Aircraft Safety Risk Analysis

May 31, 2024

Summary

Analysis of a national aviation accident database assessing risk of injury for a variety of airplane models

- Assesses risk based on fatal and non-fatal injury rates of aircraft models
- Recommendation of three safest aircraft models, based on historical injury rates, for each of three passenger capacity classes (small, medium, large)

Outline

- Business Problem
- Data Analysis
- Results
- Conclusions

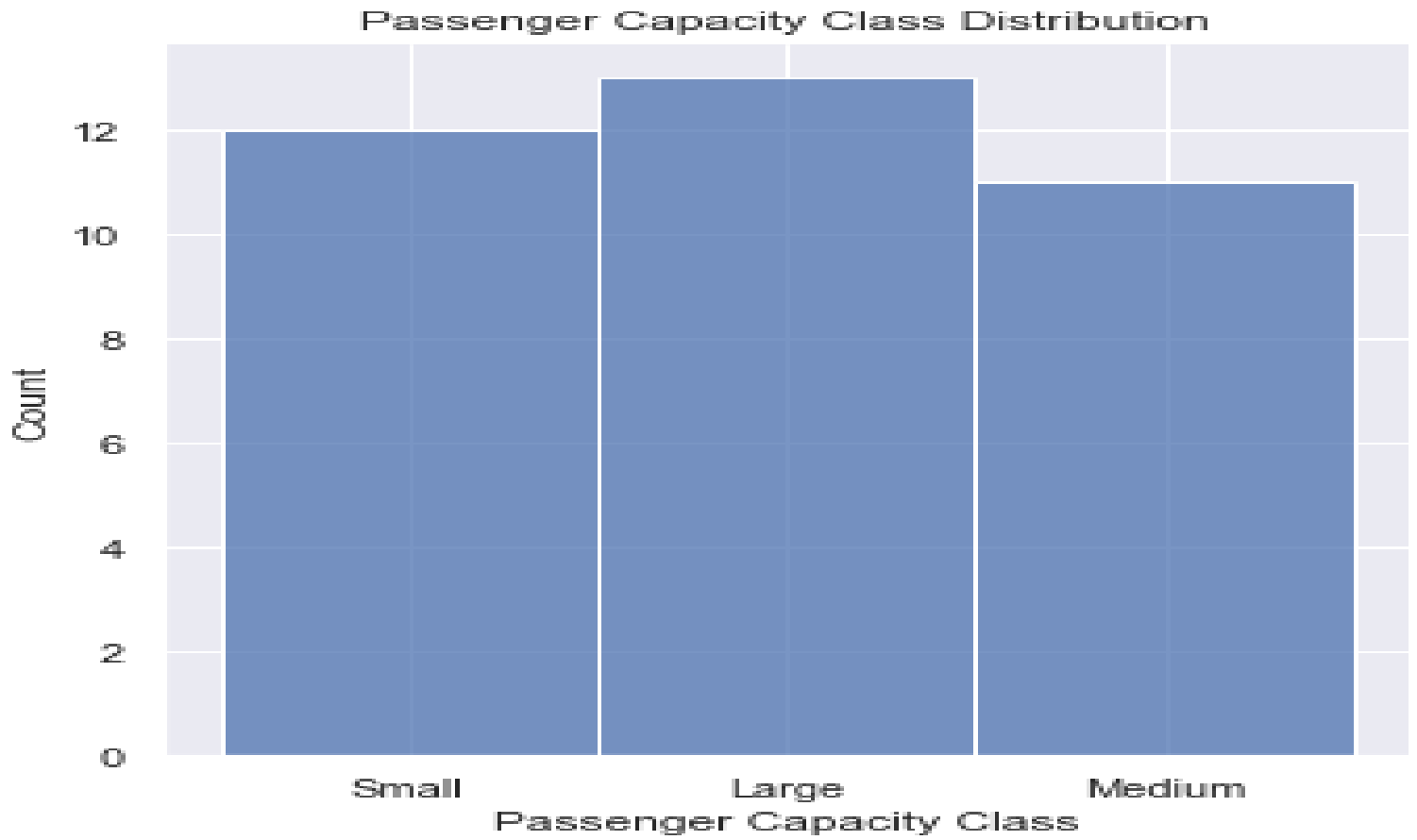
Business Problem

- The company is interested in purchasing and operating airplanes for commercial and private enterprises and needs recommendation from a safety perspective.

