STOCK MARKET REACTIONS OF THE AIRLINE INDUSTRY DURING THE FIRST AND SECOND WAVES OF COVID-19

A Study on 15 Global Airlines' Stock Performance in 2020

DATA MINING & MODELING CRN-58448-202402

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1. Introduction

Background of the research

The outbreak of COVID-19 at the end of 2019 quickly developed into a global crisis, leading governments worldwide to enforce lockdowns, close borders, and shut down businesses. These emergency responses had a profound impact on the world economy and caused immediate disruption in the global stock market.

According to Chowdhury, Khan, and Dhar (2022), the pandemic triggered a more severe reaction in global stock markets than any recent health crisis, including SARS or Swine Flu. Countries that imposed stricter lockdowns and travel restrictions witnessed deeper drops in stock market returns, particularly in sectors such as travel, oil, and tourism. The U.S., U.K., and Germany reported significant losses, while emerging economies like Brazil and Colombia saw year-to-date stock returns fall by nearly 50%. This dramatic reaction shows how sensitive stock markets are to global health emergencies, and it sets the stage for looking more closely at how specific industries—like airlines—were affected.

Research objectives

This study aims to examine how the stock market responded to the COVID-19 pandemic in the airline industry. We selected 15 major airline companies from different countries and regions to represent the global market. The selected companies include Delta, American Airlines, United Airlines, Southwest Airlines, JetBlue, Air Canada, Thai Airways, Cathay Pacific, Japan Airlines, China Eastern, Singapore Airlines, KLM Dutch, Air France, Lufthansa, and Turkish Airlines.

The analysis focuses on two key indicators: adjusted close prices and stock trading volumes. By using trend and comparison analysis, the study investigates how airline stocks were affected during the first wave of the pandemic (January 1 to June 30, 2020) and the second wave (July 1 to December 31, 2020).

Research questions

RQ1: What is the relationship between stock trading volume and the COVID-19 pandemic in the airline industry?

RQ2: How did adjusted close prices and stock trading volumes differ between the first wave (January to June) and the second wave (July to December) of COVID-19?

Significance of Research

This research helps us understand how a major global crisis like COVID-19 affected airline stocks. By studying changes in stock prices and trading volumes, the project provides useful insights for investors, airline companies, and policymakers. It can support better decision-making during future emergencies by showing how stock markets react in such situations. The findings may also guide investment strategies and help airline companies improve communication with investors during uncertain times.

The innovativeness of the project

This project is innovative because it takes a global perspective by analyzing 15 major airline companies from different countries and regions. Instead of looking at the entire COVID-19 period as one single event, the study focuses on the timeline by separating the analysis into two specific phases: the first wave (January to June 2020) and the second wave (July to December 2020). This approach allows us to understand how the stock market reacted at different points during the crisis, making the results more detailed and meaningful.

Structure of the Research project/report

This research report is organized into several key sections. The Introduction presents the background of the COVID-19 pandemic, its impact on the airline industry, and the main goals and questions of the study. The Literature Review explores previous studies on the effects of COVID-19 on global stock markets and the aviation sector. The Methodology section explains the data sources, data cleaning process, and the tools used for analysis. It also describes how the timeline was divided into two waves. The Data Analysis section includes correlation analysis, trend observation, and a statistical test to compare the two periods. Finally, the

Conclusion and Implications section discusses the results, gives practical recommendations, and outlines the limitations of the study.

2. Literature Review

The airline industry was severely impacted by the COVID-19 pandemic, which brought about unprecedented operational and financial challenges. According to IATA (2021), the airline industry experienced its worst year on record in 2020, with global passenger numbers falling by 60.2% compared to 2019 and total industry revenues dropping by 69%. In April 2020, about 66% of all airplanes were not flying because of travel restrictions. This caused big financial losses and many people in the industry lost their jobs. These extreme disruptions not only affected airline operations but also significantly impacted stock market performance, making the industry one of the most visibly affected sectors during the COVID-19 pandemic. The pandemic not only reduced travel demand but also exposed structural vulnerabilities in airline operations (Albers & Rundshagen, 2020).

The COVID-19 pandemic has and continues to affect the health and economic life of patients in an alarming manner. Research suggests that economies all over witnessed a drastic shift in stock values with news regarding the pandemic. The limitations on free travel catered to some peculiar problems for the airline sector in contrast to other industries, airlines encountered an unexpected fall in both the supply of services and their demand. In comparison, other pandemics and Global crises such as the Financial Crisis of 2008, the SARS outbreak in 2003, and the 911 terror events provide a better understanding. Airline stocks, which are indicative of the profitability of the airline industry, created significant losses during these periods, showcasing the tendency of airlines to react to global shocks. With the pandemic over, there is an expectation of an overhaul within the structural paradigm of the Airlines, which includes more business flexibility, less travel for business reasons, and an increase in digitization.

