

American Airline Industry Under COVID-19 Pandemic--using Delta as a Typical Case

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ABSTRACT

This article intended to find out and summarize the changes that American airline companies (Delta as a target) have to undertake in this unprecedented pandemic. Based on accurate statistics of 2020, this paper studies the industry overview mainly from three aspects—cost, revenue, and other issues. The Manpower field operation and the maintenance cost decreased and hedge strategies adjusted sharply during the COVID. In the Revenue part, the authors investigated that from the passenger airlines and the cargo airlines. We also made researches on the performance of stocks, policy regulations, and requirements. As is shown, though the COVID is a devastating impact on many industries, especially on the airline, there is still some good news readers can see from the statistics like derivative hedges, cargo performance, and policy support. This article is not only a review of historical data but also a precaution to the airline industry for those unintended financial catastrophes. This article hopes that not only the U.S. aviation industry, but also the global aviation industry need to pay attention to this type of event. Such incidents will directly affect the normal operation of airlines. Airlines need to reserve multiple plans even to deal with future emergency measures in order to avoid various company-related problems.

Keywords: COVID -19, Industrial analysis, Cost-revenue assessment, American airlines, Delta airline

1. INTRODUCTION

1.1. background

Amidst the unpredictable global COVID-19 pandemic, businesses of all industries were suddenly put into crisis worldwide. Before 2020, about 60% of international passenger transportation and over 30% of global trade were carried by air. The airline industry witnessed a freefall as soon as the travel bans policies were in operation, which is around 65% down on overall performance as estimated. These unprecedented uncertainties, like the number of cases, travel restrictions, and schedule difficulties faced by airline companies, led the management team to make fatal decisions swiftly and flexibly. Whilst in deep risk, the industry viewed the COVID pandemic "as a catalyst for change"—either survival or death [1].

1.2. Related Research

Garrow and Lurkin recorded the key themes conveyed in the 60th Annual Symposium of The Airline Group of the International Federation of Operations Research. Many companies viewed the COVID -19 pandemic as a historical catalyst for change [1]. Strauss et al. researched COVID-19 impact on United States airlines. In the whole United States, some flights in April 2020 decreased by 39 percent compared to April last year. The pandemic has severely disrupted commercial aviation. Because of limited travel, international aviation organizations reckoned global passage volume decreased 40 percent as the coronavirus continued to develop to United States' airline, Strauss et al. researched to find that exploration of K.T. transportation creative methods [2]. Radic et al. researched that the coronavirus pandemic made serious economic problems for airline companies. The suspension of flights let many airline companies lose plenty of revenue and lots of employees were losing their

job, including airport staff. Some airline companies are facing bankruptcy. Radic et al. said that some analysts predict that this situation will be more pessimistic [3].

Kang et al. examined the variables like policy uncertainty, oil price fluctuation, and stock return of U.S. airlines under a structural vector autoregressive model. The results confirmed that economic uncertainty and jet fuel price volatility has a significantly adverse effect on real stock returns of airlines both at industry and at firm level [4]. Akhtaruzzaman et al. investigated the empirical results of oil price risk exposure for different industries. It found out that using more financial instruments in COVID helps the airlines to moderate the high volatility of crude oil [6]. Loudon tested the airline companies in Australia and New Zealand on their financial status and stated that high earning volatility industries like airlines would prefer debt finance to equity finance [7]. Merkert and Swidan tested the usefulness of financial hedge strategy in the airline industry based on risk management theories and illustrated that it is effective in decreasing EBIT margin, which is the financial risks [8].

Nena Adrienne et al. examined the scope of aircraft grounding at airports and explored the challenges of resuming flights after COVID-19 from an airport operations perspective. The grounding of aircraft brings additional parking costs and harms future resumption of flights due to employee furloughs [9]. Diego Alonso Tabares examines the measures taken by airports and airlines in response to the COVID-19 outbreak. This includes measures for the detection of the virus and the prevention of its spread. The process, facilities, locations, and responsibilities for testing are further elaborated [10]. By using the framework of sustainable development to identify the immediate responses, Bartle et al. find that the different market conditions, roles of the governments, and long/short term schedule strategies would also make a tremendous impact on air cargo companies' performance [20].

