1992). These results show a switch effect since the accident/incident has opposed effects on Boeing and its rivals, with the negative impacts on the former seeming to be captured to benefit the latter. So, the abnormal returns obtained for aircraft commercial manufacturers lead us to reject the null hypothesis of no significant aggregate market reaction to the aircraft commercial manufacturers (H1a and H1b).

Regarding the impact of eight incidents with Boeing aircrafts on airline firms, the results presented in Table 3 (market model) and Table 4 (Fama–French three-factor model) indicate a lack of statistical significance of the abnormal returns. Contrary to previous results, we cannot reject the null hypothesis of no significant aggregate market reaction for the airline industry—H1c. According to Ni et al. (2014), airlines don't seem to experience a negative reputation as a result of the accidents because travellers/consumers don't blame them. The results show that investors are well aware that the manufacturer is to blame. In our opinion, the absence of fatalities associated with these events helps to explain the lack of statistical significance for the airline industry. As highlighted by Ho et al. (2013), only when there is an airline accident with a death toll in the two-digit or three-digit number, does the airline industry experience significant reductions in equity value, indicating the 'contagion' effect of large-scale disaster within the entire airline industry.

5.2 | Return Differences Between Boeing Fleet Weight, Business Model and Airline Safety Record

We also evaluate the short-term stock market impact of airline fleet composition (weight of Boeing aircraft), the influence of the business model (low-cost vs full-service carriers) and the impact of the airline safety record on airlines' cumulative average abnormal returns. Regarding airline fleet composition and airline safety record, like Lang and Stulz (1992), we divided the sample into two subsamples—above and below the sample median. Regarding the business model, the sample was divided into two subsamples depending on whether the airline firms were low-cost or full-service carriers. The results are presented in Table 5.

The results reveal a negative and statistically significant CAARs for airlines with a high weight of Boeing aircrafts in their fleet and for low-cost carriers. Airlines with a dominance of Boeing aircrafts in their fleet present negative and statistically significant abnormal returns, while airlines with a smaller presence or lack of Boeing aircrafts in the fleet present positive and statistically significant abnormal returns. The result of the two-sample t-test for the differences in terms of CAARs between the two samples reveals statistically significant (5% significance level). As explained before, airlines with a dominance of Boeing aircrafts in their fleet absorb all the (reputational) risk of Boeing, without a clear option to hedge or diversify, except by purchasing different aircrafts or cancelling orders.

TABLE 1 | Commercial aircraft manufacturers CARs and results of abnormal returns tests—market model.

Aircraft manufacturer	CAR [−1, 1]	Adj. Patell	KP test	CAR [−1, 5]	Adj. Patell	KP test
Panel 1: Door Torn off Mid-Flight, Emergency Landing—Alaska Airlines (January 5, 2024)						
Boeing	**−5.95%**	0.000***	0.000***	**−10.95%**	0.000***	0.000***
Airbus	**4.35%**	0.001***	0.001***	**8.53%**	0.000***	0.000***
Embraer	**1.56%**	0.038**	0.040**	**2.29%**	0.042**	0.044**
Panel 2: National Transportation Safety Board (NTSB) Report (February 6, 2024)						
Boeing	**−2.23%**	0.013**	0.015**	**−2.32%**	0.031**	0.033**
Airbus	**1.39%**	0.044**	0.046**	**2.24%**	0.034**	0.035**
Embraer	**1.33%**	0.047**	0.049**	**1.18%**	0.091*	0.094*
Panel 3: Cargo Hold Door Found Open – Alaska Airlines (March 1, 2024)						
Boeing	**−3.14%**	0.007***	0.006***	**−4.14%**	0.008***	0.009***
Airbus	**2.07%**	0.019**	0.021**	**2.81%**	0.022**	0.024**
Embraer	**7.44%**	0.000***	0.000***	**7.11%**	0.000***	0.000***
Panel 4: Emergency Landing in Los Angeles—United Airlines (March 7, 2024)						
Boeing	**−2.30%**	0.012**	0.012**	**−10.29%**	0.000***	0.000***
Airbus	**1.31%**	0.045**	0.046**	**1.76%**	0.055*	0.057*
Embraer	**1.78%**	0.022**	0.024**	**3.74%**	0.011**	0.012**
Panel 5: Landing Gear Collapse After Landing – United Airlines (March 8, 2024)						
Boeing	**−4.25%**	0.001***	0.001***	**−9.46%**	0.000***	0.000***
Airbus	**1.91%**	0.021**	0.023**	**2.84%**	0.022**	0.023**
Embraer	**1.76%**	0.042**	0.043**	**3.05%**	0.020**	0.021**
Panel 6: Loss of Control After Instrument Failure – LATAM Airlines (March 11, 2024)						
Boeing	**−8.34%**	0.000***	0.000***	**−8.98%**	0.000***	0.000***
Airbus	**1.78%**	0.038**	0.040**	**5.05%**	0.001***	0.001***
Embraer	**2.08%**	0.033**	0.034**	**6.62%**	0.000***	0.000***
Panel 7: Dutch Roll—Southwest Airlines (May 25, 2024)						
Boeing	**−1.97%**	0.018**	0.021**	**−2.31%**	0.033**	0.034**
Airbus	**1.75%**	0.024**	0.026**	**3.73%**	0.001***	0.001***
Embraer	**2.09%**	0.032**	0.035**	**2.65%**	0.000***	0.000***
Panel 8: Cabin Pressurisation System—Korean Air Lines (June 23, 2024)						
Boeing	**−1.30%**	0.042**	0.045**	**−1.95%**	0.044**	0.049**
Airbus	**2.34%**	0.038**	0.040**	**3.89%**	0.001***	0.001***
Embraer	**1.94%**	0.033**	0.034**	**2.44%**	0.000***	0.000***
Panel 9: Cumulative Average Abnormal Return (CAARs)						
Boeing	**−3.69%**	0.008***	0.0010***	**−6.30%**	0.006***	0.007***
Airbus	**2.11%**	0.029**	0.031**	**3.86%**	0.006***	0.007***
Embraer	**2.50%**	0.022**	0.021**	**3.64%**	0.014**	0.016**

