Weather & Flight Delays
USA | June 2003 – January 2016

STA 199

Spring 2026 / Duke University

Presented by

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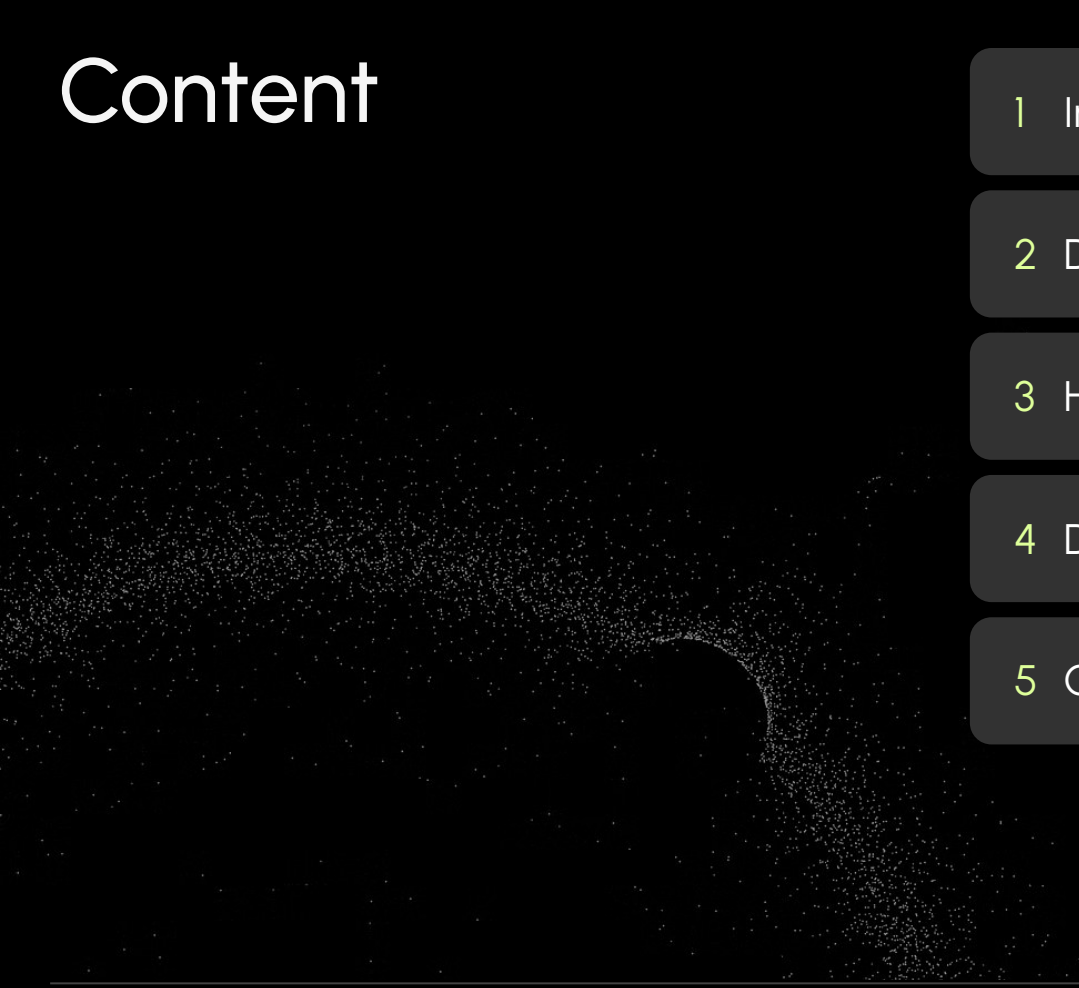
Content



Introduction

Research question:

- How does the number of delays and number of minutes delayed due to weather, as well as the the number of flights cancelled, delayed, or diverted, vary depending on the time of year?

Motivation:

- Observe and determine the influence of factors that contribute to varying flight delays
- Inform future investigations to address consequences of delays

Our accomplishments

Introducing the data

Sourcing

Found in CORGIS, compiled by Austin Cory Bart, reported to US Department of Transportation

June 2003 - Jan 2016

Timespan of data

4408 rows 24 columns

Structure of data

Example variables:

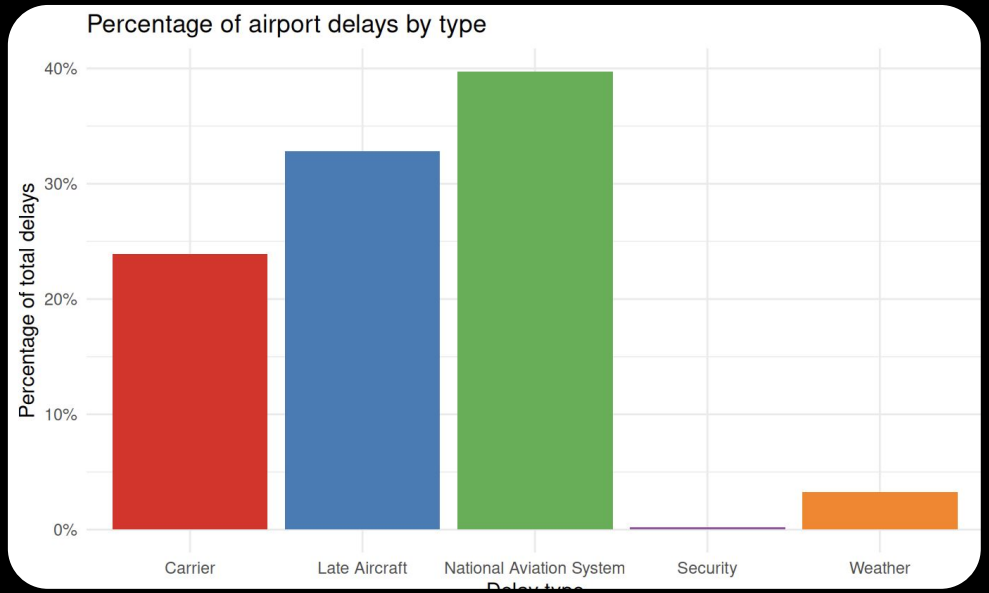
- Number of flights on time, delayed, diverted and cancelled
- Minutes delayed
- Cause of delay: weather, system, late aircraft, carrier, security
- Name of carrier

Data collected from American airlines that comprise at least 1% of the total scheduled-service passenger revenue

Data criteria

Airport delays, by type of delay

- Weather caused around 3.25% of all delays
  - 333780 delays
  - Second smallest delay factor
- The national aviation system was the largest contributor, causing 32.8% of delays
  - 4207790 delays

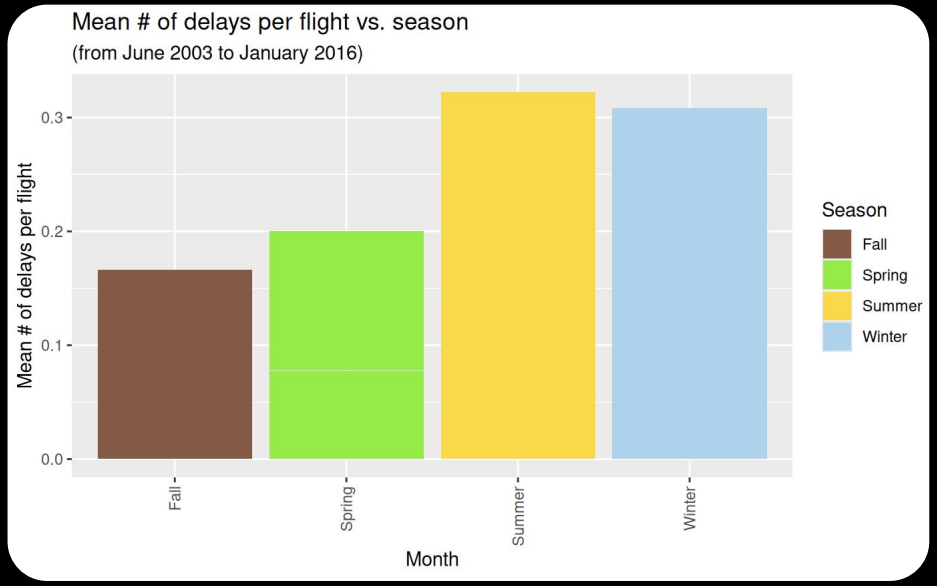


Conclusion → Weather is not a major cause of flight delays, indicating other factors, namely system-related factors, are at play

