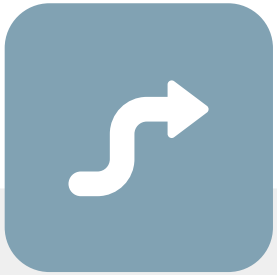
Grounded Insights: Recommendations to Mitigate Flight Cancellations

Seamus Flaherty, Tina Lin, Sanchita Mahapatra, Irvin Carreon, Kimberly Kiepek (Team 11)

Explaining Cancellations



Logistic Regression

We explored three potential factors: Airlines, Airports, and Departure Hour

92%

Weather and carrier related cancellations

Agenda

01 Methodology

02 Operating Airline

03 Origin Airport

04 Scheduled Departure Hour

05 Conclusion

06 Questions

01

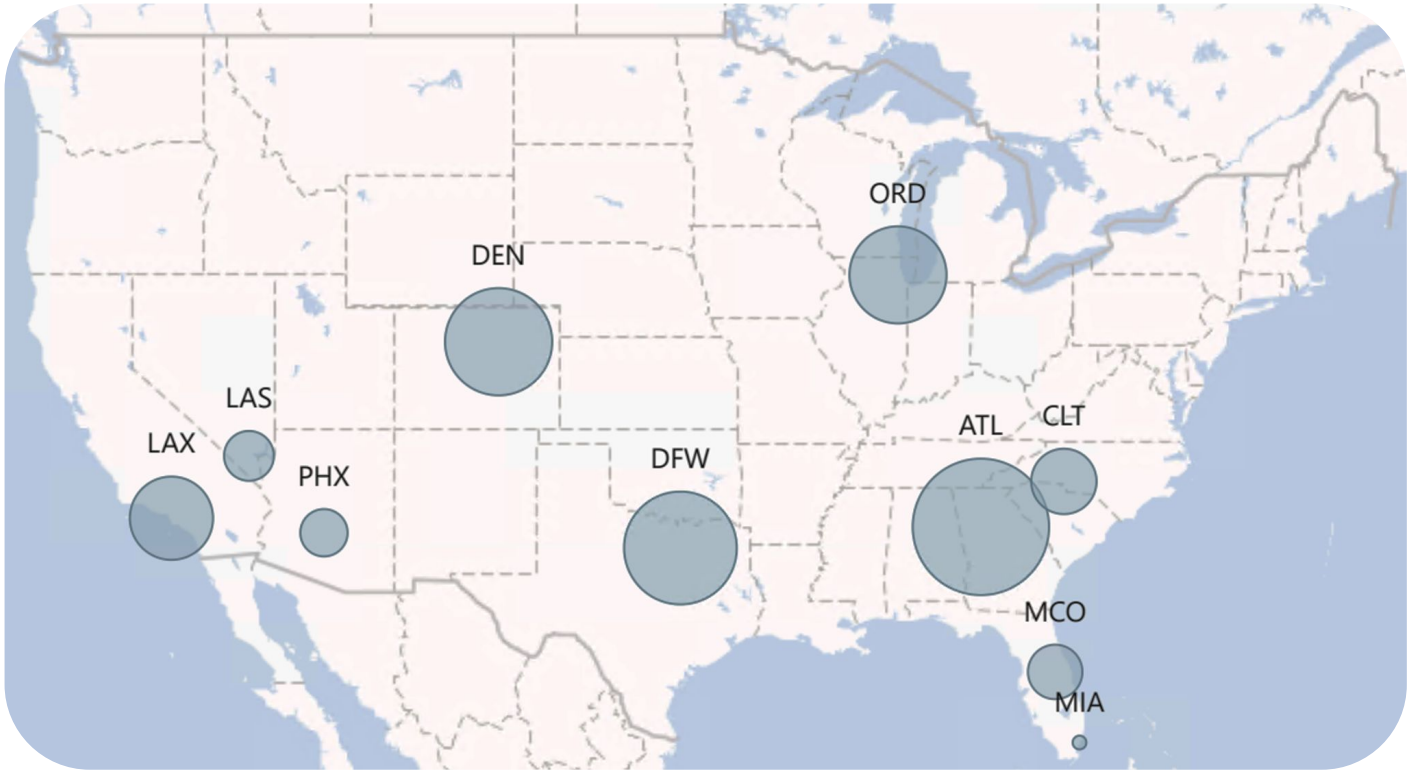
Methodology

What We Analyzed

Who We Focused On: Top 10 U.S. Airlines

HA	UA	DL	B6	NK
Hawaiian	United	Delta	JetBlue	Spirit
AS	WN	F9	G4	AA
Alaska	Southwest	Frontier	Allegiant	American

Where We Focused: Top 10 U.S. Airports



Flight-Level Factors

Operating Airline

Origin Airport

Scheduled Departure Hour

Departure Delay

Distance

Flight-Level Factors

Operating Airline

Origin Airport

Scheduled Departure Hour

Departure Delay

Distance

Flight-Level Factors

Operating Airline

Origin Airport

Scheduled Departure Hour

Departure Delay

Distance

Input: Five Key Factors

Logistic Regression Model

Output: Odds of Cancellation

76.3%

Model Performance (Concordance): Correctly assigns a higher probability to cancelled flights 76.3% of the time