Data Analysis

- Data Source : National Transportation Safety Board (NTSB) aviation accident/incident database
- Performed on 68,000 records of crash events in the U.S. from years 1982 to 2022
- Assessment based on aircraft make, model, passenger capacity, injury rates (fatal and non-fatal)
- To ensure adequate sample size, only aircraft that had a history of at least 1000 total passengers involved in accidents were considered

Results – Aircraft Model Capacity Classes

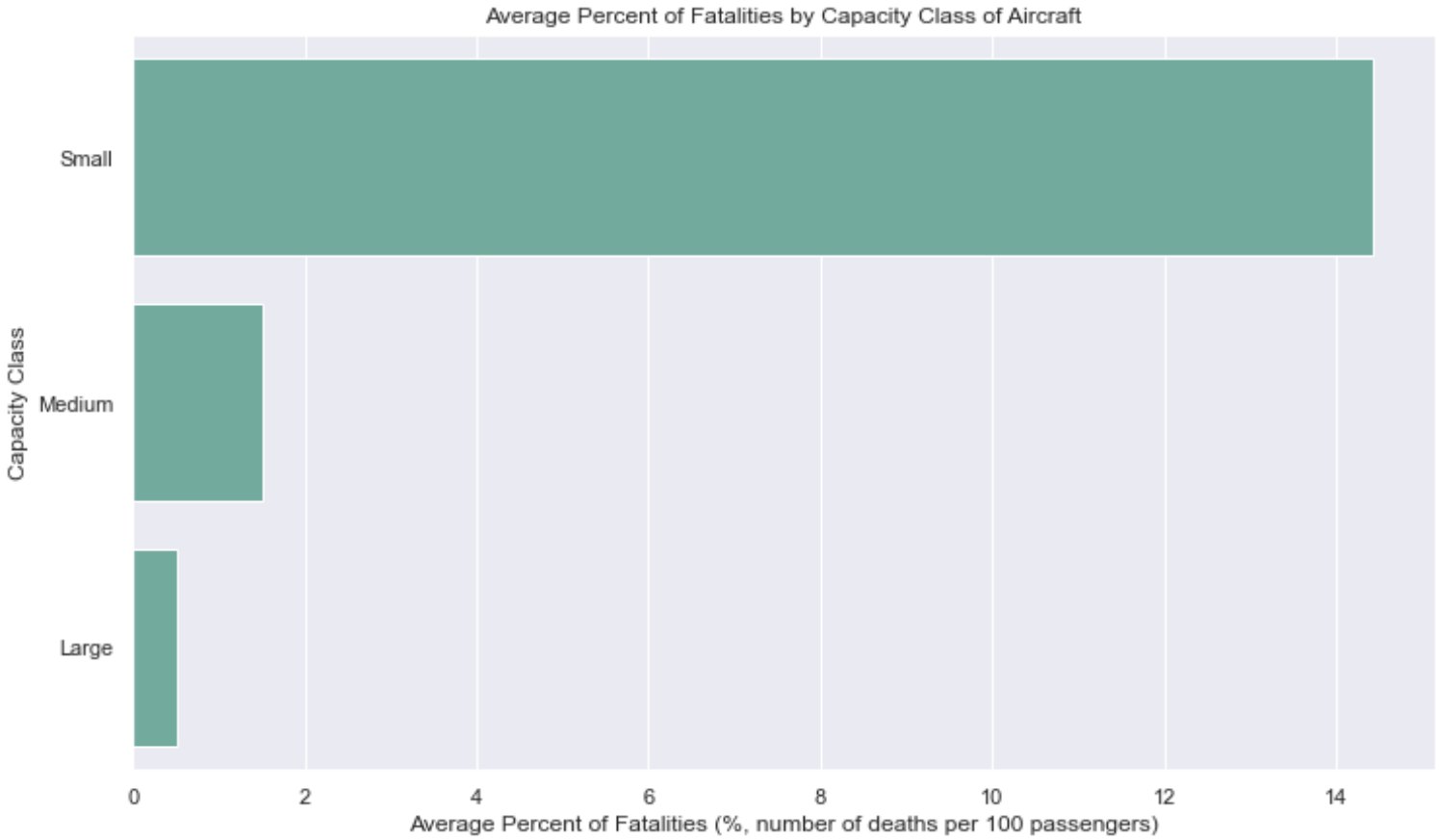


Small: 1-2 Passenger Models