Brown et al. analyses a situation that during 2019 and 2020, COVID-19 make an impact on the American airline management team. There have also been some such pandemics in history. Brown et al. said that airline companies need to prepare for this problem when the pandemic approaches. A lot of American airline companies didn't be aware of the problem. Some airline companies choose to merge and be more powerful[21]. Deb states that the aircraft industry is suffering pain during COVID-19. Deb used a new way to analyze the stock trends in three airlines company. Deb problem that coronavirus made an unprecedented and serious influence. Deb used Model Confidence Set (MCS) to show that the influence of the Internet's attention to different topics on airlines' stock price trends. After Deb did this research, the result shows the American three airline company's stock had bigger price fluctuation[22].

1.3. Objective

The objective of this article is to look into the impacts and upheavals that COVID-19 brought to the U.S. airline industry. With specific statistics, we also checked the corresponding actions and strategies that the companies took to tackle this unprecedented disaster, which may also be an opportunity. We hope the industrial analysis on the cost, revenue, share prices, and policies could give some inspiration on the direction of following adjustments to adapt to the post-COVID-19 era. By drawing lessons from history, enterprises can reflect on themselves, make up for their shortcomings, and always be alert to the macro crisis to prepare for hedging.

2. COST

2.1. Manpower field operation and maintenance decreased

Facing the coronavirus epidemic, the airline and air transport industry were under severe operational risks. Almost overnight, the entire airline industry faced many problems. Plenty of people decrease their interest in travel, aircraft bans, and national policies. Radic et al. researched that after more than two days of suspension, air traffic was lost, as well as aircraft manufacturers, airports, and other air traffic regulators. Travel agents and hoteliers, with losses estimated at hundreds of billions of dollars. The airlines that have cut the most jobs in this regard are thousands of employees. Strauss et al. researched that for the entire aviation industry, the impact is undoubtedly huge. Many small airlines are facing bankruptcy in the face of the COVID-19 pandemic. Airlines' costs are also rising, as travel restrictions in many countries have led to a large number of airline cancellations [2]. Many of the airline's planes are stuck on company grounds. This will increase the cost of managing the aircraft, including the cost of space and staff. Radic et al. researched that according to the Air Transport Action Group (ATAG, 2019), air traffic supports 65.5 million jobs nationwide. Airlines, airports, and service providers directly employ 3.5 million people. Air transport also indirectly provides job services for tourism. As a result, the bad situation of airlines will make lots of people unemployed, and many airlines companies are faced with a large number of layoffs.

According to Radic et al., because restrictions on the movement of people and goods inevitably lead to lower revenues, there are many chains of supply disruptions that include economy-wide problems. Airlines and other participants are laying off employees (temporarily or permanently), failing to meet obligations to creditors, paying for planes to be parked at airports, and failing to deal with raids by pilots and other workers, among others. Airlines have had to reduce their routes as the coronavirus pandemic has spread around the world in

dire conditions. For example, Delta reduced scheduled flights by 80% in the second quarter of 2020, with an average cancellation rate of 0% in early May. Southwest canceled an average of 1,450 times over the same period. American Airlines, the nation's largest airline, cancels an average of 320 times a day (17 percent) [3]. Almost all American airlines continue to cut flights, and their operational costs continue to rise. But problems were far more beyond that.

2.2. Hedging strategies adjustments regarding fuel and debt uncertainties

Some researchers confirmed that economic uncertainty and jet fuel price volatility has a significantly adverse effect on the real stock returns of airlines both at the industry and at the firm level [4]. During the COVID

-19 period, these factors were amplified by the emergency variable. This part will review how major players like Delta and the American aviation industry were impacted by fuel price and interest rate fluctuation.

As jet fuel is refined from crude oil, the price of them tends to move in the same direction. In 2020, the crude oil price surprisingly dropped to almost negative in April, and the following year, it witnessed a crazy surge to above \$80 in the October of 2021. From history data, the revenue of airline companies has a positive correlation with the world price of crude oil (Figure 1). In the period of decline, airlines can remain competitive only by cutting down fuel surcharges. On the contrary, when the price is increasing, the companies fuel cost increases accordingly.