Significant Factors

Operating Airline

Origin Airport

Scheduled Departure Hour

02

Operating Airline

Operating Airline

HA	UA	DL	B6
Hawaiian	United	Delta	JetBlue

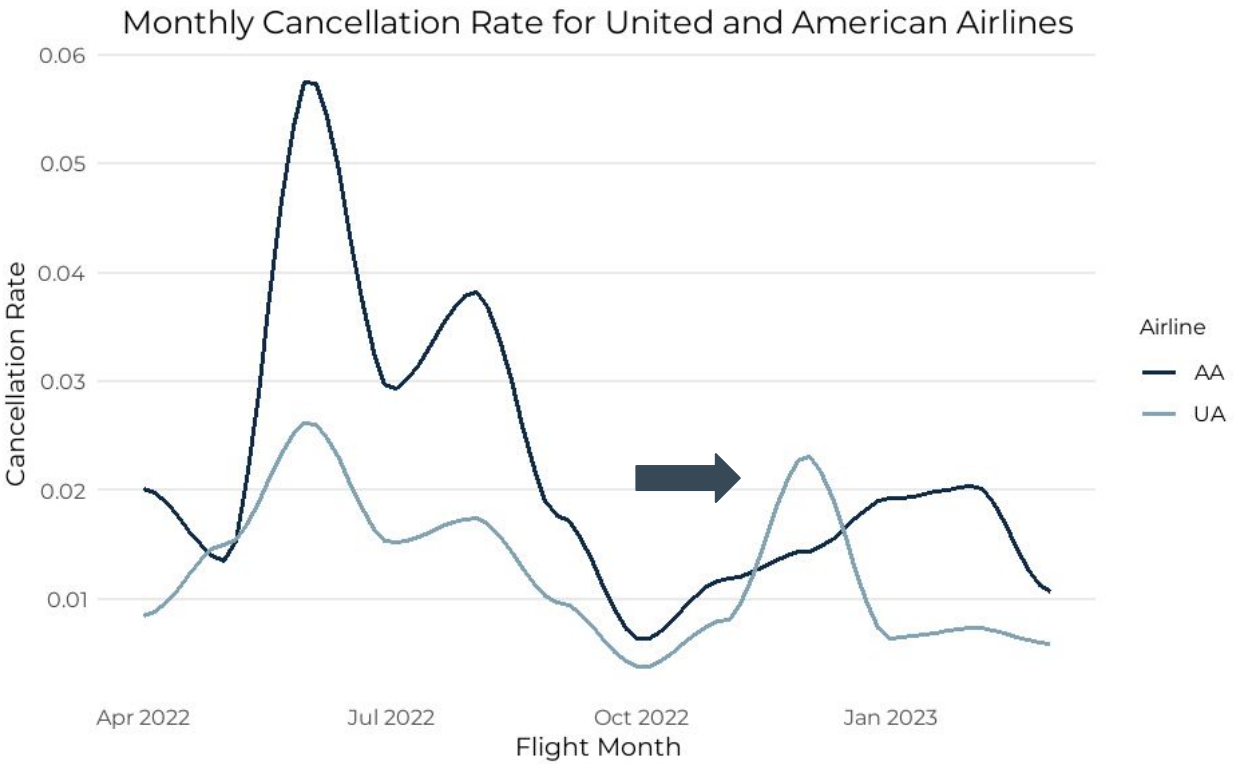
NK	AS	WN
Spirit	Alaska	Southwest

Operating Airline

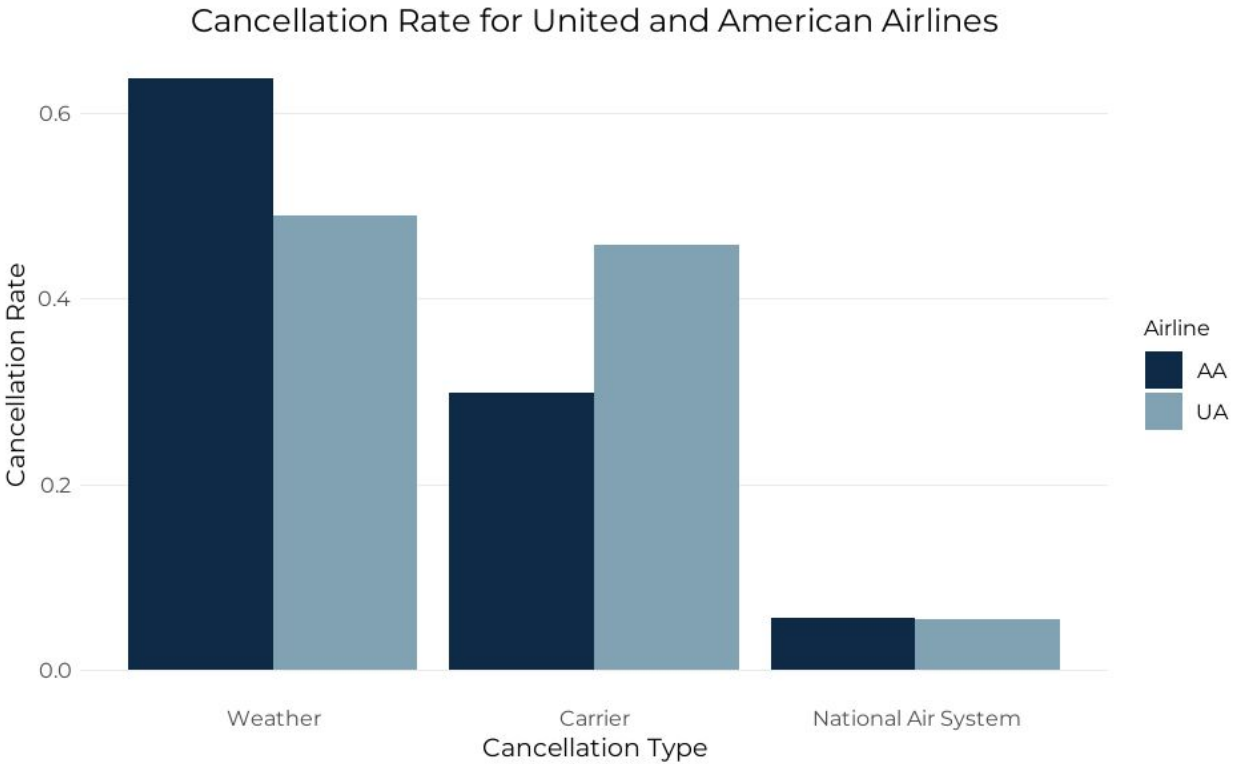
HA	UA	DL	B6
Hawaiian	United	Delta	JetBlue