Note: This table presents the CARs for the three commercial aircraft manufacturers listed firms—Boeing, Airbus and Embraer, calculated using market model (*MM*), for two different time windows: [−1; +1] and [−1; +5]. Adj. Patell and KP Test are the *p* values of Adjusted Patell (Kolari and Pynnönen 2010) and Kolari and Pynnönen (KP) nonparametric test (Kolari and Pynnönen 2011), respectively. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

TABLE 2 | Commercial aircraft manufacturers CARs and results of abnormal returns tests—Fama–French three factor model.

Aircraft manufacturer	CAR [−1, 1]	Adj. Patell	KP test	CAR [−1, 5]	Adj. Patell	KP test
Panel 1: Door Torn off Mid-Flight, Emergency Landing—Alaska Airlines (January 5, 2024)						
Boeing	**−6.07%**	0.000***	0.000***	**−11.17%**	0.000***	0.000***
Airbus	**4.44%**	0.001***	0.001***	**8.70%**	0.000***	0.000***
Embraer	**1.60%**	0.036**	0.039**	**2.24%**	0.041**	0.043**
Panel 2: National Transportation Safety Board (NTSB) Report (February 6, 2024)						
Boeing	**−2.32%**	0.012**	0.013**	**−2.34%**	0.030**	0.032**
Airbus	**1.40%**	0.043**	0.045**	**2.26%**	0.034**	0.034**
Embraer	**1.34%**	0.046**	0.048**	**1.19%**	0.089*	0.091*
Panel 3: Cargo Hold Door Found Open—Alaska Airlines (March 1, 2024)						
Boeing	**−3.01%**	0.008***	0.008***	**−3.97%**	0.009***	0.009***
Airbus	**1.99%**	0.021**	0.024**	**2.70%**	0.023**	0.026**
Embraer	**7.14%**	0.000***	0.000***	**6.83%**	0.000***	0.000***
Panel 4: Emergency Landing in Los Angeles – United Airlines (March 7, 2024)						
Boeing	**−2.28%**	0.012**	0.012**	**−10.19%**	0.000***	0.000***
Airbus	**1.30%**	0.046**	0.046**	**1.74%**	0.056*	0.057*
Embraer	**1.76%**	0.021**	0.022**	**3.70%**	0.011**	0.011**
Panel 5: Landing Gear Collapse After Landing—United Airlines (March 8, 2024)						
Boeing	**−4.29%**	0.001***	0.001***	**−9.55%**	0.000***	0.000***
Airbus	**1.93%**	0.020**	0.022**	**2.87%**	0.021**	0.023**
Embraer	**1.78%**	0.041**	0.043**	**3.08%**	0.020**	0.020**
Panel 6: Loss of Control After Instrument Failure—LATAM Airlines (March 11, 2024)						
Boeing	**−8.08%**	0.000***	0.000***	**−8.71%**	0.000***	0.000***
Airbus	**1.73%**	0.039**	0.041**	**4.90%**	0.001***	0.002***
Embraer	**2.02%**	0.034**	0.036**	**6.42%**	0.000***	0.000***
Panel 7: Dutch Roll—Southwest Airlines (May 25, 2024)						
Boeing	**−1.89%**	0.021**	0.025**	**−2.22%**	0.036**	0.039**
Airbus	**1.68%**	0.025**	0.027**	**3.58%**	0.002***	0.002***
Embraer	**2.00%**	0.034**	0.036**	**2.55%**	0.000***	0.000***
Panel 8: Cabin Pressurisation System—Korean Air Lines (June 23, 2024)						
Boeing	**−1.26%**	0.044**	0.047**	**−1.89%**	0.046**	0.050**
Airbus	**2.28%**	0.039**	0.042**	**3.77%**	0.002***	0.001***
Embraer	**1.88%**	0.034**	0.036**	**2.36%**	0.001***	0.001***
Panel 9: Cumulative Average Abnormal Return (CAARs)						
Boeing	**−3.65%**	0.009***	0.0010***	**−6.26%**	0.006***	0.007***
Airbus	**2.09%**	0.030**	0.031**	**3.81%**	0.007***	0.007***
Embraer	**2.44%**	0.023**	0.022**	**3.56%**	0.015**	0.016**

Note: This table presents the CARs for the three commercial aircraft manufacturers listed firms—Boeing, Airbus and Embraer, calculated using Fama–French three factor model (*FF3*), for two different time windows: [−1; +1] and [−1; +5]. Adj. Patell and KP Test are the *p* values of Adjusted Patell (Kolari and Pynnönen 2010) and Kolari and Pynnönen (KP) nonparametric test (Kolari and Pynnönen 2011), respectively. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

TABLE 3 | Airline listed firms: descriptive statistics of CARs and control variables and results of abnormal returns tests—market model.

