**Project Overview.** Flying has become more affordable over the last several years, and it is often the chosen option for long-distance travel. However, the efficiency and convenience in taking a flight may also be hindered by disruptions from travel delays. These experiences can leave a negative impression on consumers, directly influencing consumer decisions for future flights and business activity for different airline carriers.

Our goal is to understand the impact that flight delays may have on various airline companies through statistical models and estimations of fluctuations in consumer demand. Relatedly, we will model how different pricing strategies may be affected for certain flight itineraries. This will also provide insight on whether travel delay experiences are generally remembered or forgotten in any meaningful way within the consumer population.

Although the data discussed here will be most relevant for the aviation and travel industries, our approaches for data analysis may be applied to any business that provides reliable scheduled services to their customers. For our purposes, the client is an airline company that is monitoring the performance of competing airlines, and interested in identifying areas of their operations that can be improved.

**Data sources.** The Bureau of Transportation Statistics (BTS)  has available an abundance of daily flight delay information that dates back to 1987. This includes details for flight itineraries such as the airline company, origin and destination airports, departing and arriving times, and flight durations. This will be used to identify whether specific itineraries are more susceptible to delay, if certain companies are better at staying on time, and if delays tend to be intermittent or random.

The BTS also provides quarterly data for itinerary details for a random sample (10% of consumers) from reporting carriers dating back to 1993, which will be used to understand the possible causal effects between consumer demand and airline pricing. Information about distances traveled, number of segments for an itinerary and the itinerary fare are included. Unfortunately, these data do not have specific dates and times for each reported flight, but the origin and destination airports remain preserved, which will allow us to relate these data with known itinerary delays.

**Methods.** We will provide an overview of airline carrier performance through summary statistics, modeling and related visualization. Relationships in travel delays for daily flight itineraries will be explored through different levels of regression analysis and analysis of variance. These time series data will also be aggregated to find trends in the consumer population, specifically how a delay may impact the choices a consumer makes and whether pricing adjustments are needed. Simulations can also be performed to evaluate whether these effects have a significant impact on overall business performance or if consumer behavior is mostly unchanged.

**Dissemination of Results.** A formal written report on the methods and results of our analysis, in addition to a slide deck describing our findings, will be provided at the end of this project. We will also prepare a list of possible vulnerabilities in service operations for the different companies involved, and suggestions for how they may be remedied.