**Are Premium Airlines Also Premium in Performance?**

Have you ever had the feeling that when you thought you booked a good flight, because you paid a premium fare, the airline actually performed not as good as you initially expected? Maybe you would have wanted to select an airline that has a better track record on punctuality and on delays, but where to find such information?

Over the last 40 years global air travel has increased tremendously as airlines transported 3.6 billion passengers in the year 2016, which is about 800 million more than in 2011 (IATA, 2016). Air travel has become part of our daily lives, and since the era of mass air travel began, has become more affordable as time passed by. This decline in fare price is the response to the airline deregulation act from 1978 and to the dynamics in the elasticity of demand for air transportation. Nowadays, research has indicated that the ticket price is still the most important feature on which passengers choose an airline, despite other investments such as loyalty programs and the overall improvement of the customer’s experience (Skyscanner, 2009). However, booking the flight with the lowest fare is not always the best strategy. Research has indicated that low cost carriers are often also leaders in late arrivals, low customer satisfaction, uncomfortable cabins and unsatisfactory frequent flyer programs (NBC News, 2017). Besides the group of passengers that aims to minimize flight fare, a second group exists, which values a seat on a particular flight in a different manner. For example, a flight is far more valuable for a salesperson who suddenly has an opportunity to visit an important client than to someone visiting a friend or relative abroad. Consequently, the salesperson is more willing to pay a higher fare in order to make the appointment (Airline Economics, 2017). As the price of the flight is of secondary concerns, the salesperson is interested in other performance indicators for flight selection, but where to find such information? Sequentially, with the aim of providing passengers with such information, the following research question was coined:

**“Can performance indicators on flight duration support passengers in the decision-making process**

**of airline selection?”**

**Dataset**

To assess airline operation, a wide variety of indicators are available; however, not all of these indicators are of interest for the passenger. Interesting indicators of operational performance might be: Percentage of flights delayed, Average minutes delay per flight, Percentage of flights delayed per reason, and for example the Number of flights to a particular destination (NWDS, 2017). In order to present such insights to passengers, a reliable longitudinal data set is required that allows for the analysis of multiple airlines over an extended period of time. Though, the time period should be chosen carefully, as airline performance tends to sway over seasons, which could sequentially influence the results (Bureau of Transport Statistics, 2002). Consequently, the time period is set to the last month of flight information in order to prevent seasonal bias and to ensure that passengers are informed about the current state of affairs. A dataset that allows for such an analysis is the USA Airline On-Time Performance dataset from the Bureau of Transportation Statistics, U.S. Department of Transportation.

The USA Airline On-Time Performance dataset contains 479,000 observations on 12 airlines, observed over the period April 2017. Furthermore, the dataset contains a multitude of variables from which 11 were used for the analysis:

1. UniqueCarrier: A code representing the FAA designated airline code
2. Origin: A code representing the airport from which the flight originated
3. Dest: A code representing the airport to which the flight is flying
4. TaxiIn: The recorded taxi time toward the gate after wheels on time, recorded in minutes
5. TaxiOut: The recorded taxi out time toward the runway till wheels of time, recorded in minutes
6. AirTime: Flight time, recorded in minutes
7. CarrierDelay: Delays caused by the carrier like aircraft cleaning, aircraft repairs, etc., recorded in minutes
8. WeatherDelay: Weather delay is caused by extreme or hazardous weather conditions that are forecasted or

manifest themselves on point of departure, on-route, or on point of arrival, recorded in minutes

1. NASDelay: Delay that is within the control of the National Airspace System (NAS) may include: non-

extreme weather conditions, airport operations, heavy traffic volume, air traffic control, etc., recorded in minutes

1. SecurityDelay: Security delay is caused by evacuation of a terminal or concourse, re-boarding of aircraft

because of security breach, inoperative screening equipment and/or long lines in excess of 29 minutes at screening areas, recorded in minutes.

1. LateAircraftDelay: Arrival delay at an airport due to the late arrival of the same aircraft at a previous airport,

recorded in minutes.

**Methodology**

In order to inform passengers on airline performance indicators, an application was constructed using R and Shiny. The application can be found at the following internet location: <https://stevenjongerden.shinyapps.io/flightstatusapp/>.

To evaluate the functionality and usability of the shiny application, a flight scenario was designed, consisting of a flight from Atlanta Airport to San Francisco Airport on the 16th of Aug, returning on the 23rd of Aug. The possible flights options were determined by using Sky Scanner, as well as the pricing options for these flights. Sequentially, in order to determine the “best” flight, the presented performance indicators and statistics from the Shiny application were used.