NK	AS	WN
Spirit	Alaska	Southwest

Monthly Cancellations for UA & AA



Cancellation Types for UA and AA



Airlines - Recommendations

Technology Enhancements

Show weather patterns and alerts in mobile applications

Resource Planning

Address staffing shortages and have a backup plan in case of emergencies

Consumer Forward Policies

Offer incentives in the form of compensation, vouchers, or points

03

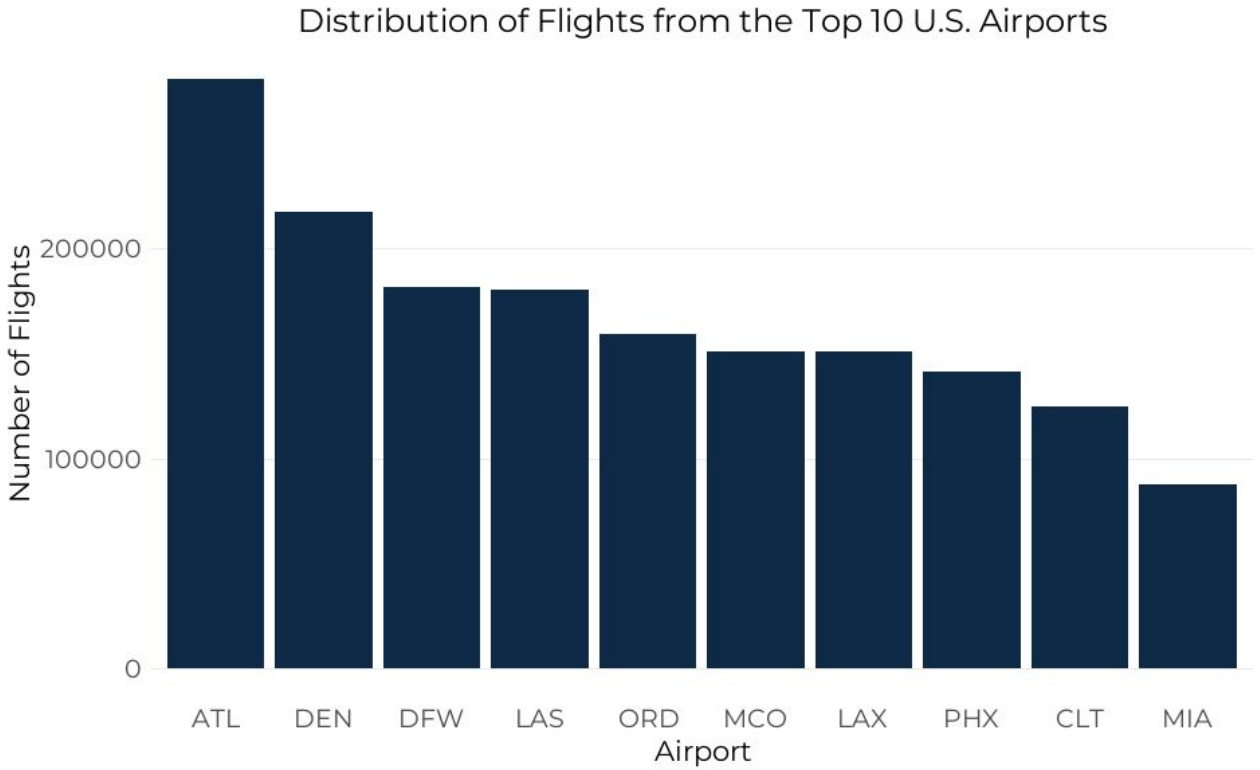
Origin Airport

Origin Airport

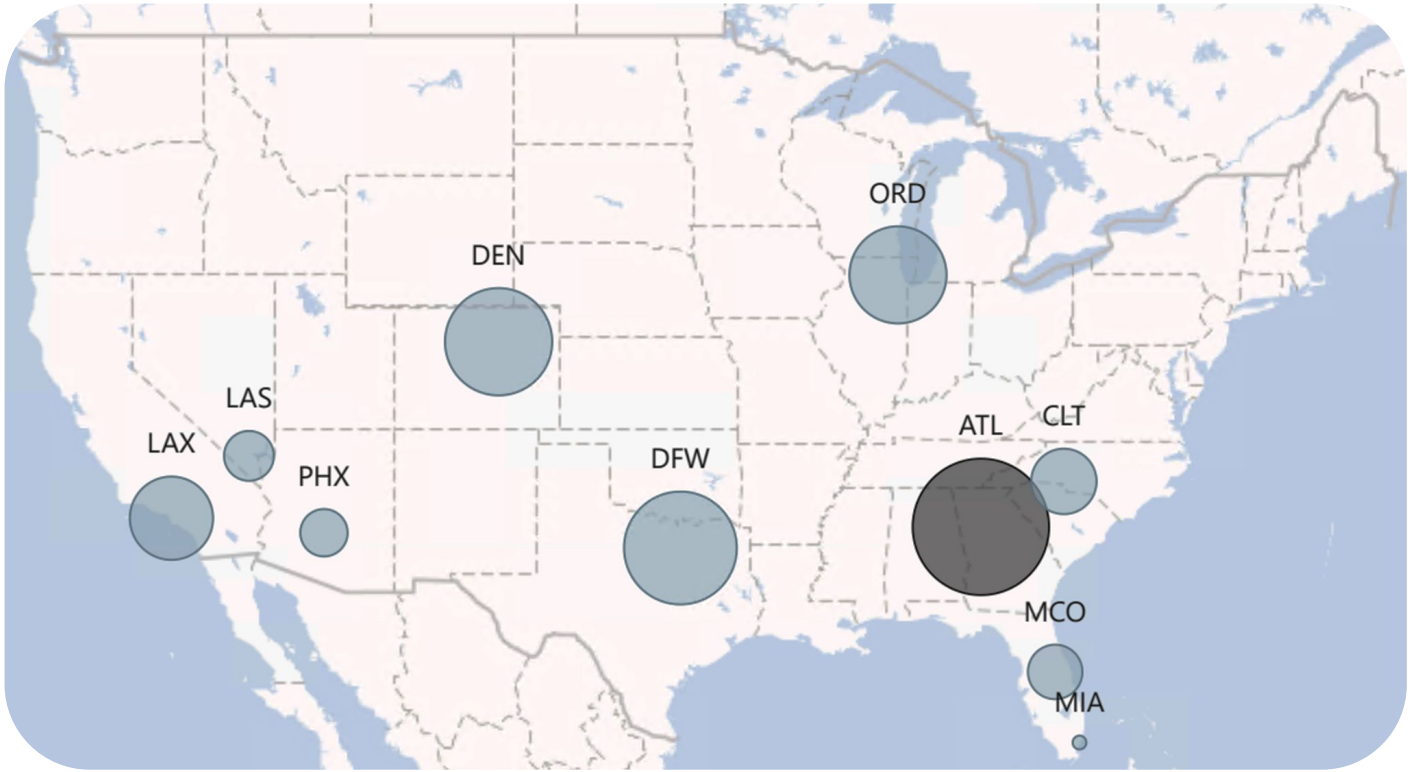
MCO	DFW	ORD	MIA
Orlando	Dallas	Chicago	Miami