Variable	Mean	SD	25th perc.	Median	75th perc.	A. Patell	KP test
Panel 1: Door Torn off Mid-Flight, Emergency Landing—Alaska Airlines (January 5, 2024)							
CAR [−1, 1]	−0.41%	5.29%	−3.71%	−1.17%	2.51%	0.325	0.340
CAR [−1, 5]	−1.35%	4.31%	−4.14%	−1.32%	0.21%	0.121	0.134
Panel 2: National Transportation Safety Board (NTSB) Report (February 6, 2024)							
CAR [−1, 1]	−0.84%	3.51%	−2.71%	−0.51%	0.29%	0.245	0.233
CAR [−1, 5]	−0.94%	6.84%	−3.15%	−1.26%	0.04%	0.266	0.254
Panel 3: Cargo Hold Door Found Open—Alaska Airlines (March 1, 2024)							
CAR [−1, 1]	0.13%	9.90%	−3.24%	−1.04%	1.18%	0.444	0.465
CAR [−1, 5]	−0.48%	5.81%	−3.82%	−1.26%	1.56%	0.388	0.395
Panel 4: Emergency Landing in Los Angeles—United Airlines (March 7, 2024)							
CAR [−1, 1]	−0.15%	4.88%	−2.42%	−0.87%	1.38%	0.431	0.440
CAR [−1,5]	−0.77%	6.11%	−2.73%	−0.67%	1.80%	0.311	0.335
Panel 5: Landing Gear Collapse After Landing – United Airlines (March 8, 2024)							
CAR [−1, 1]	0.36%	7.38%	−1.90%	−0.66%	1.86%	0.372	0.391
CAR [−1, 5]	−0.50%	9.67%	−2.95%	−1.06%	2.55%	0.397	0.409
Panel 6: Loss of Control After Instrument Failure—LATAM Airlines (March 11, 2024)							
CAR [−1, 1]	−0.99%	5.14%	−2.57%	−0.56%	1.74%	0.189	0.197
CAR [−1, 5]	−0.94%	6.68%	−3.15%	−1.59%	2.16%	0.231	0.243
Panel 7: Dutch Roll—Southwest Airlines (May 25, 2024)							
CAR [−1, 1]	−0.86%	3.20%	−1.70%	−0.56%	0.56%	0.201	0.210
CAR [−1, 5]	−0.71%	7.27%	−2.48%	−0.50%	3.07%	0.281	0.292
Panel 8: Cabin Pressurisation System—Korean Air Lines (June 23, 2024)							
CAR [−1, 1]	−1.09%	3.93%	−1.89%	−0.74%	0.45%	0.165	0.170
CAR [−1, 5]	−1.35%	5.22%	−4.88%	−1.75%	0.71%	0.127	0.134
Panel 9: Cumulative Average Abnormal Return (CAARs)							
CAAR [−1, 1]	−0.48%	3.69%	−2.51%	−0.89%	1.10%	0.323	0.330
CAAR [−1, 5]	−0.80%	4.10%	−2.76%	−1.18%	1.47%	0.277	0.285
Panel 10: Control Variables							
Size (SIZE)	€18,325 mL	€24,310 mL	€4335 mL	€8835 mL	€25,432 mL		
Ownership Concentration (OWN)	37.5%	28.5%	17.7%	24.4%	57.1%		
Total Leverage (TLEV)	46.1%	16.8%	36.4%	45.9%	64.4%		
Return on Assets (ROA)	3.0%	8.2%	0.3%	5.1%	7.8%		
Low-Cost Dummy (LCD)	30.5%	47.4%	0	0	1		
Airline Age (AGE)	49.69	29.50	27	44	78		
Airline Safety Index (AS)	78.56%	8.72%	82.33%	87.44%	90.23%		
Boeing Fleet (BO_F)	39.0%	36.6%	0.60%	41.1%	69.2%		

Note: This table presents descriptive statistics of CARs and control variables and the results of abnormal returns tests in airline listed firms, calculated using market model (*MM*), for two different time windows: [−1; +1] and [−1; +5]. All figures of control variables are calculated from the most recent year-end accounting figures. Adj. Patell and KP Test are the *p* values of Adjusted Patell (Kolari and Pynnönen 2010) and Kolari and Pynnönen (KP test) nonparametric test (Kolari and Pynnönen 2011), respectively. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

TABLE 4 | Airline listed firms: descriptive statistics of CARs and control variables and results of abnormal returns tests—Fama–French three factor model.