The impact of global crises on financial markets has been widely studied. Notably, Horta, Lagoa, and Martins (2014) examined how the 2008 Global Financial Crisis and the 2010 European Sovereign Debt Crisis affected the behavior of international stock markets through

the lens of Hurst exponents. According to their findings, the 2008 financial crisis significantly increased long memory behavior in stock returns, suggesting a drop in market efficiency. The Hurst exponents deviated notably from 0.5 (the value indicating a random walk or market efficiency), especially during the Subprime crisis. Moreover, there was a substantial rise in correlation between local Hurst exponents across markets, indicating strong contagion effects. In contrast, the 2010 crisis, although impactful, showed weaker evidence of long memory and lower contagion intensity. Unlike most terror events, which show little long-term price impact after adjusting for systematic risk, the 9/11 attacks had a significant effect. Sectors like airlines, hotels, and defense experienced abnormal negative returns, and systematic risk (beta) increased notably, indicating a structural shift in investor risk perception (Karolyi & Martell, 2010). This highlights how large-scale terror events can reshape market dynamics beyond short-term shocks.

It is also important to understand how airlines responded to the crisis from a strategic and operational perspective. A study by Albers and Rundshagen (2020) examined how European airlines responded to the COVID-19 crisis in the first half of 2020. By analyzing 148 airline news reports, they identified five main response strategies: retrenchment, persevering, innovating, exit, and resuming. Most airlines quickly reduced costs and grounded fleets, but some also explored long-term strategies such as switching to cargo or entering new markets. The study highlights how government aid played a major role in supporting airlines, but also created new political challenges for business decisions. These findings help explain the background of airline performance during the pandemic, including the financial pressure reflected in stock market behavior.

3. Research Methodology

Overview of Methodology

The research methodology adopted in this study aimed at assessing the stock market performance of the airline industry during the COVID-19 pandemic period. In this instance, we utilized quantitative data from Yahoo Finance and analyzed the information using Microsoft Excel. Excel was the preferred tool because it is user-friendly and sufficiently

transparent to conduct the required statistical computations and trend analysis pertinent to the project.

The methodology was carried out in several phases: identification of the data, data cleansing, development of two time segments corresponding to the two waves of COVID-19, execution of statistical analysis with the use of Excel's built in commands, and the design of graphs and charts with the purpose of determining stock market trends. This was designed to generate meaningful and objective results on the impact of the pandemic on airline stocks.

Data Collection

The dataset consisted of the major stock prices of airline companies from January 1, 2020, to December 31, 2020. This dataset includes global airlines such as, Air Canada, Air France, American Airlines, Cathey Pacific, China Easter, Delta, Japan Airlines, JetBlue, KLM Dutch, Lufthansa, Singapore Airlines, SouthWest Airlines, Thai Airways, Turkish Airlines, and United Airlines.

The primary variables collected were:

- Adjusted Close Price (reflects actual closing price with corporate actions factored in)
- Trading Volume (in millions of shares)
- Date (month and year)
- Airline Name

To align with the structure of the COVID-19 pandemic timeline, the data was segmented into two phases:

- Wave 1: January 1 – June 30, 2020
- Wave 2: July 1 – December 31, 2020

These distinctions allowed for comparative analysis across two critical periods in the pandemic's development.

Data Cleaning

All data cleaning was conducted in Microsoft Excel. This included deleting repeating rows, confirming that all date entries were consistent, transforming volume numbers into millions, and verifying that corresponding airline dates matched the entries. For each record, waves (Wave 1 and Wave 2) were created based on the date, which helped in grouped analysis later during the project.

In addition, we checked so that the Adjusted-Close prices and volumes for each company did not differ for the 12 months and that missing and erroneous data was cleaned. Names of the airlines were changed to a common format to avoid duplication during group creation.

Data Storage

Cleaned data was stored in Excel format and used for statistical analysis.

4. Data Analysis and Results

The purpose of this section is to describe the statistical analyses performed on the stock performance data of the selected airline companies in correlation to the two waves of COVID-19 in 2020. Correlation analysis, trend analysis, and the Wilcoxon Signed-Rank Test were the three primary techniques used. All analyses were performed using Microsoft Excel.

Correlation analysis:

Airlines	Wave 1	Wave 2
Air Canada	0.98	-0.91
Air France	0.60	-0.28
American Airlines	0.68	-0.67
Cathey Pacific	0.28	-0.47
China Easter	0.24	0.08
Delta	-0.83	-0.92
Japan Airlines	-0.01	-0.47
JetBlue	-0.17	-0.79
KLM Dutch	0.36	-0.83
Lufthansa	0.08	-0.67
Singapore Airlines	0.71	-0.74
SouthWest Airlines	-0.90	-0.84
Thai Airways	0.50	-0.46
Turkish Airlines	0.70	0.07
United Airlines	-0.72	-0.70

Market participants use trading volume to make educated guesses about the future movements of stock prices. To study this relationship, Spearman's correlations were done for the two waves of COVID-19 for trading volume and adjusted close.