DEN	CLT	LAS
Denver	Charlotte	Las Vegas

Flights Across Airports



Origin Airport



Origin Airport

MCO	DFW	ORD	MIA
Orlando	Dallas	Chicago	Miami

DEN	CLT	LAS
Denver	Charlotte	Las Vegas

Origin Airport

MCO	DFW	ORD	MIA
Orlando	Dallas	Chicago	Miami

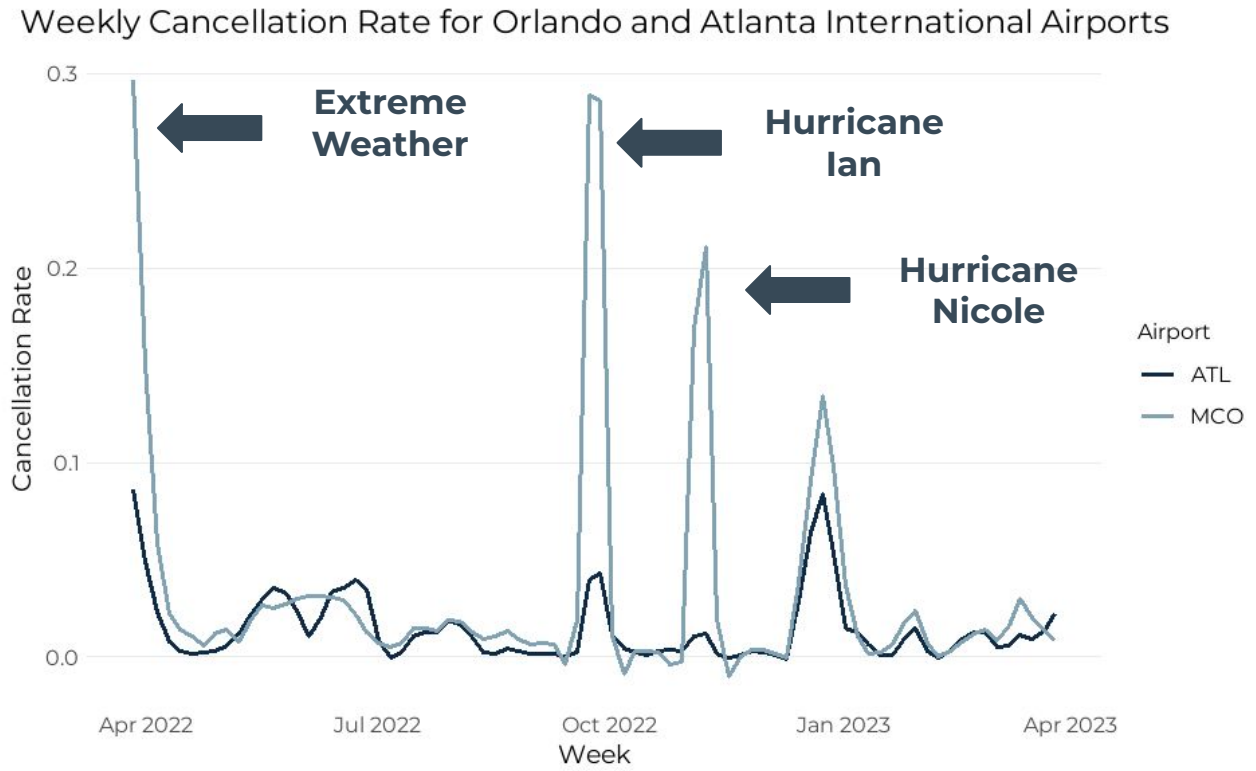
DEN	CLT	LAS
Denver	Charlotte	Las Vegas

Orlando International Airport

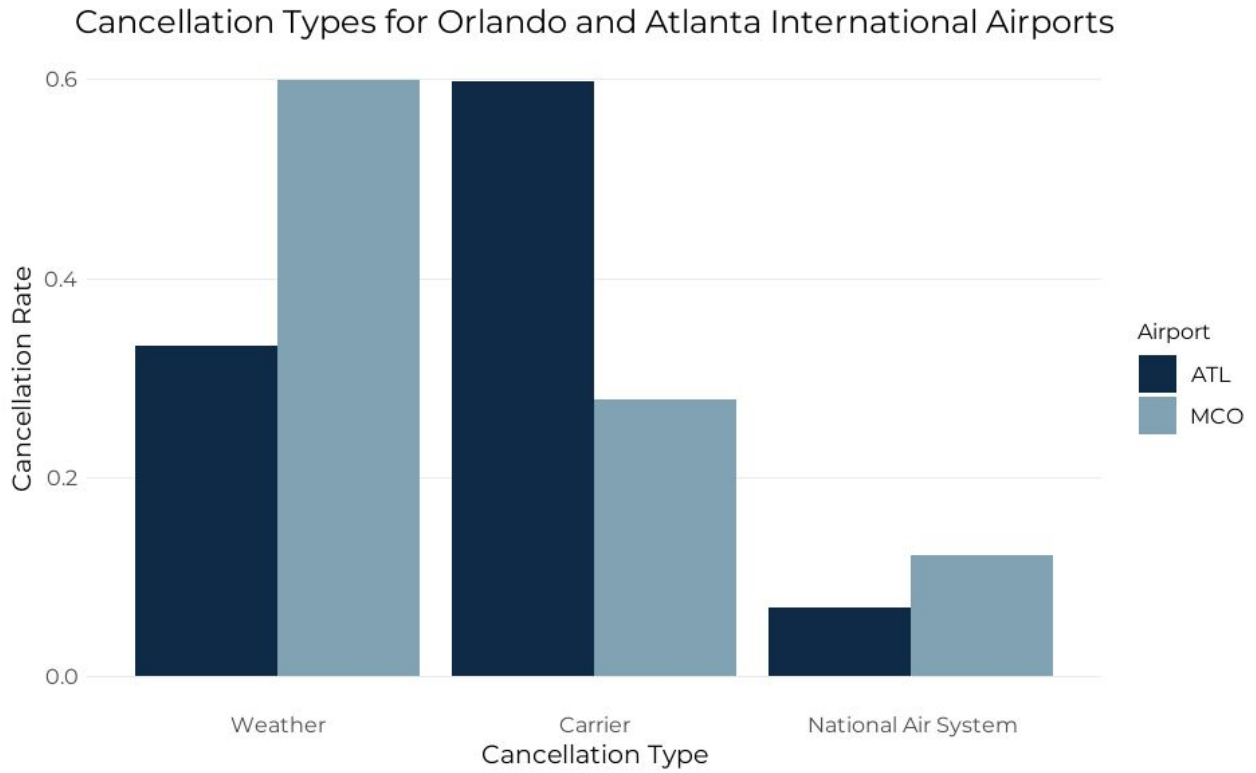
Flights departing from **Orlando International Airport (MCO)** have **115% higher odds** of being cancelled*