Variable	Mean	SD	25th perc.	Median	75th perc.	A. Patell	KP test
Panel 1: Door Torn off Mid-Flight, Emergency Landing—Alaska Airlines (January 5, 2024)							
CAR [−1, 1]	−0.45%	5.40%	−3.78%	−1.20%	2.57%	0.320	0.329
CAR [−1, 5]	−1.48%	4.40%	−4.22%	−1.34%	0.21%	0.119	0.130
Panel 2: National Transportation Safety Board (NTSB) Report (February 6, 2024)							
CAR [−1, 1]	−0.91%	3.54%	−2.74%	−0.52%	0.29%	0.241	0.231
CAR [−1, 5]	−1.02%	6.91%	−3.18%	−1.27%	0.04%	0.262	0.251
Panel 3: Cargo Hold Door Found Open—Alaska Airlines (March 1, 2024)							
CAR [−1, 1]	0.14%	9.50%	−3.11%	−1.00%	1.13%	0.441	0.462
CAR [−1, 5]	−0.49%	5.58%	−3.66%	−1.21%	1.50%	0.385	0.394
Panel 4: Emergency Landing in Los Angeles—United Airlines (March 7, 2024)							
CAR [−1, 1]	−0.16%	4.83%	−2.40%	−0.86%	1.36%	0.428	0.435
CAR [−1, 5]	−0.82%	6.05%	−2.71%	−0.67%	1.78%	0.306	0.327
Panel 5: Landing Gear Collapse After Landing—United Airlines (March 8, 2024)							
CAR [−1, 1]	0.38%	7.30%	−1.88%	−0.65%	1.84%	0.367	0.383
CAR [−1, 5]	−0.54%	9.77%	−2.98%	−1.07%	2.58%	0.391	0.399
Panel 6: Loss of Control After Instrument Failure—LATAM Airlines (March 11, 2024)							
CAR [−1, 1]	−1.07%	5.20%	−2.60%	−0.57%	1.76%	0.177	0.185
CAR [−1, 5]	−0.98%	6.48%	−3.06%	−1.55%	2.10%	0.221	0.234
Panel 7: Dutch Roll—Southwest Airlines (May 25, 2024)							
CAR [−1, 1]	−0.88%	3.07%	−1.63%	−0.54%	0.54%	0.195	0.202
CAR [−1, 5]	−0.07%	6.98%	−2.38%	−0.48%	2.95%	0.423	0.435
Panel 8: Cabin Pressurisation System—Korean Air Lines (June 23, 2024)							
CAR [−1, 1]	−1.13%	3.81%	−1.83%	−0.72%	0.44%	0.158	0.162
CAR [−1, 5]	−1.41%	5.07%	−4.73%	−1.70%	0.68%	0.120	0.128
Panel 9: Cumulative Average Abnormal Return (CAARs)							
CAAR [−1, 1]	−0.51%	3.64%	−2.51%	−0.89%	1.12%	0.314	0.321
CAAR [−1, 5]	−0.85%	4.06%	−2.74%	−1.17%	1.47%	0.269	0.278

Note: This table presents descriptive statistics of CARs and control variables and the results of abnormal returns tests in airline listed firms, calculated using Fama–French three factor model (*FF3*), for two different time windows: [−1; +1] and [−1; +5]. All figures of control variables are calculated from the most recent year-end accounting figures. Adj. Patell and KP Test are the *p* values of Adjusted Patell (Kolari and Pynnönen 2010) and Kolari and Pynnönen (KP test) nonparametric test (Kolari and Pynnönen 2011), respectively. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Regarding the business model, the results show a negative and statistically significant (10% significance level) abnormal returns for low-cost carriers and a lack of statistical significance for full-service carriers. The results also show the existence of a statistically significant difference (10% significance level) for the two subsamples of airlines. As mentioned before, full-service legacy airlines have much more diverse fleets and are better able to manage their safety reputation image. The CAARs for low-cost airlines do not present a higher magnitude because there are several low-cost airlines that, despite not having diversified fleets, chose to have only Airbus aircraft, as is the case of Wizz Air or easyJet, and have positive returns around events.

Finally, the results reveal a negative and statistically significant CAARs for airlines with a poor safety record (below the sample median) and a lack of statistical significance for airlines with a safety record above the median. The result of the two-sample *t*-test for the differences in terms of CAARs between the two samples reveals statistically significant results (5% significance level). This result shows that airline safety records tend to alleviate or exacerbate the fear that

TABLE 5 | Impact of Boeing fleet weight, business model and airline safety record on CAARs and differences in cumulative average abnormal returns.

			[−1; 1]	[−1; 5]
Panel 1: Boeing fleet weight				
# Airline firms				
Above the sample median	28	CAAR	−1.47%	−2.21%
		Adj. Patell	0.034**	0.043**
		KP Test	0.037**	0.045**
Below the sample median	27	CAAR	1.15%	1.57%
		Adj. Patell	0.065*	0.081*
		KP Test	0.068*	0.084*
Difference		CAAR	−2.62%	−3.78%
		t-test (*p* value)	0.015**	0.021**
Panel 2: business model (full-service and low-cost carriers)				
# Airline firms				
Low-cost	18	CAAR	−1.12%	−1.46%
		Adj. Patell	0.071*	0.078*
		KP Test	0.074*	0.076*
Full-service	37	CAAR	0.65%	0.86%
		Adj. Patell	0.234	0.255
		KP Test	0.243	0.262
Difference		CAAR	−1.77%	−2.32%
		t-test (*p* value)	0.053*	0.059*
Panel 3: airline safety record (JACDEC airline safety index)				
# Airline firms				
Above the sample median	28	CAAR	0.83%	0.48%
		Adj. Patell	0.133	0.354
		KP Test	0.139	0.359
Below the sample median	27	CAAR	−1.91%	−2.25%
		Adj. Patell	0.044**	0.046**
		KP Test	0.046**	0.048**
Difference		CAAR	2.74%	2.73%
		t-test (*p* value)	0.014**	0.029**