Wave 1 (Jan–Jun 2020):

- ○ Spearman Correlation between price and volume: **0.1908**
- ○ p-value: **0.0716** prices
- ○ **Interpretation:** It is noticed that a weak positive relationship is suggested. While the correlation is not statistically significant at the five percent level, it does indicate heightened investor participation associated with changes in pricing in the initial stages of the pandemic.

Wave 2 (Jul–Dec 2020):

- ○ Spearman Correlation between price and volume: **0.0301**
- ○ p-value: **0.7784**
- ○ **Interpretation:** During the second wave, there is practically no relationship between the price and volume which suggests that the market had become more dormant or had adjusted to the prevailing crisis.

Trend Analysis

Trading Volume Surge: Wave 1 (Panic) vs. Wave 2 (Recovery)
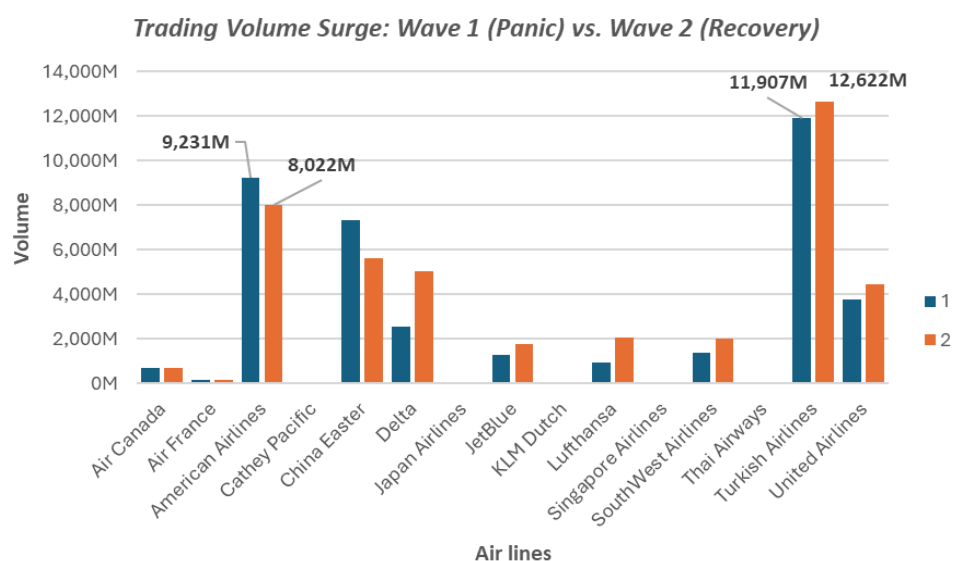
Depending on the airline and the period under study, trading volume varies greatly. According to the statistics, most airlines saw a decrease in trade volume during the panic phase of the first wave as opposed to the recovery phase of the second wave. As an illustration of this pattern, Air Canada's trading volume decreased from 9,231M in the first wave to 6,022M in the second. According to this trend, market participation and investor activity were muted during the first panic but picked up steam as the recovery period went on.
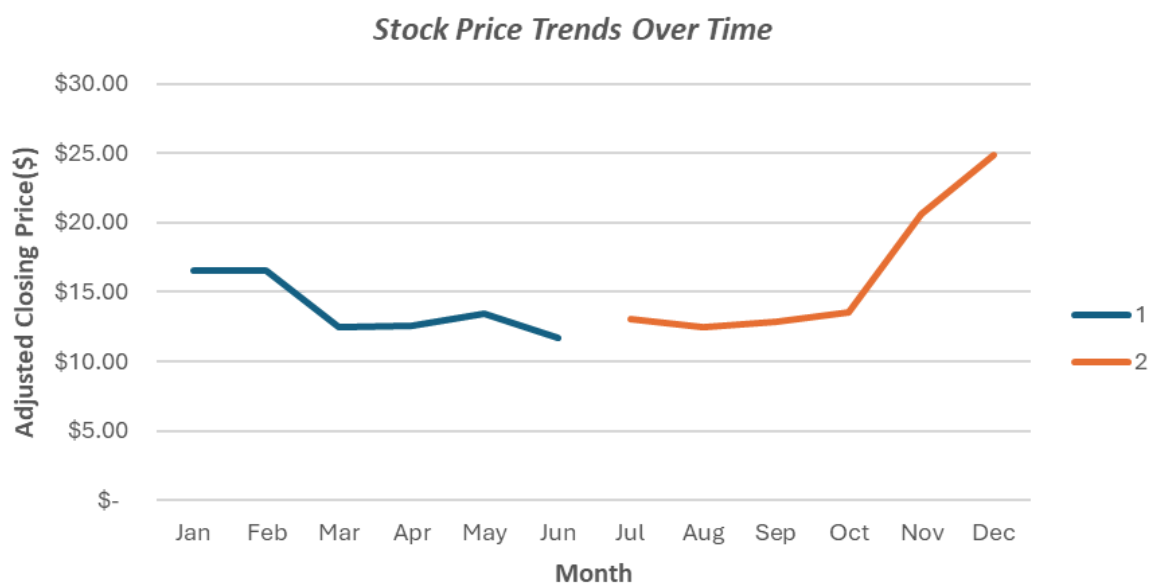
There was a major decline in the stock prices of airlines in March and April 2020, which corresponded with the initial lockdowns all over the world.