** relative to flights departing from Atlanta*

Weekly Cancellation Rate for MCO and ATL



Cancellation Types for MCO and ATL

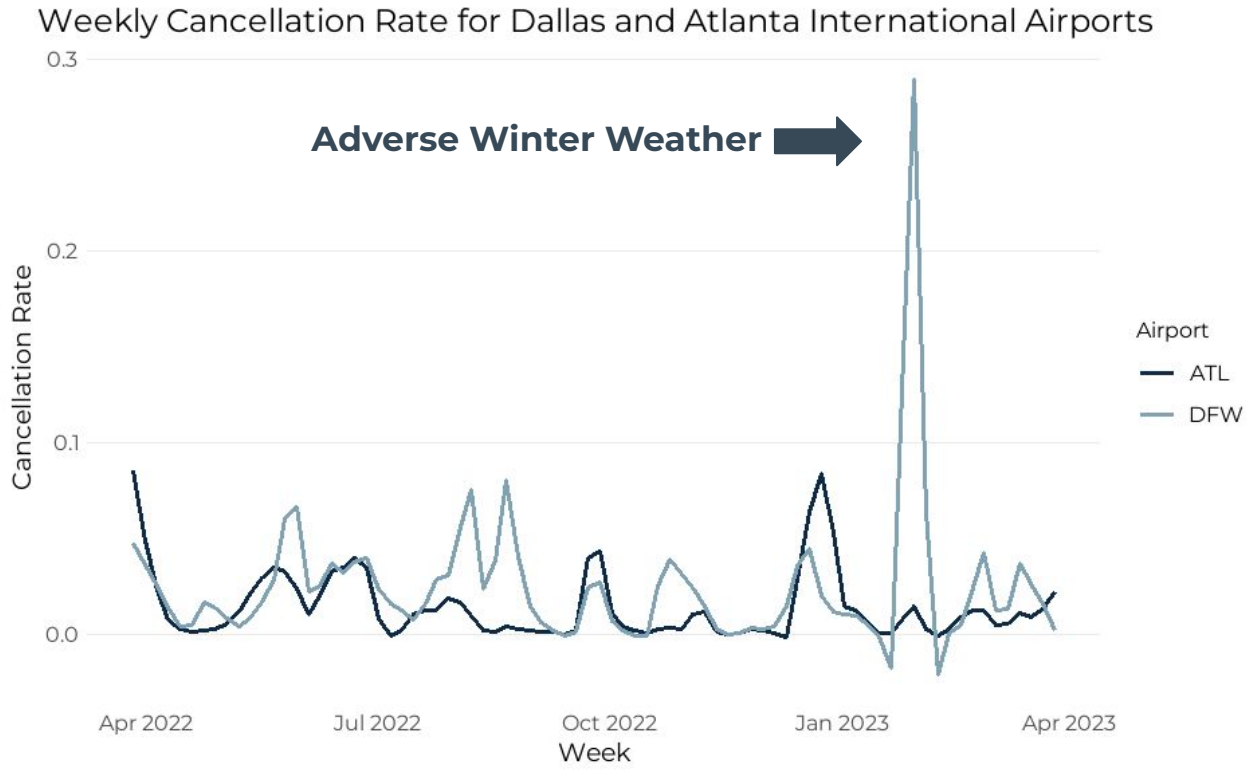


Dallas International Airport

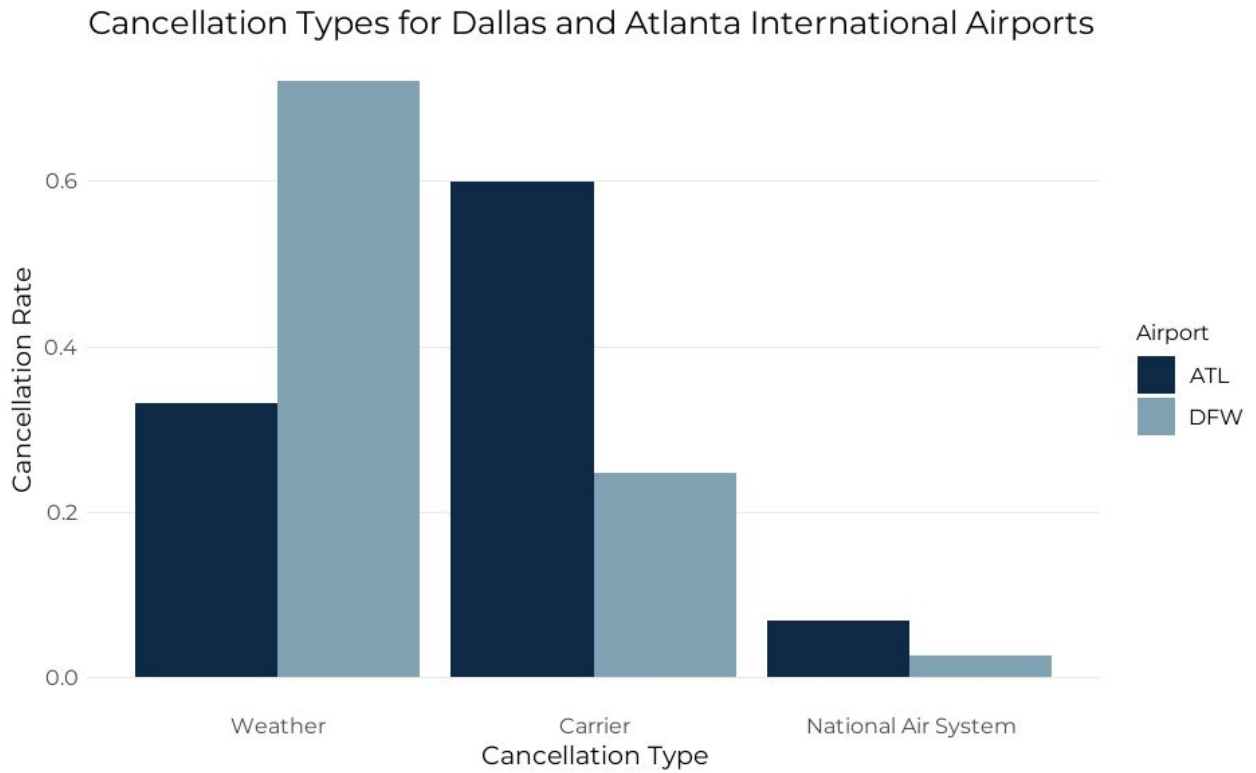
Flights departing from **Dallas/Fort Worth International Airport (DFW)** have **91% higher odds** of being cancelled*