Figure 1 Corporation revenue and the world price of Crude oil [24]

There was a deep decrease in the fuel purchase cost of Delta in 2020 in its annual report, from \$8581 million to \$2938 million, because of decreasing demand for travel on the air. In contrast, there was an increase in consumption in the fuel hedge contracts, from \$14 million in 2019 to \$22 million in 2020 [5]. When the crude fuel price was hitting the bottom line (less than zero), it was also a great opportunity to eliminate the oil price risk exposure in the future. As COVID -19 gave the industry a great recovery chance in the following year, using more financial instruments in COVID helped the airlines to moderate the high volatility of crude oil [6]. By longing fuel derivatives in the middle of 2020 to fix a low price, Delta did see effectiveness in its Gain(loss) performance (\$85 million) compared with Y2019 (-\$41 million).

From Delta's balance sheet, its total 2020 noncurrent liabilities are far beyond the ones in 2019, and the main

gap is that it made amazing more debt and finance leases in 2020 to cope with the pandemic, which is 27425 to 8873 (million dollars). This also conforms to Loudon's statement that high earning volatility industries like airlines would prefer debt finance to equity finance [7]. Compared with Delta's historical data, its D/E ratio of 2020 was dangerously high. A similar risky capital structure also shows in other Airline companies like American Airlines.

The borrowing cost is directly linked to the market interest rate. As estimated by a sensitivity analysis on annual interest rate volatility and benefit/cost effect, even a 100 basis points increment would lead to a decrease of \$1.2 billion fair value and an increase of \$29 million interest expense [5]. Since the outbreak of the COVID-19, the federal government had lowered its bond interest rate to nearly zero (0.428 in Oct) under a Q.E. monetary policy. As a result, Delta also declined the value of its

interest rate derivatives from 61 to 23 million dollars accordingly [5], which were mainly swap contracts used to offset the fluctuation of its floated I.R. debts.

Merkert and Swidan confirmed the usefulness of the financial hedge strategy in the airline industry and illustrated that it is effective in decreasing EBIT margin, which is the financial risk [8]. During an abnormal period, aviation companies were only battling against economic uncertainty and jet fuel price volatility themselves. They were also drastically adjusting their derivative portfolios to hedge the risks.

3. REVENUE

3.1. passenger airlines

COVID-19 has dramatically affected all aspects of society. Border closures are not the exception during the pandemic worldwide. The United States has banned all foreigners from China, Iran, and certain European countries. The ban includes anyone who has visited these countries within 14 days before traveling to the U.S.[11]Public fear of the epidemic and government propaganda against non-essential travel have contributed to the flights' decline. Due to the government's transportation control or people's fear of the virus, aviation was hit hard by the pandemic. Not just passengers of flights are decreasing. The shrinkage of the global manufacturing industry declines the global transportation volume and reduces the number of air cargo flights, which will be elaborated in the next section. As Table 1A, the number of both domestic and international airlines in 2020 is declining rapidly. By August 2021, flights operating in August are 84.1% of those operating in August 2019 before the pandemic and a 50.4% year-over-year increase overflights operating in August 2020.

Table 1. Annual Passengers on U.S. Airlines [12]

Country	Region	2019	2020	Change %
U.S Airlines	Domestic	811.6	335.5	-58.7
	International	115.5	34.0	-70.5

Because of the decreasing numbers of flights, the airlines need to use price strategies to attract consumers. Also, the airlines need to reduce their cost, such as laying off their employments, which has been mentioned above. Despite the many measures taken by both airlines and the significant drop in jet fuel prices from November 2019, the overall net income of the U.S. airline industry remains negative, as shown in Figure 3. A large proportion of the costs cannot be reduced in the short term, such as depreciation costs, fixed salaries of employees, insurances, and parking costs. In particular, costs such as parking charges are higher due to mass groundings of

passenger aircraft. So, airlines need to reduce their fares and even operate at a loss. Otherwise, they will suffer even greater losses. airlines



Figure 2 U.S. Average Air Fare(Inflation-Adjusted)[13]