Medium: 70 - 150 Passenger Models

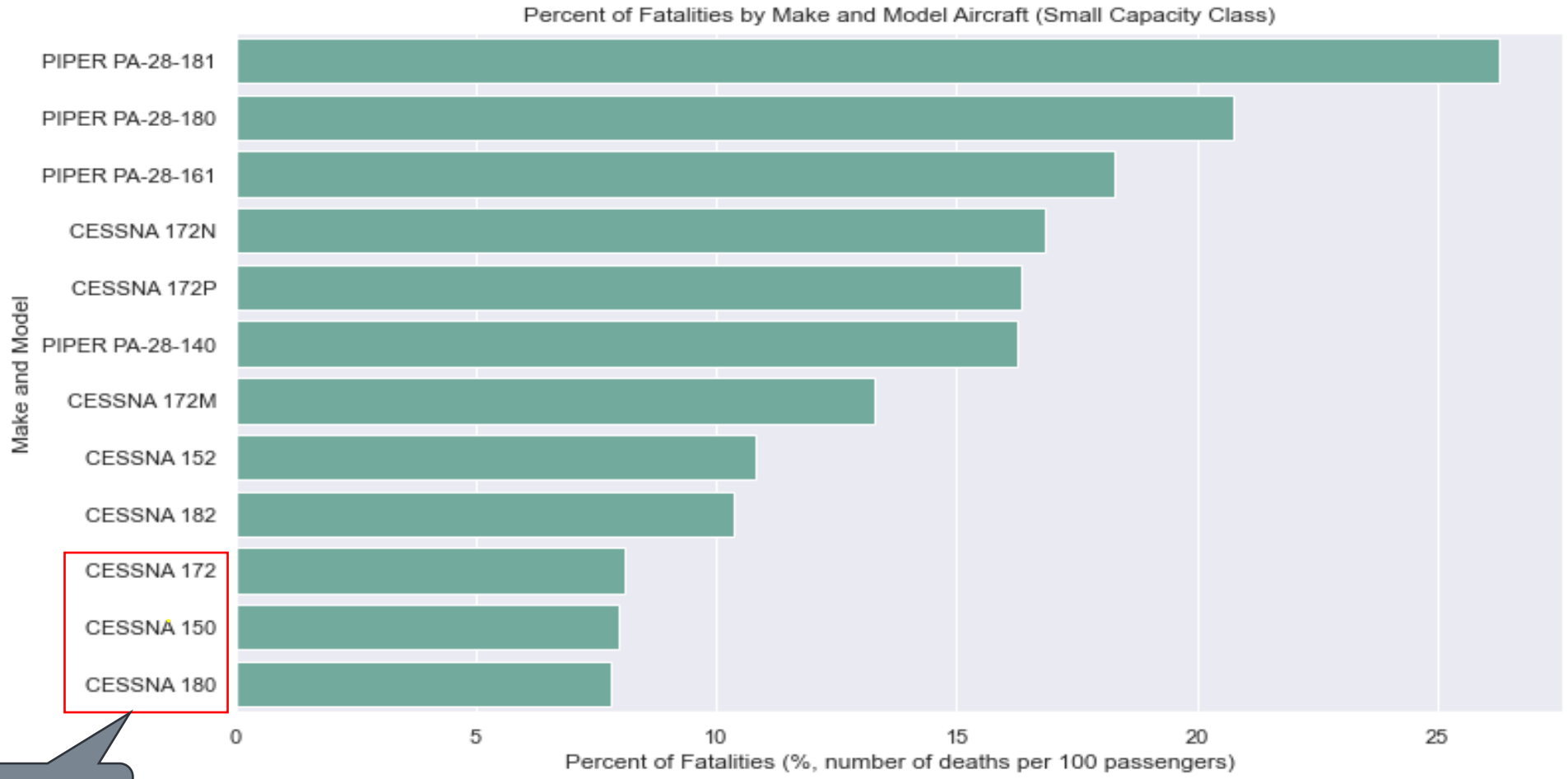
Large: > 150 Passenger Models

Results – Fatality Rates by Class



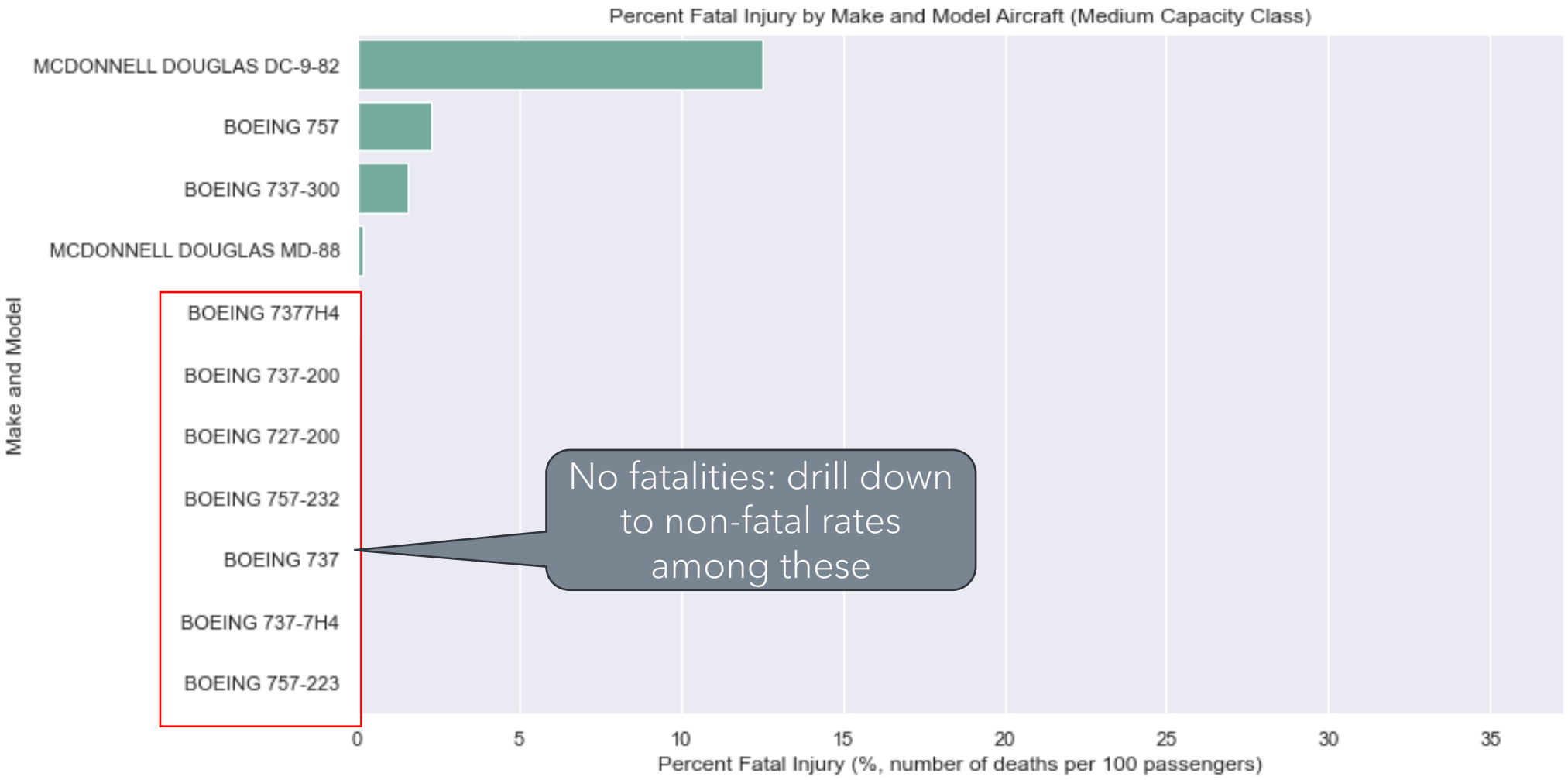
- Smaller aircraft have a much higher potential for fatality than the larger counterparts