** relative to flights departing from Atlanta*

Weekly Cancellation Rate for DFW and ATL



Cancellation Types for DFW and ATL



Cancellation by Airport - Recommendations

Prepare

Adverse weather conditions can lead to cancellations; prepare in advance

Communicate

Maintain contact with the NAS to minimize unnecessary flight cancellations

04

Flight Departure Hour

Flight Departure Hours

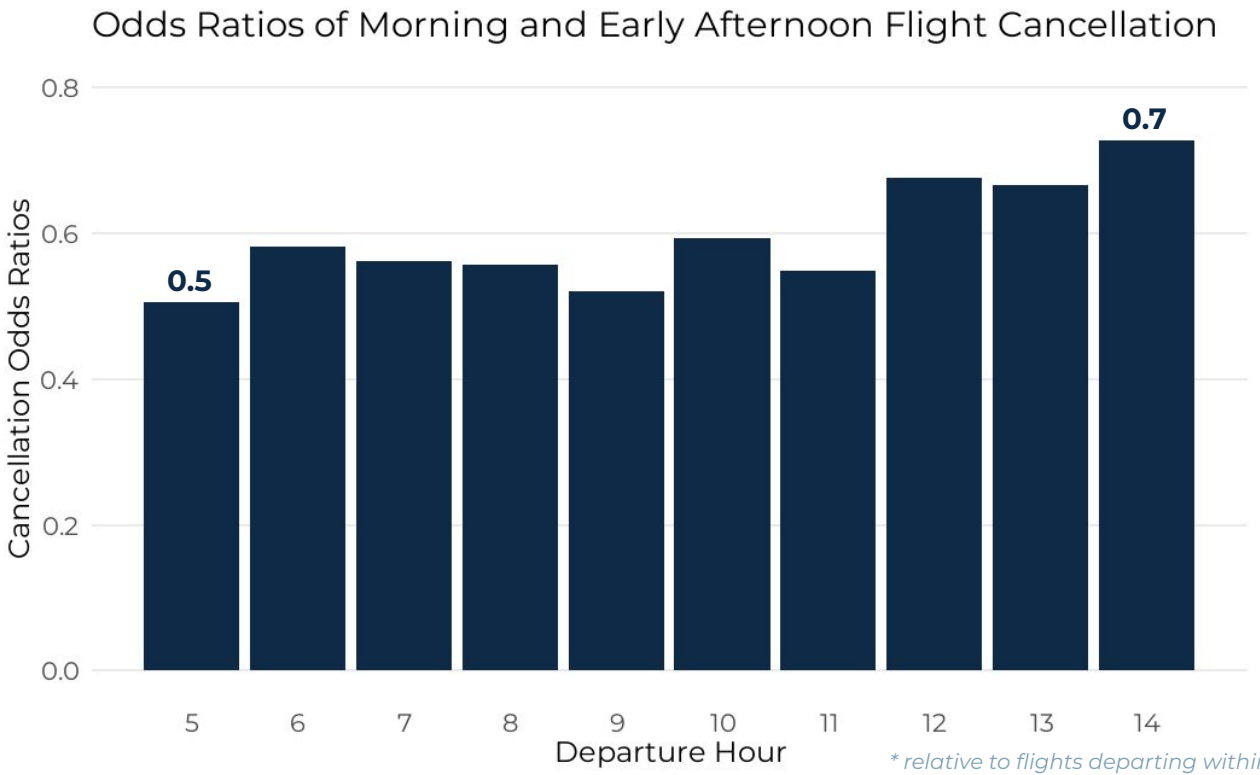
Departure Hour

5 AM - 2 PM Flights

10 PM - 11 PM Flights

** relative to flights departing within the hour of 12 AM*

Morning and Early Afternoon Flights



** relative to flights departing within the hour of 12 AM*

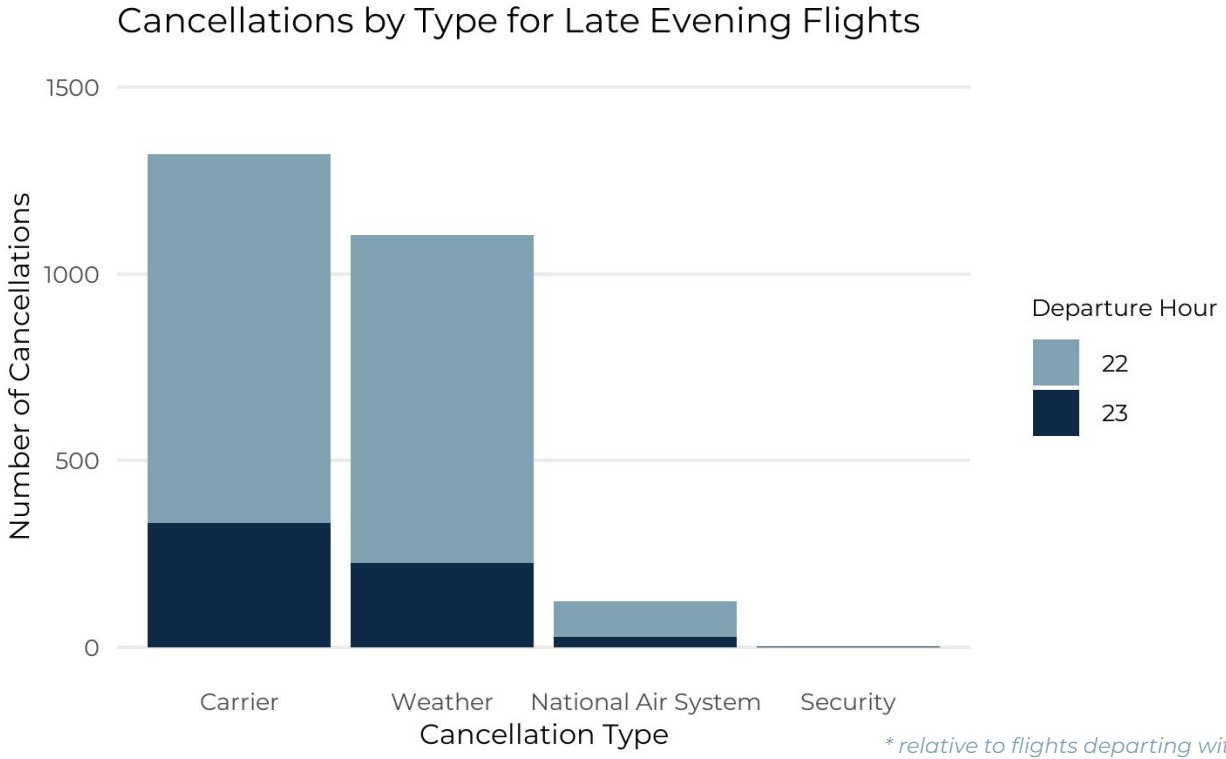
Late Evening Flights

Flights departing within the hour of **10 PM** have **40% higher odds** of flight cancellation*

Flights departing within the hour of **11 PM** have **30% higher odds** of flight cancellation*

** relative to flights departing within the hour of 12 AM*

Late Evening Flights



** relative to flights departing within the hour of 12 AM*

Late Evening Flights - Carrier Cancellations

Reduced Staffing Availability

Limited Aircraft Readiness

Cumulative Impact of Earlier Delays

Late Evening Flights - Recommendations

Aircraft Delays

Monitor aircraft delays and implement contingency procedures

Staffing Shortages

Monitor staffing shortages and offer late-night incentives

Maintenance

Monitor maintenance logs to predict and schedule maintenance

05

Conclusion

Recommendations

Communication

- Implement Weather Tracking and Notification System
- Communicate with the National Air System

Resource Planning

- Monitor Aircraft Delays
- Track Staffing Shortages
- Utilize Maintenance Logs

Carrier, Weather, and NAS Cancellations

Carrier

Resource planning, tracking specific subcategories, and staffing and maintenance

Weather

Proactively communicating with consumers

National Air System

Strengthening communication with National Air System

06

Questions

Questions?