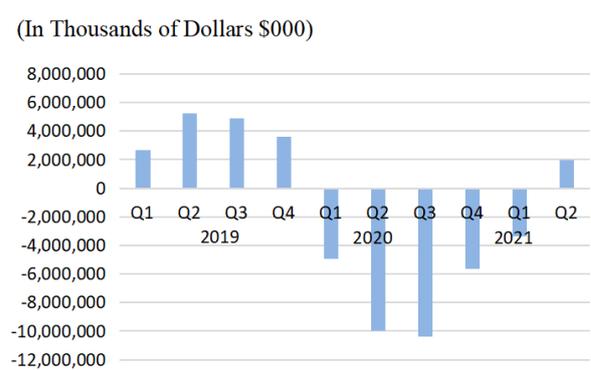


Figure 3 Net Income of All U.S. Carriers [14]

The result of the pandemic is shown in Figure 2 and Figure 3. U.S. airlines have negative net income from the first quarter of 2020 through the first quarter of 2021 and do not begin to improve until the second quarter of 2021. Although the U.S. airline industry is gradually recovering, the negative effects of the epidemic are still present, and it will take a long time to return to pre-epidemic conditions. The global aviation industry may need 2024 to recover to 2019 levels [15].

3.2. Cargo airlines

When seeing through the cargo revenue of the U.S. Cargo industry, the total statistics of that didn't witness a predominant change (-0.16%) in 2020 compared to that of 2019 [16], which is an unimaginable thing for the 2020 U.S. Passenger industry. The cargo revenue of Delta did witness a decline of 19%, whereas it is like nothing to its passenger revenue loss (70%). Similarly, from the cargo giant--FedEx's 2020 annual report, despite that more operating lease liabilities were undertaken by the company, its revenue only decreases by 1% in 2020 [17]. A dynamic balance was achieved during the pandemic.

Several elements led to this atypical dynamic equilibrium. The cargo ton-kilometers (CTK) data of the global-wide demand reduce by 8% in a year-to-year comparison with that of 2019. At the same time, the total capacity for air cargo expressed in global available cargo-

tonne kilometers (ACTKs) was also contracting (-25.2%) [18]. With cargo services declining more sharply than the demand side, freights prices were commonly higher than that of 2019. These statistics were conformed to the diagram 'Revenue per Shipment' offered by FedEx Freight. Besides, the substantial decline in the price of fuel also guaranteed profitability from the cost side, which accounts for more than 7% of industry revenue[19].

The air transport system's sustainability is largely shocked by The COVID -19 crisis, whereas the different market conditions, roles of the governments, and long/short term schedule strategies would also make a tremendous impact on air cargo companies' performance [20]. As seen from the international CTKs chart (Figure 4), North America has a strong tenacity from its demand side. It dropped the least through all regions in the most severe months and bounded back to nearly normal level quickly until Sep 2020. With the gradual recovery of the Chinese production lines, the strong demand for goods from Asia drove the Asia-North America cargo line to surge dramatically. Attributing to the second strict lockdown of the U.S., its domestic market cargo had exceeded its regional routes as the benefit of online shopping popularity [18].

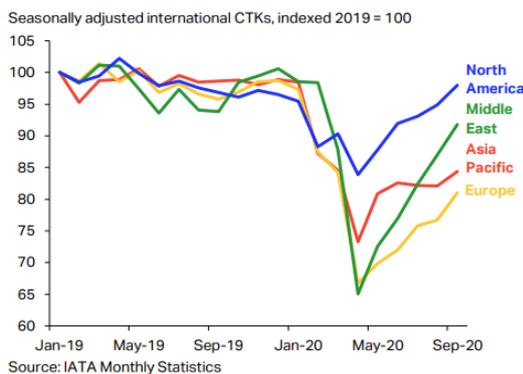


Figure 4 Seasonally-adjusted international CTKs of selected Regions [25]

Under extreme environments, the Cargo airline industry of America showed a unique style of resilience. It kept a balance point between dynamic multi-lateral forces.