Note: This table presents the CAARS and the differences in the CAARs for three subsamples of airlines listed firms—above and below the median in terms of Boeing fleet weight (Panel 1), business model—full-service versus low-cost carriers (Panel 2) and above and below the median in terms of JACDEC airline safety index (Panel 3), for two different time windows: [−1; +1] and [−1; +5]. The CAARs were estimated using the market model (*MM*) and daily returns. Adj. Patell and KP Test are the *p* values of Adjusted Patell (Kolari and Pynnönen 2010) and Kolari and Pynnönen (KP) nonparametric test (Kolari and Pynnönen 2011), respectively. The significance of the differences in CAARs is determined via two-sample *t*-test. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

some travellers have of flying, after the recurring incidents recorded with Boeing aircraft.

In short, the results allow us to validate the H2 hypothesis, which states that incidents with Boeing aircrafts affect more negatively the abnormal returns of airlines with a greater weight of Boeing aircrafts in its fleet, low-cost airlines, and airlines with a poor safety record. Thus, associated with a reputational contagion effect, 'airlines use Boeing aircraft' suffers a negative impact on the stock market.

5.3 | Cross-Sectional Analysis

We regress cumulative average abnormal returns (CAAR [−1, 1] and CAAR [−1, 5]) against the set of airline-specific variables as proposed by the empirical specification in Equation (3). Table 6 presents the results.

The results reveal the existence of statistical significance for the variables *SIZE*, *LCD, AGE, AS*, and *BO_F*, when the total sample of airlines is considered (Panel 1 of Table 6). For the remaining three variables—*OWN*, *ROA* and *TLEV*, there is a lack of statistical significance. According to Rose (1992), large airlines tend to provide consumers with greater security guarantees, thus reducing information asymmetries that may exist between them. The previous study also highlights that airline profitability is correlated with lower accident and incident rates, which helps to explain the positive sign found for the *AS* variable coefficient. Thus, the higher level of safety on airlines is recognised with a higher market value.

We also find a negative coefficient for the *AGE* variable. According to Baker and Kennedy (2002), more experienced airlines are more likely to learn about their abilities and are more able to adopt strategies to mitigate the effects caused by negative events.

Regarding *LCD* and *BO_F* variables, the negative sign of both coefficients is consistent with the idea that the structure and profile of full-service airlines (legacy flag carriers) possess a strong reputation with consumers for safety and reliability when compared with low-cost carriers. Moreover, low-cost carriers, with their focus on a single type of aircraft for cost minimisation purposes (e.g., Cioroianu et al. 2021), absorb the negative impact of Boeing equity abnormal returns. Finally, Boeing's airline customers tend to absorb Boeing's reputational risk, without a clear option to hedge or diversify, except by purchasing different aircraft or cancelling orders.

The lack of statistical significance of the variable *OWN* is consistent with the basic benefit of diversification. For example, Akhigbe et al. (2005) regarding the WorldCom bankruptcy, state that even the world's largest bankruptcy should have no impact on well-diversified shareholders. As for the remaining two variables *ROA* and *TLEV*, and given the absence of fatalities associated with incidents involving Boeing aircraft, it does not seem to us that the argument used by Martins and Cró (2022) that airlines with greater debt and lower profitability tend to be more penalised by investors given the predictable negative impact of the event (in this case, the COVID-19 pandemic) on sales and access to credit makes sense in this scenario.

In an additional test for the results, we divided the sample into two subsamples—airlines with a weight of Boeing aircraft above (Panel 2 of Table 6) and below (Panel 3 of Table 6) the sample median. In both subsamples, the variables *SIZE* and *AGE* present positive statistically significant coefficients. The most interesting results are related to the *TLEV* and *LCD* variables, which both present a negative and statistically significant coefficients in the subsample of airlines with a fleet dominated by Boeing aircraft. As explained before, firms with high levels of debt tend to face constraints in terms of investments, with shareholders considering it a good policy to cut discretionary investments, such as quality ones, favouring increased current cash flows, in order to avoid immediate financial difficulties (e.g., Maksimovic and Titman 1991). Furthermore, the firms with high indebtedness tend to cut investments in quality and thus the probability of safety/security problems tends to increase (Kini et al. 2017). Lastly, low-cost airlines with a fleet dominated by Boeing aircraft tend to suffer a double reputational problem—one that derives from Boeing reputational risk and another that results from consumers assigning a lower reputation in terms of safety and reliability when compared to legacy flag carriers (e.g., O'Connell and Williams 2011).

Furthermore, the results show that airlines with a good safety record (*AS*) can mitigate the negative effects caused by successive incidents involving Boeing aircraft, where their record of good safety practices and safety controls tends to alleviate the fear that some travellers have of flying on Boeing aircraft. Thus, H3 is validated since we conclude that airlines' abnormal returns change with Boeing aircraft incident announcements, and their signal and magnitude depend on airline-specific characteristics.

