**Summary:**

Through data analysis, observations were found regarding which airline carrier is the best regarding delays, how often they fly, and how many flights they cancel by comparing data from the first quarters of 2019 and 2020. However, since the COVID-19 pandemic has deeply affected the travel industry (and especially the airline industry) starting in March 2020 more research was conducted on the affects COVID has on these factors that contribute to the best carrier. While most of the first quarter of 2020 went relatively well for the airline industry, they were hit hard in early March and are still trying to recover. Research has found that Southwest Airlines is one of the best carriers. Although they have a higher number of cancellations, they offer more flight opportunities than any other carrier and have the lowest amount of delays. There are some smaller airlines that outperform Southwest in some areas, but Southwest serves a wide spread of locations making it statistically one of the best options available.

**Carrier Data:**

***Cancelations:***

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The above graphs compare the number of cancelations by carrier in the first quarter of 2019 and 2020. There was a significant increase in cancellations for all carriers in 2020 which was concluded to be because of COVID-19 (see COVID Pandemic vs Airlines section for more information). Despite that Southwest Airlines has the most cancellations by far in each year.

***Arrival Delays:***

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| ***Chart, surface chart  Description automatically generated*** |

The next factor analyzed was arrival delay as most customers care most if they arrive on time since departure delays can possibly be made up during the flight (see graph below for arrival vs departure delay correlation). Delays of over 5 hours were factored out to control outliers. As shown by the two graphs, the first two quarters of 2019 and 2020 for each carrier were relatively similar when it came to their average delay time over the two years. Southwest remained one of the top airlines with the lowest average delays (excluding Hawaiian Airlines because they offer limited flights to Hawaii). SkyWest appears to be the worst with their average arrival delays.

***Correlation between departure delay and arrival delay:***

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While these graphs contain a lot of data it helps visual the makeup time between departure delays and arrival delays from the first quarter of 2019 and 2020. From the data we can’t conclude that a flight will always make up for delayed time in the air. There are some cases where this is true but a lot of the counts form a steadily sloped line that show delays in departure lead to similar timed delays in arrival. From this graph we can also see that 2020 has had significantly less delays within the bounds examined (possibly due to less flights with COVID or that they had delays greater than 300 minutes) that fall into the no greater than 30 minutes early to depart, no greater 300 minutes to depart, and similar with arrival. These numbers were chosen to control the data set. The light blue area also indicates how few flights depart and arrive early.

***Number of Flights:***

|  |  |
| --- | --- |
| ***Chart, histogram  Description automatically generated*** | **KEY:**  9E = Endeavor Air Inc.  AA = American Airlines  AS = Alaska Airlines  B6 = JetBlue Airlines  DL = Delta Airlines  EV = ExpressJet Airlines  F9 = Frontier Airlines  G4 = Allegiant Air  HA = Hawaiian Airlines |
| ***Chart, histogram  Description automatically generated*** | MQ = Envoy Air  NK = Spirit Air Lines  OH = PSA Airlines  OO = SkyWest Airlines  UA = United Air Lines  WN = Southwest Airlines  YV = Mesa Airlines  YX = Republic Airlines |

\*\*Note\*\* Carrier ID’s were used for easy identification on the labels of the chart

From the bar chart above Southwest, American, and Delta Airlines offer the most flights consistently each year. This may explain why Southwest cancels more because they offer more flights overall. Below presents a comparison of popular airlines flight options.

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**COVID Pandemic VS Airline Industry:**

Background: On March 11th,2020 the United States bans all travel to China, Europe, and Iran. By March 14th, 2020 every state (except West Virginia) in the United States had cases of COVID-19. On March 16th, 2020 airlines requested $50 billion in assistance packages.

*Source:* [*https://www.thinkglobalhealth.org/article/updated-timeline-coronavirus*](https://www.thinkglobalhealth.org/article/updated-timeline-coronavirus)

***Cancelled Flights March 2019 vs March 2020:***

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Although the travel ban did not include domestic flights, the demand for air travel dramatically decreased and thousands of flights were canceled. Southwest Airlines tripled the amount of flights they had canceled compared to the year before during that time. The airline industry has been one of the hardest hit by the pandemic.