Seamus Flaherty

Tina Lin

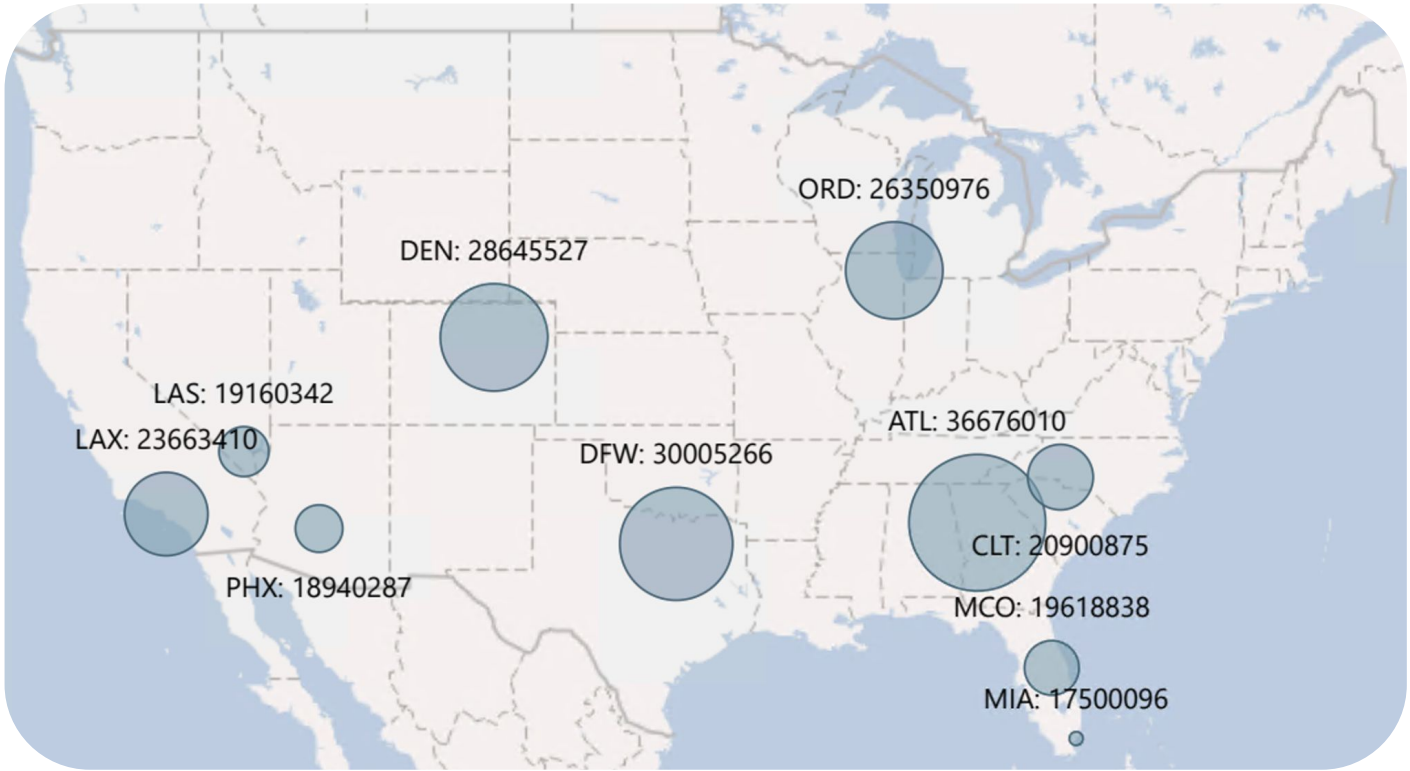
Sanchita Mahapatra

Irvin Carreon

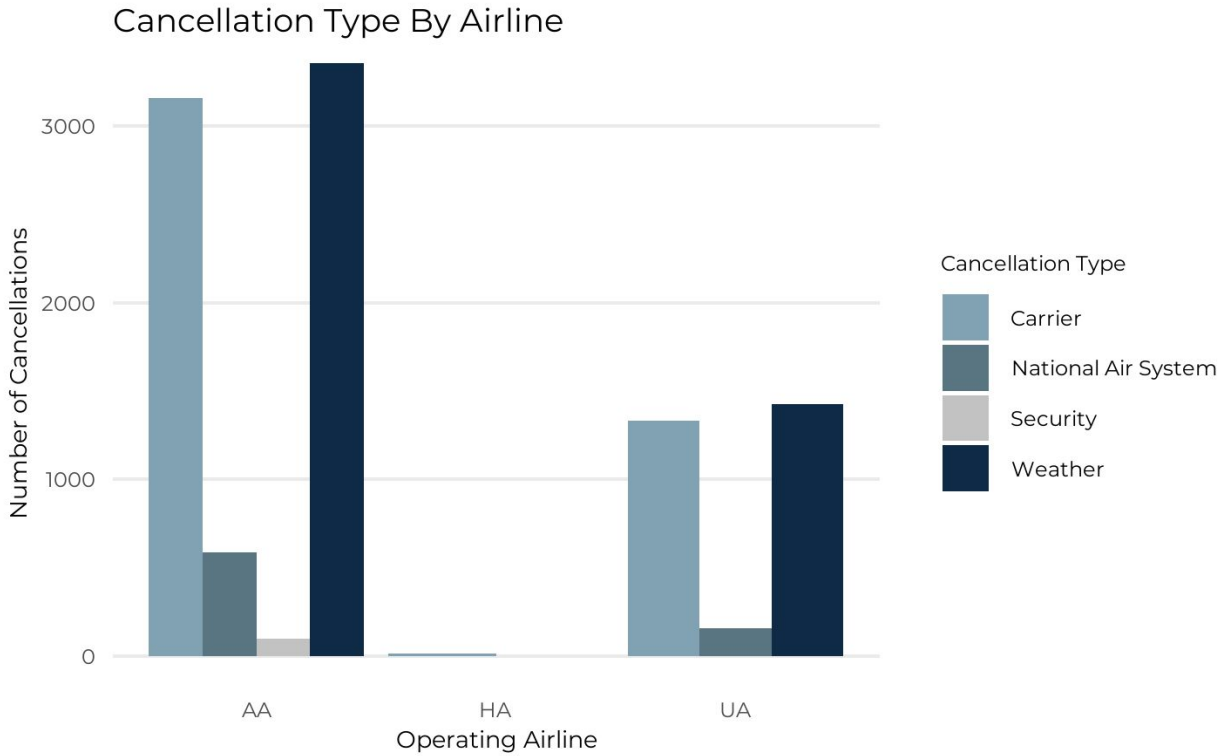
Kimberly Kiepek

Appendix

Where We Focused: 10 Busiest U.S. Airports



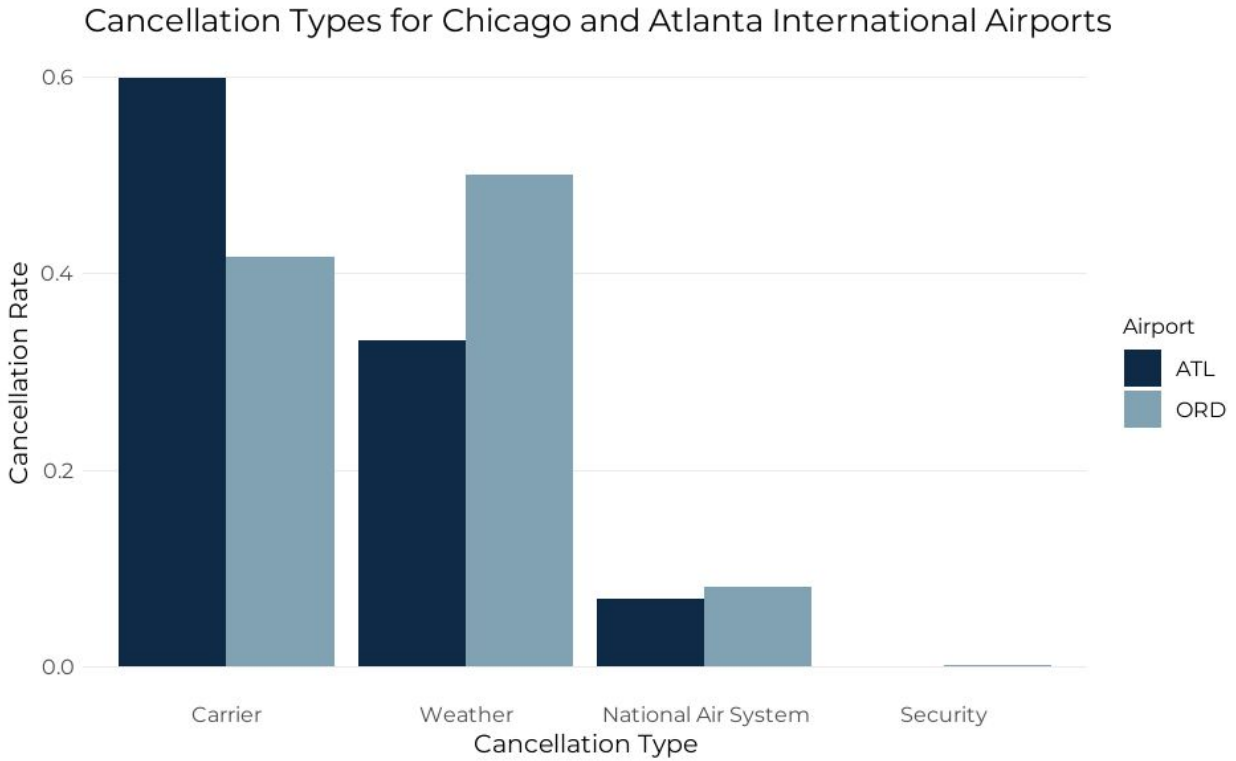
Airline Cancellation Types



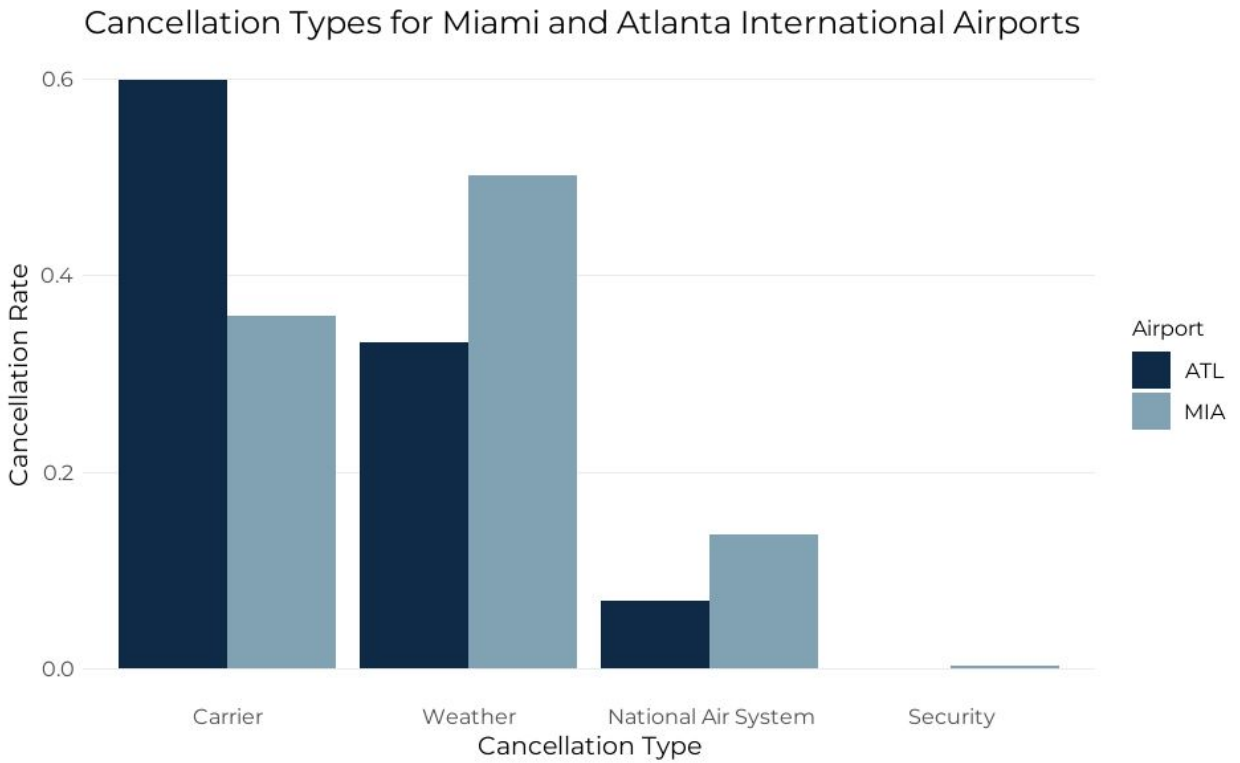