5.4 | Robustness Check

We conduct additional robustness checks to assess the sensitivity of our findings to an extension of the pre- and post-event window and a different model specification. For the first purpose, abnormal returns were calculated for the three commercial aircraft manufacturers and airlines, using different pre- and post-event windows. The results are presented in Table 7. Finally, Table 8 presents the results obtained in the estimation of Equation (3) when we employ a variable dummy that takes the value of 1 for the airlines whose fleet is mostly composed of Boeing aircraft (*BO_D*) instead of using the variable *BO_F*. For both robustness tests, the general conclusions of the study do not change.

6 | Conclusions

This paper analyses the short-term market reaction of aircraft commercial manufacturers and the airline industry for eight Boeing aircraft incidents that occurred in the first semester of 2024. The results show a negative and statistically significant stock price reaction for Boeing around the dates of the aircraft incidents. Although there are no fatalities in our air incidents data, this result supports the investor sentiment literature. Thus, in accidents/incidents with lower media coverage, investors also seem to experience enough bad moods and anxieties to affect the stock prices of the involved aircraft manufacturer negatively, possibly due to the recurring effect of the Boeing disasters. We also find a positive statistically significant abnormal returns to its rivals Airbus and Embraer. These results are consistent with the competitive effect as explained by Fang et al. (2024), which envisages a redistribution of wealth within the industry. So, there is a switch effect between negative returns for Boeing and positive returns for its rivals. Also, reputation is a crucial factor influencing how stock prices react. Considering that travellers often change their airline choices based on safety, airlines may

TABLE 6 | Cross-sectional analysis of CAARs for the global airline industry.

	Panel 1: total sample		Panel 2: weight of Boeing in the fleet ABOVE the median		Panel 3: weight of Boeing in the fleet BELOW the median	
	[−1, 1]	**[−1, 5]**	**[−1, 1]**	**[−1, 5]**	**[−1, 1]**	**[−1, 5]**
Constant	0.003 (0.037)	0.121 (1.582)	−0.008 (−0.523)	0.020 (1.002)	−0.009 (−0.225)	−0.013 (−0.477)
Ln(SIZE)	0.013** (2.233)	0.014** (2.350)	0.009** (2.133)	0.012** (2.320)	0.011* (1.744)	0.011* (1.880)
OWN	0.003 (0.159)	0.008 (0.427)	−0.011 (−1.044)	−0.040 (−1.594)	0.009 (0.154)	0.027 (0.976)
TLEV	0.021 (0.548)	−0.040 (−1.031)	−0.050** (−2.311)	−0.119** (−2.520)	0.112 (1.433)	0.080 (1.291)
ROA	−0.016 (−0.204)	−0.036 (0.471)	−0.052 (−1.133)	−0.154 (−1.522)	−0.035 (−0.411)	0.033 (0.345)
LCD	−0.012* (−1.909)	−0.011* (−1.899)	−0.048** (−2.511)	−0.045** (−2.530)	−0.027 (−1.133)	0.017 (0.540)
AGE	0.011* (1.852)	0.016* (1.905)	0.023* (1.846)	0.027* (1.837)	0.019* (1.689)	0.022* (1.704)
AS	0.048* (1.694)	0.062* (1.788)	0.075** (2.221)	0.082** (2.230)	0.041 (1.533)	0.044 (1.528)
BO_F	−0.076*** (−4.565)	−0.104*** (−6.158)				
# Observations	55	55	28	28	27	27
Adj. R^2	0.431	0.519	0.334	0.411	0.352	0.233

Note: This table presents OLS estimates of the impact of eight recent Boeing aircraft incidents events on the global airline firms CAARs'. Panel 1 reports the short-term stock market reaction for the total sample of airline listed firms (55 airline firms). Panel 2 presents the short-term stock market reaction for the subsample of airline listed firms with a weight of Boeing aircraft in their fleet above the median (28 airline firms). Panel 3 shows the short-term stock market reaction for the subsample of airline listed firms with a weight of Boeing aircraft in their fleet below the median (27 airline firms). The dependent variables are the airline CAARs for two different time windows: [−1, 1] and [−1, 5], calculated using Fama–French three factor model (*FF3*). *SIZE* is the total assets (natural logarithm of total assets, million of USD); *OWN* is the cumulated ownership of the three main shareholders (%); *TLEV* is the ratio of total debt to total assets (%); *ROA* is the ratio of operating income to total average assets (%); *LCD* is a dummy variable that assumes the value of 1 for low-cost carriers and 0 otherwise; AGE_i is the number of years since the airline i was founded; AS_i is the JACDEC airline safety index; *BO_F* is the ratio of aircrafts produced by BOEING in the total fleet (%). *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively. Country-fixed robust errors are used (in parentheses).

TABLE 7 | Pre- and post-event CAARs for commercial aircraft manufacturers and airlines.