Analysis pt. 2

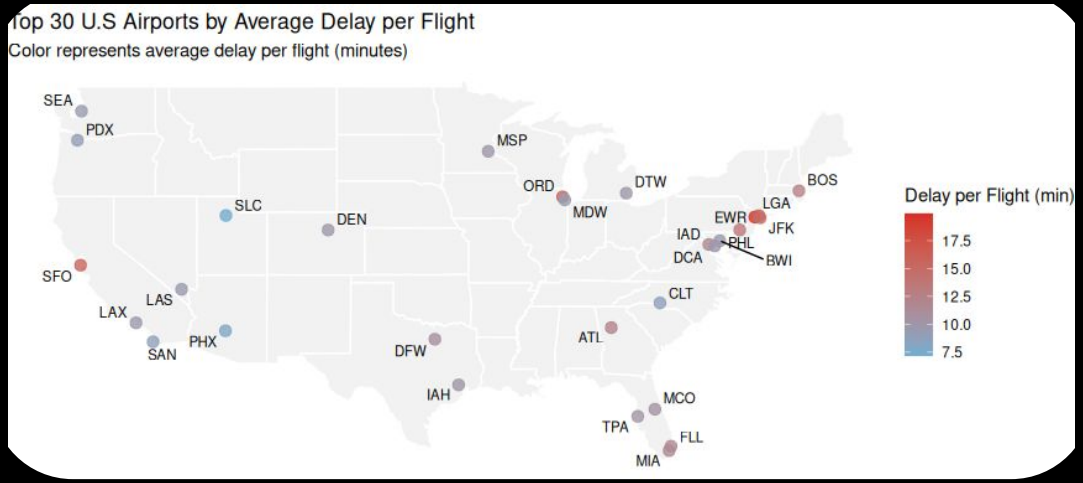
Seasonal influences

- Of all the seasons, summer had the largest mean number of delays, followed by winter
- Autumn constituted smallest number of delays



Conclusion → Since more delays occurred during the summer than during the winter, other factors besides season-related weather influence delays and diversions

Top 30 Airports mapped



Highest delays per flight:

- EWR (19.94 min), LGA (15.78), ORD (15.70), SFO (15.69)
- Northeast airports (EWR, LGA, JFK) show the highest delays (Avg: 13.72 mins)

No relationship between traffic and delays
→ Busier airports do not necessarily experience longer delays
→ Regional airport concentration does not predict delays ($p = 0.622$)

Conclusion

→ Delays are likely driven by weather, operations, and air traffic complexity, not just volume or density

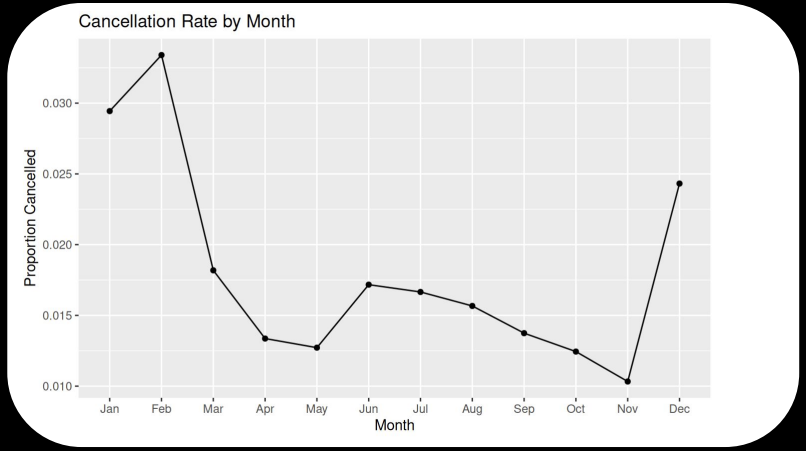
Analysis pt. 4

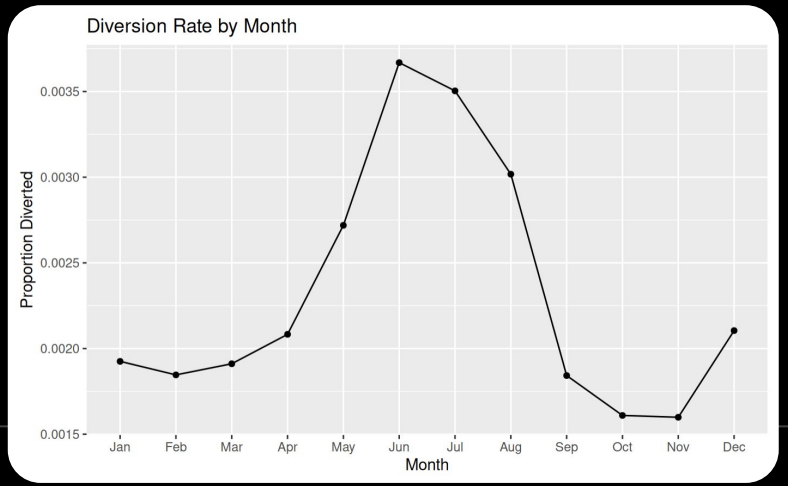
Airport diversions by month

- No major variation in diversion rates; slight increase during warmer months
  - Suggests diversions are impacted by other factors besides season
- Cancellation rates significantly varied; peaked in February
  - Cause uncertain

Conclusion →

Seasons did not clearly correlate with changes in diversion and cancellation rates.





