This section explores whether aviation incidents involving one aircraft manufacturer—either Boeing or Airbus—affect the stock performance of the other. The analysis is based on a standard event study framework, as referenced in Campbell et al. (1997). Event study methodology offers several advantages over directly using time series data, as it isolates the impact of specific events by controlling for market-wide movements and other factors.

The event study framework divides the time surrounding each event into an estimation window and an event window, to investigate the magnitude of the impact. Following MacKinlay (1997), we select a 60-day [-60,-1] estimation window and a 12-day [-1,+10] event window, based on the recommendation of D. Krivin et al. (2003). Considering time zone differences and data alignment issues, the event date is set as the trading day prior to the actual calendar date of the event. If the event occurs on a non-trading day, day 0 of the event window is treated as the next available trading day, and the last trading day before the event is considered day -1.

For the statistical model, we use the Market Model as suggested by MacKinlay (1997). The market model establishes normal expected returns by accounting for overall market movements, thereby isolating the abnormal returns directly attributable to the event. Under the assumptions of a stable relationship between market and stock returns, the model allows us to estimate normal returns using OLS.

Below are our computational frameworks. First, we compute the daily returns for the market index and that of the two companys separately. The daily returns are given by

where represents different cases and is the index level at time .

By the Market Model, the return during the estimation window is given by

where stands for the return of case at time , stands for the return of the market at time are the estimated parameters in the linear regression model, and stands for the error term.

During the event window, the expected normal return in the case where there was no impact of the event can be estimated by

The abnormal return of the aircraft companies’ stocks during the event window can be calculated as

The CAR is the sum of the included abnormal returns during the period from to

To test the significance of CAR for single stock, the hypotheses are

The statistic under null hypothesis is

and test statistics follow t-distribution. The standard deviation of CAR is given by

where stands for the number of observations during the estimation window and stands for the number of abnormal returns.

Then the abnormal returns and the cumulative abnormal returns are averaged for each day in the event window, forming the AAR and CAAR respectively. Given N cases, we have

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Then the Null hypothesis is that there are no abnormal returns within the event window, and the Alternative is that there are abnormal returns within the event window. Under the null hypothesis, they both follow a normal distribution. Then we have the statistic

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|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Airbus incidents on Boeing stock** | | | | **Boeing incidents on Airbus stock** | | | |
| **Event Category** | **Event Count** | **t-statistic** | **p-value** | **Reject at 5%** | **Event Count** | **t-statistic** | **p-value** | **Reject at 5%** |
| OCC | 6 | -3.18167 | 0.001872 | Yes | 20 | 1.491375 | 0.138532 | No |
| ACC | 163 | 0.261365 | 0.794267 | No | 135 | 0.388978 | 0.697993 | No |
| INC | 224 | 0.226413 | 0.821272 | No | 234 | 0.253 | 0.800709 | No |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Airbus incidents on Boeing stock** | | | | **Boeing incidents on Airbus stock** | | | |
| **Event Category** | **Event Count** | **t-statistic** | **p-value** | **Reject at 5%** | **Event Count** | **t-statistic** | **p-value** | **Reject at 5%** |
| Major Injury | 3 | 2.103557 | 0.036425 | Yes | 2 | -1.27902 | 0.203399 | No |
| Minor Injury | 368 | 0.193394 | 0.846809 | No | 363 | 0.259036 | 0.796058 | No |
| Major Injury: Injury Count >100 | | | | | | | | |

Using our result, we see that in analyzing the short-term impact of aviation incidents on competitor stock performance, only two scenarios show statistically significant effects: Airbus major injury events positively impact Boeing stock, suggesting investors shift confidence toward Boeing after serious Airbus safety incidents, while Airbus occurrences surprisingly harm Boeing stock, potentially reflecting industry-wide regulatory concerns. All other incidents show minimal statistical significance, indicating that most aviation incidents are perceived as company-specific with limited competitive consequences in the commercial aircraft market.

However, the small sample sizes in these significant categories, only 6 occurrences and 3 major injury events, raise questions about the robustness of these findings. To further validate these potential spillover effects, we examined the significance of CAR.

Two directions of spillover are considered: (1) the effect of Boeing incidents on Airbus stock and (2) the effect of Airbus incidents on Boeing stock. For each direction, CARs are aligned by relative event day and averaged across all available events. To capture uncertainty, standard errors are computed and used to produce ±1 SE confidence bands. Daily one-sample t-tests are conducted to assess whether mean CARs differ significantly from zero, with statistically significant results (p < 0.05) highlighted in red.

图表, 折线图

AI 生成的内容可能不正确。The panel below visualizes the cumulative abnormal returns across both directions. The orange line represents the effect of Boeing-related incidents on Airbus stock, while the blue line corresponds to Airbus incidents affecting Boeing stock.

For most of the event window, CARs in both directions remain close to zero, showing minimal evidence of persistent spillover. However, in the Boeing → Airbus case, a sharp spike appears at day +10, which is statistically significant. This jump is not observed on neighboring days and lacks corroborating trends, suggesting it may stem from calendar-related alignment issues such as weekend gaps, data sparsity, or skewed distribution of events. Given the sample size difference—over 1,300 Boeing events vs. under 300 Airbus events—the precision of estimates may also be affected.

The second chart below focuses on the effect of Airbus incidents on Boeing stock.

The trajectory is smooth, and no days exhibit statistical significance. This supports the view that the market largely treats Airbus incidents as isolated firm-specific events without broader competitive implications for Boeing.

图表, 折线图

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The third chart shows the Boeing incidents’ effect on Airbus stock.

Here, a noticeable positive spike occurs at day +10, which passes the 5% significance threshold. However, no other day shows a comparable response, raising doubts about the consistency or robustness of this result. The spike may be due to event misalignment rather than a genuine delayed reaction.

In conclusion, the updated results again indicate that abnormal return reactions in a competitor’s stock are limited in scope. The statistically significant spike on day +10 following Boeing incidents should be interpreted with caution. Further refinements—such as filtering for trading days, adjusting event alignment, or applying rolling windows—may help clarify whether this effect is systematic or driven by noise.