Event window	CAAR value	A. Patell	KP test
Panel 1: commercial aircraft manufacturers			
Boeing			
CAR [−10, 0]	−1.33%	0.229	0.234
CAR [−5, 0]	−0.90%	0.214	0.220
CAR [−3, 0]	−0.81%	0.195	0.199
CAR [−1, 0]	−0.35%	0.187	0.192
CAR [0, +1]	−2.45%	0.007***	0.008***
CAR [0, +3]	−3.25%	0.009***	0.010***
CAR [0, +5]	−3.49%	0.011**	0.013**
CAR [0, +10]	−3.91%	0.015**	0.016**
CAR [0, +15]	−3.97%	0.022**	0.024**
CAR [0, +20]	−5.76%	0.016**	0.017**
Airbus + embraer			
CAR [−10, 0]	1.28%	0.245	0.248
CAR [−5, 0]	1.35%	0.135	0.138
CAR [−3, 0]	0.95%	0.148	0.152
CAR [−1, 0]	0.58%	0.140	0.144
CAR [0, +1]	1.75%	0.013**	0.015**
CAR [0, +3]	2.89%	0.013**	0.014**
CAR [0, +5]	3.59%	0.012**	0.012**
CAR [0, +10]	3.47%	0.019**	0.021**
CAR [0, +15]	4.68%	0.018**	0.020**
CAR [0, +20]	4.83%	0.024**	0.026**
Panel 2: airlines			
CAR [−10, 0]	−0.72%	0.302	0.315
CAR [−5, 0]	−0.44%	0.279	0.284
CAR [−3, 0]	0.03%	0.476	0.485
CAR [−1, 0]	0.25%	0.245	0.251
CAR [0, +1]	−0.08%	0.455	0.450
CAR [0, +3]	−0.53%	0.197	0.202
CAR [0, +5]	−0.46%	0.206	0.215
CAR [0, +10]	−0.60%	0.234	0.247
CAR [0, +15]	−0.77%	0.228	0.231
CAR [0, +20]	−0.91%	0.245	0.252

Note: This table provides the pre- and post-event CAARs for the three commercial aircraft manufacturers and airlines around the eight recent Boeing aircraft incidents events analysed in the study. In Panel 1, we present the CAARs for the involved commercial aircraft manufacturers. In Panel 2, we present the CAARs for the total sample of airlines (55 airline firms). For each of the panels, we present the value of the CAARs calculated based on the Fama–French three factor model (*FF3*) for different pre- and post-event time windows. Adj. Patell and KP Test are the *p* values of Adjusted Patell (Kolari and Pynnönen 2010) and Kolari and Pynnönen (KP test) nonparametric test (Kolari and Pynnönen 2011), respectively. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

TABLE 8 | Cross-sectional analysis of CAARs for the Global Airline Industry: robustness check results.

	Total sample	
	[−1, 1]	**[−1, 5]**
Constant	0.015 (0.055)	0.123 (1.332)
Ln(SIZE)	0.013** (2.220)	0.014** (2.330)
OWN	0.003 (0.151)	0.008 (0.433)
TLEV	0.023 (0.592)	−0.042 (−1.088)
ROA	−0.018 (−0.234)	−0.037 (0.482)
LCD	−0.012* (−1.911)	−0.011* (−1.902)
AGE	0.012* (1.859)	0.016* (1.911)
AS	0.048* (1.704)	0.063* (1.794)
BO_D	−0.068*** (−3.988)	−0.099*** (−4.275)
# Observations	55	55
Adj. R^2	0.444	0.501

Note: This table presents the estimation results of the robustness check for Equation (3). The dependent variables are the airline CAARs for two different time windows: [−1, 1] and [−1, 5], calculated using Fama–French three factor model (*FF3*). In this table is employed a dummy variable (*BO_D*) that takes the value of 1 for the airline listed firms, whose fleet is mostly composed of BOEING aircrafts and 0 otherwise, instead of using the *BO_F* variable (the ratio of aircrafts produced by BOEING in the total fleet (%)). *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively. Country-fixed robust errors are used (in parentheses).

shift their investments towards aircraft manufacturers with strong safety records, which affects aircraft manufacturers' demand, profit, and cash flows. It appears that manufacturers involved in incidents suffer significant reputational damage, while their competitors benefit by enhancing their safety reputations.

Previous studies have shown that financial markets are susceptible to spillover effects from aircraft accidents/incidents. As for the airline industry, the results do not show the existence of statistically significant effects on equity market values. The absence of fatalities associated with these events helps to explain the lack of statistical significance for airline industry. However, a more detailed analysis of the sample reveals different patterns of behaviour of airline share prices. The results reveal a negative and statistically significant CAARs for airlines with a high weight of Boeing aircrafts in its fleet, for low-cost carriers and for airlines with a poor safety record. Such evidence furthers our understanding of the effects of third-party reputational contagion from internal corporate decision-making. Investors seem to distinguish the negative effects of airline incidents based on their use of Boeing aircraft, low-cost companies, and unsafe airlines (all of them are 'airlines use Boeing aircraft'). This leads to a contagion effect on reputation—known as reputational contagion—due to the transfer of the negative reaction from Boeing to those airlines. There is a 'guilt by association' effect. These airlines may face problems in terms of demand and cash flow due to the fear and anxiety of travellers, who may choose other non-Boeing airlines. Bad investor sentiment about these 'airlines use Boeing aircraft' performance is reflected in the decrease in stock price. Our results show that investors understand the airline safety issues with Boeing aircraft as unique and limited to Boeing and its customers in the airline industry. The aircraft accident/incident may result in significant spillover effects on other markets beyond the aircraft manufacturer industry. Like Krieger and Chen (2015), it seems that the causes of the accidents are related to potential flaws in commercial aircraft manufacturers. So, the reputational contagion induced by shocks like aircraft accidents/incidents has the intensity to impact not only manufacturers financial markets but also airline financial markets. Finally, we also find that these reactions are reinforced or mitigated by airline-specific characteristics such as size, leverage, and firm age.