There was a sharp increase in trading volume during those months, which could possibly suggest panic selling or some opportunistic buying.

There was a slow recovery in prices in the middle to late 2020, although by this time not all airlines went back to their pre-pandemic name brands.

This image helped elucidate the quantitative results and greatly enhanced the understanding of the shifts in investor behavior during the pandemic year.

Wilcoxon Signed-Rank Test

To statistically compare the performance of stocks between Wave 1 and Wave 2, the Wilcoxon Signed-Rank Test was applied to both adjusted close prices and trading volumes.

Airline	Wave 1 Median	Wave 2 Median	Difference	Absolute Diff	Rank
Air France	20.88	28.02	7.13	7.13	15.00
SouthWest Airlines	36.44	32.92	-3.53	3.53	14.00
Singapore Airlines	4.59	7.57	2.98	2.98	13.00
KLM Dutch	12.33	15.04	2.71	2.71	12.00
Delta	30.20	27.79	-2.41	2.41	11.00
United Airlines	35.38	33.08	-2.30	2.30	10.00
Air Canada	12.48	13.95	1.46	1.46	9.00
Cathey Pacific	3.62	5.07	1.45	1.45	8.00
JetBlue	11.75	10.49	-1.26	1.26	7.00
Japan Airlines	10.56	11.80	1.25	1.25	6.00
Lufthansa	6.30	7.03	0.73	0.73	5.00
Turkish Airlines	1.60	1.82	0.22	0.22	4.00
China Easter	0.72	0.64	-0.08	0.08	3.00
American Airlines	12.67	12.63	-0.04	0.04	2.00
Thai Airways	0.11	0.15	0.04	0.04	1.00

Positive Rank Sum	Negative Rank Sum	W-test
73	47	47

- **Adjusted Close Prices:**
  - Test Statistic: **6.0**, p-value: **0.00085**
  - **Conclusion:** There is a statistically significant difference in adjusted close prices between the two waves, suggesting a meaningful market shift.
- **Trading Volume:**
  - Test Statistic: **37.0**, p-value: **0.208**
  - **Conclusion:** No statistically significant difference was found in trading volume between the two waves.

These results reveal that, despite the relatively stable trading activities of the investors, there were noteworthy changes to the stock prices which were most likely influenced by policy changes, vaccine progress, and overall market optimism.

5. Implications and Conclusion

Research Implications

This research explains the changes in investor behavior during the COVID-19 pandemic. In Wave 1, there was a weak correlation between trading volume and stock price suggesting early uncertainty and heightened reactions in the market. By Wave 2, these links were no longer present, possibly indicating that investors had adjusted to the challenges posed by the pandemic. The stock price differences across waves also illustrate how the market evolved and became more resilence over time.

Practical Recommendations

1. **For Airline Companies:** Develop emergency response plans to stabilize financial performance during crises.
2. **For Investors:** Monitor early trading volume trends as potential indicators of price volatility.
3. **For Policymakers:** Implement early interventions and support measures to calm markets and restore confidence.
4. **For Business Strategy:** Airlines should invest in digitalization, flexible scheduling, and diversified service models to remain competitive and resilient.

Theoretical Recommendations

1. Future studies can explore how other sectors responded to COVID-19 using a similar methodology.
2. Incorporating social media and news sentiment data could add depth to the understanding of investor psychology.
3. More detailed and higher-frequency data (e.g., daily or intra-day) might reveal additional trends.
4. Longitudinal studies could examine how airline stock performance evolved beyond 2020 into post-pandemic recovery.

Study Limitations

- The study is limited to the year 2020 and does not capture long-term recovery.
- Only adjusted close price and trading volume were analyzed, excluding other financial indicators.
- External factors such as government policies, investor sentiment, or global news were not quantitatively included.

6. Conclusion

The COVID-19 pandemic had a significant impact on the aviation industry's stock performance. While trading volume remained relatively consistent between waves, adjusted close prices shifted significantly, indicating how investors responded to uncertainty early on and gradually adjusted to current conditions.

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