Discussion & critique

Conclusions

Our hypothesis was incorrect.

- Most delays were not caused by weather
- Most delays occur during the summer and winter months
- Busier airports do not necessarily experience higher delays

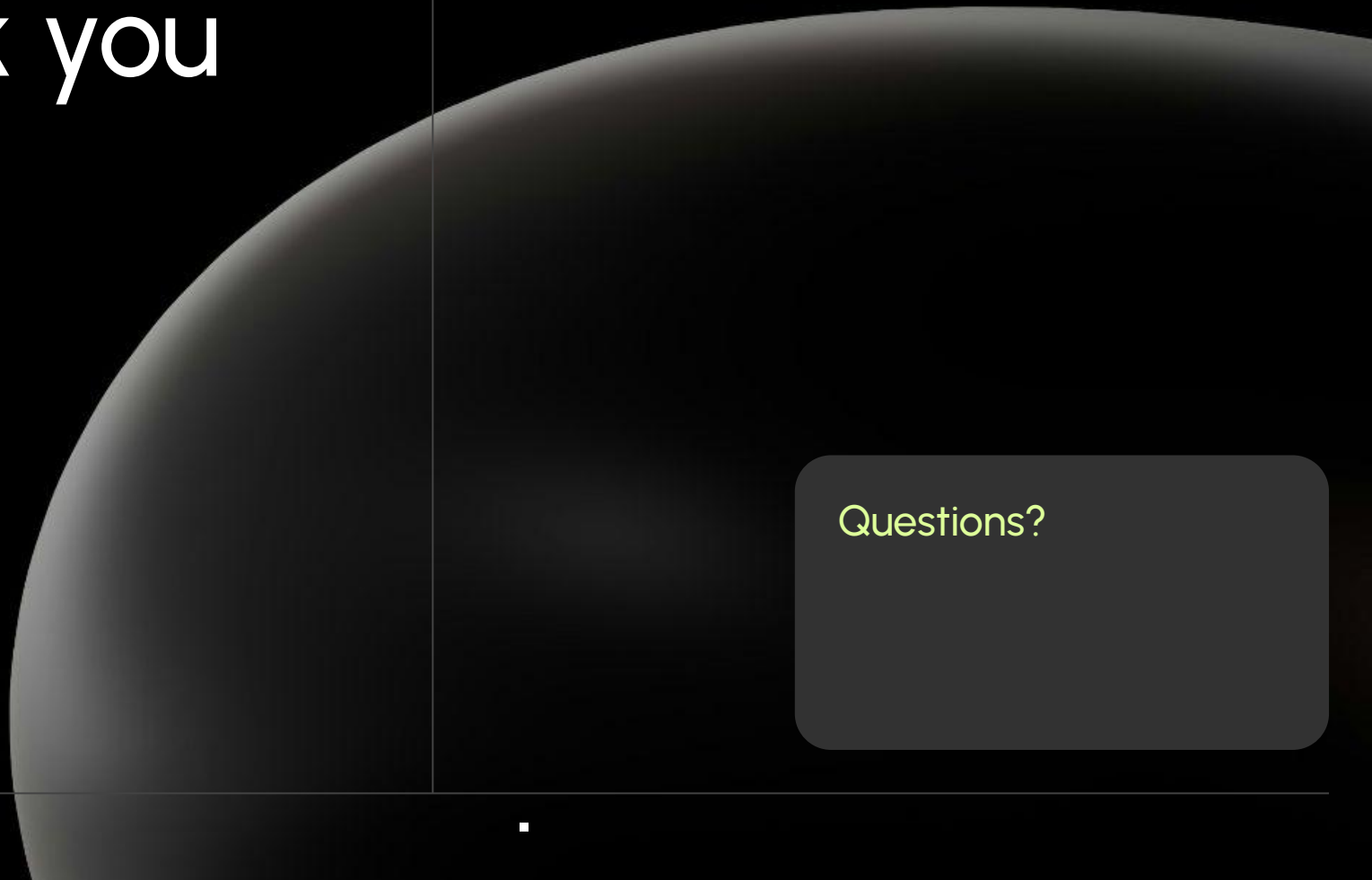
Limitations & critique

- Data is from 2003 - 2016; may not reflect climate change effects
- Correlation vs. causation

Further inquiry

- Trickle-down effect of weather through systems
- Carrier effect (e.g. Spirit vs. Delta)
- Modeling with specific weather data (e.g. wind speed)

Thank you



Questions?