The results have important managerial implications. First, for aircraft commercial manufacturers, it seems clear that a strategy of 'risk-averse and focused on cost-cutting and financial performance' may not be the most appropriate in terms of creating value. In the first quarter of 2024, Boeing lost more than 26% of its market value due to issues regarding the lack of quality and safety of their aircrafts[11]. But for its rivals this is good news, as incidents with Boeing aircrafts have led to a rise in abnormal returns. Second, given that the airline industry depends on reputation, not only for punctuality and comfort, but, most importantly, for safety, it is important that airlines in their aircraft acquisition investment decisions not only take into account savings in terms of costs (e.g., fuel efficiency) but also safety guarantees on the part of the aircraft commercial manufacturers. These results demonstrate that airlines share part of reputational costs of safety Boeing issues. From the results it is evident that the lack of diversification in the definition of the aircraft fleet is a bad policy. Therefore, airlines must find an optimal equilibrium between cost savings and diversification when defining their aircraft fleet. Third, in response to the quality control failures reported by the FAA, policymakers may require higher quality control standards and more rigorous quality reports from manufacturers. To protect the interests of consumers/travellers, authorities in aircraft-producing countries should collaborate to strengthen safety and quality control regulations. These rules should be consistent across countries to ensure that quality issues do not become a competitive (dis)advantage, as described by Boeing. Fourth, aircraft manufacturers' reports must transparently disclose their safety improvement procedures, as well as information on accidents and incidents, both with and without fatalities. This transparency is essential for institutional investors and others to fully understand the operational risks involved. Following Akyildirim et al. (2025), regulators may also require these disclosures be included in Environment, Social and Governance (ESG) reports.

While this research provides insightful implications, it is important to keep in mind its limitations. This study was limited to studying a very short period (one semester), which may have unique and unrepeatable characteristics. Furthermore, it only studied aircraft incidents without fatalities (a new feature). We believe that richer insights could be gained by expanding the time period of the sample and the typology of aircraft accidents. Other two interesting lines of future investigation are the study of stock returns volatility around multiple non-fatal airline incidents, which may provide further insight into the reaction of airline stock price dynamics to incidents and the examination of stock price reactions at the intraday level.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Endnotes

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[6] https://www.faa.gov/sites/faa.gov/files/2023-08/ServiceBulletins_AircraftOwner.pdf. 'Service bulletins' from the manufacturer report different gravity levels of situations, many of them related to security and require specific actions, anything from changes in operational procedures to inspections to hardware changes and are equivalent to a product recall in the automobile industry (https://www.quora.com/Why-dont-Boeing-recall-the-737-max-and-troubleshoot-the-problem).

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Appendix I

Sample of Publicly Listed Airline Firms

This table reports the list of global airline firms publicly listed analysed in the present study. For each one, the country where the firm's headquarters is located is presented.

Airline listed firm	Country	Airline listed firm	Country
1. Air Canada	Canada	29. Icelandair Grp.	Iceland
2. Air China	China	30. InterGlobe Aviation	India
3. Air France-KLM	France/Netherlands	31. International Consolidated Airlines Grp. (IAG)	UK
4. Air New Zealand	New Zealand	32. Japan Airlines	Japan
5. Air Asia Berhad	Malaysia	33. Jeju Air	South Korea
6. Alaska Air Grp.	US	34. JetBlue Airways	US
7. Allegiant Travel	US	35. Jin Air	South Korea
8. American Airlines	US	36. Korean Air Lines	South Korea
9. ANA Holdings	Japan	37. LATAM Airlines	Chile
10. Azul	Brazil	38. Mesa Air Grp.	US
11. Bangkok Airways	Thailand	39. Norwegian Air Shuttle	Norway
12. Cathay Pacific Airways	Hong Kong	40. Pegasus	Turkey
13. China Airlines	Taiwan	41. Aeroflot – Russian Airlines	Russia
14. China Eastern Airlines	China	42. Qantas Airways	Australia
15. China Express Airlines	China	43. Ryanair	Ireland
16. China Southern Airlines	China	44. SAS AB	Sweden
17. Controladora Vuela Compañía de Aviación	Mexico	45. Singapore Airlines	Singapore
18. Copa Holdings	Panama	46. SkyWest	US
19. Delta Air Lines	US	47. Southwest Airlines	US
20. Deutsche Lufthansa	Germany	48. SpiceJet	India
21. easyJet	UK	49. Spirit Airlines	US
22. El Al Israel Airlines	Israel	50. Spring Airlines	China
23. EVA Airways	Taiwan	51. Thai Airways International	Thailand
24. Finnair Oyj	Finland	52. Turkish Airlines	Turkey
25. Garuda Indonesia	Indonesia	53. T'Way Air	South Korea
26. Gol Linhas Aéreas Inteligentes	Brazil	54. United Airlines	US
27. Hainan Airlines	China	55. Wizz Air	Hungary
28. Hawaiian Airlines	US		