Weekly Cancellation Rate

Smoothing functions that we utilized may introduce **negative values** due to the nature of curve fitting.

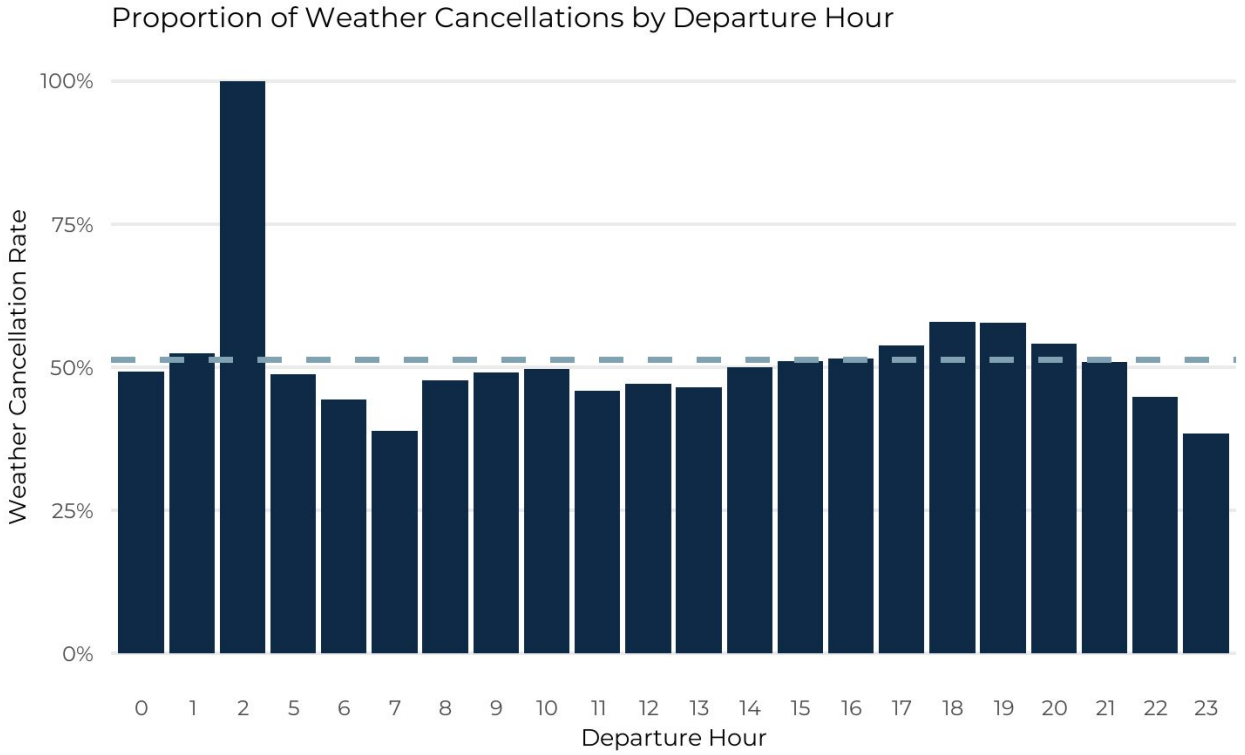
Cancellation Types for ORD and ATL



Cancellation Types for MIA and ATL



Weather Cancellation Rate



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