**Findings and Results**

1. **Overall Airline Performance**

For the flight from Atlanta to San Francisco there are three possible options for direct flights, which are: Delta Air Lines, Frontier Airlines and United Airlines. These options were found using Sky Scanner and align with the information available in the Shiny application. For these airlines, the following airline wide information is available:

Table 1: Overall Airline Performance

|  |  |  |  |
| --- | --- | --- | --- |
|  | Number of Airplane | Number of Destination | Percentage of flights delayed |
| Delta Air Lines | 145 | 143 | 11.18% |
| Frontier Airlines | 52 | 49 | 19.29% |
| United Airlines | 85 | 83 | 15.36% |

From these results, one could infer that the performance of Delta Airlines with regards to delayed flights is better in comparison with Frontier Airlines and United Airlines. This might be a first initial indication of the airlines performance for the route from Atlanta to San Francisco; however, does not necessarily mean that Delta Air Lines performs on average for that particular route. Consequently, route specific analysis should be performed.

1. **Route Specific Airline Performance**

The Shiny application also provides the functionality to compare specific routes, as route performance might deviate from overall performance. When the airlines are compared for the route Atlanta to San Francisco, the following route performance is presented:

Table 2: Route Specific Airline Performance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| (min) | Taxi Out | Air Time | Taxi In | Duration | Delay |
| Delta Air Lines | 20 +/- 1 | 279 +/-1 | 11 +/- 1 | 310 +/- 2 | 9 +/- 3 |
| Frontier Airlines | 22 +/- 4 | 286 +/- 5 | 24 +/- 6 | 332 +/- 10 | 17 +/- 10 |
| United Airlines | 16 +/- 1 | 282 +/- 2 | 8 +/- 1 | 306 +/- 2 | 11 +/- 7 |

For this route, the presented route performance indicates that the flight duration (taxi out + air time + taxi in) is the longest for Frontier Airlines, and comparable for Delta Air Lines and United Airlines. It is also possible to infer that the overall delay for Frontier Airlines is longer than Delta Air Lines and United Flights, which is in line with the earlier findings from the average airline performance. However, from this information, as Delta Airlines and United Airlines are somehow comparable, it is not jet possible to conclude which airline performs better. Consequently, the flights are compared using ANOVA and a Tuckey-HSD post-hoc test (a test to compare the average flight duration for more than two groups). The table below presents the results and indicates that Delta Air Lines flights and United Airlines flights are both statistically shorter than Frontier Airlines, but that there is no difference between United Airlines and Delta Air Lines.

Table 3: Route Specific Airline Performance Comparison

|  |  |  |
| --- | --- | --- |
| Flight Duration Comparison | Statistical Difference | Flight Duration |
| Frontier / Delta | Different | Longer |
| United / Delta | Not Different | The Same |
| United / Frontier | Different | Shorter |

Therefore, based on the average airline performance and specific route performance it is possible to conclude Delta Airlines shows the best punctuality and flight duration, and is the preferred airline.

1. **Flight Time Selection**

At this point of the selection process, the date, airports and airline have been selected, which leaves the flight time. As Delta Air Lines provides seven opportunities on the 16th of Aug to fly to San Francisco, the passengers can select the flight time while taking into account factors that might influence the delay of the flight. Delay information for Atlanta International Airport indicates that as the day passes more flights become delayed. Consequently, in order to reduce the probability of a delayed departure, it is most favorable to fly early in the morning. This selection can be made without having to take into consideration any price changes as the flight fare is the same during the entire day.

**Conclusion**

Since the era of mass transportation, the price flights have become ever more important for commuters. However, another group of travelers exists that, next to the price of a flight, also highly ranks the punctuality of a flight. To facilitate this group of travelers in the flight selection process, a Shiny application was constructed using data from the Bureau of Transportation Statistics, U.S. Department of Transportation. The results from a scenario study indicate that information on flight performance can assists in the selection of airlines for specific routes within the United States and assist in the selection for specific flight times in order to reduce the probability of delay. However, the findings presented within the document are limited to USA Airlines for the period of April 2017 and therefore do not reflect future airline performance.

*Disclaimer*

*This publication has been prepared solely for illustration, educational and or discussion purposes. It does not constitute independent research and under no circumstances should this publication or the information contained in them be used or considered for the selection of airlines.*

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