4. OTHER SITUATIONS

4.1. Share price performance and policy subsidies

The bad situation facing the COVID-19 pandemic is having an impact not just on the airline industry itself but on other things as well. Whether it's a big airline or a small airline, the pandemic is having a big impact on the world. Air traffic is also linked to many other industries. This includes tourism, diplomacy between countries, politics, sports, science, and so on. These industries are

directly affected by changes in air traffic. Airlines around the world have many subsidies, including bank loan extensions or direct subsidies from the state. Brown et al research that American Airlines received \$29 billion in aid and loans in March and April -- American airlines (\$581 million), Delta (\$5.4 billion), and United (\$5 billion) [21]. These figures are proof of government subsidies to the airline industry. The government wants to help the airlines face and survive this downturn. The COVID-19 pandemic is cruel. In the face of these force majeure factors, people can only use the minimum damage to reduce the loss of the airline industry. Starting in late January 2020, most airlines' stock prices fell and were more volatile than usual. Such erratic behavior in the stock market is unprecedented. Thanks to the powerful information power of the Internet, airline shares have reacted to the latest news about COVID-19 and the world. According to Deb's research, the stock indexes of the three major U.S. airlines have been more volatile, which can be explained by the Internet's focus on COVID-19 [22]. The mass response to the information on the Internet is great. Then with COVID-19 cases increasing every day, governments may have to implement new policies to contain the virus. The day-to-day conditions around the world are changing every day, and so are policies. This will certainly cause problems for the airline industry, and many airlines will lose money

During the pandemic, some airline companies faced financial problems and couldn't maintain the way they lived before. As a result, several American airline companies chose to merge with other airline companies. Mergers will have some influence on the aircraft industry. In the aircraft industry, It will have the trend towards oligopoly. In American history, when some big thing happened, several airline companies faced bankruptcy. However, Some big airlines would consider affiliate almost bankrupt airline companies. Brown et al. state that Us Airways, for example, bought American Airlines in 2011. Delta bought Northwest airlines in 2008 and became the world's largest airline at the time. Overall, continuing bankruptcies and mergers in the U.S. airline industry have created a structure of horizontal concentration.

4.2. New regulations and requirements

The epidemic has also brought new requirements to airlines. Due to the fear of COVID -19, consumers value more on hygiene and health. The new transport regulations from the authority and institutions like IATA also ask airlines to update their operation procedure, including vaccinations, protective equipment, and contact regulations to prevent infection [23]. In addition, airlines need to protect their employments with partitions and other facilities, urge employments and passengers to wear masks, and keep social distances. Conducting temperature and virus testing is also one of the most

important measures to prevent the spread of COVID-19. But testing for body temperatures is not accurate, and testing for the virus, such as PCR tests, is limited at many airports. Keeping social distance onboard means that planes can't have the same high-density seating arrangements, and that reduces the amount of profit they can make.

The demand for digitization of airline services is also increasing. For example, customers want flights to be canceled and changed at any time and want to book online. What's more, the increase of online activities also increases the demand for in-flight WIFI. Since the future of airlines is not promising, that requires airlines to adjust the new regulations and satisfy the requirements of consumers as soon as possible.

5. CONCLUSION

The main purpose of this article is to reveal the impact of the COVID-19 on all aspects of the U.S. aviation industry and to make predictions for the future development of the U.S. aviation industry. This paper is not only analyzing the impact of the pandemic in terms of revenue, cost, and government policies. It also analyzes the effectiveness of Hedging strategies in negative shocks, the different impacts of the epidemic on passenger and cargo transportation, and the future directions for airlines to make improvements.

The global airline industry has been hit hard by the new crown epidemic, and the U.S. airline industry is no exception. Due to government traffic control, public fear of the virus, or shrinking global trade, the number of flights and routes drastically reduced. Many small airlines face bankruptcy, and large companies are not doing well and have to cut costs by laying off employees. At the same time, the U.S. government has subsidized airlines to mitigate the negative effects of the epidemic, especially job losses from layoffs. In addition, airlines used financial hedging strategies to reduce financial risk. However, these measures have had little effect in the face of the significant negative impact of the epidemic, and the North American airline industry as a whole has operated in debt during the epidemic. Thus, although the North American airline industry began to recover gradually from the fourth quarter of 2020, the outlook is not promising. It may take up to 2024 to return to the pre-epidemic levels of 2019. Judging from the emergence of Coronavirus variants such as Omicron, the pandemic will continue for a long time and cause greater damage to the world economy. Airlines will need to make progress in areas such as hygiene to meet the new requirements of agencies and customers. Unpredictable events like this will not only affect the U.S. aviation industry, but also cause great problems and disruptions to the global aviation industry. We need to pay attention to this incident to prevent similar situations in the future so that the aviation industry can better face such problems. Also,

airlines must prepare for new variants to cause disruptions to the industry's recovery or even a downturn again.

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