Results – Fatality Rates for Small Class Models

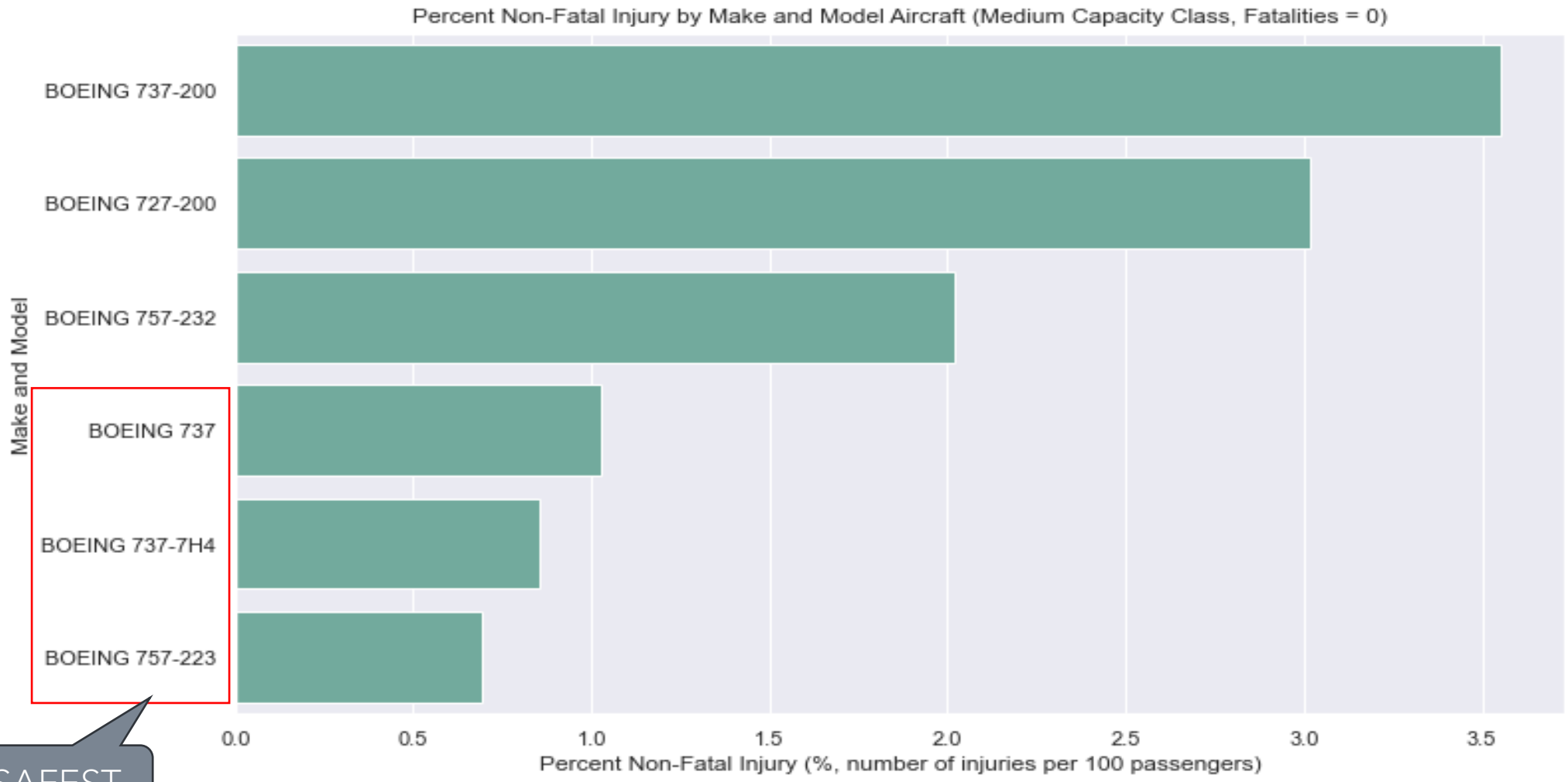


SAFEST

Results – Fatality Rates for Medium Class Models

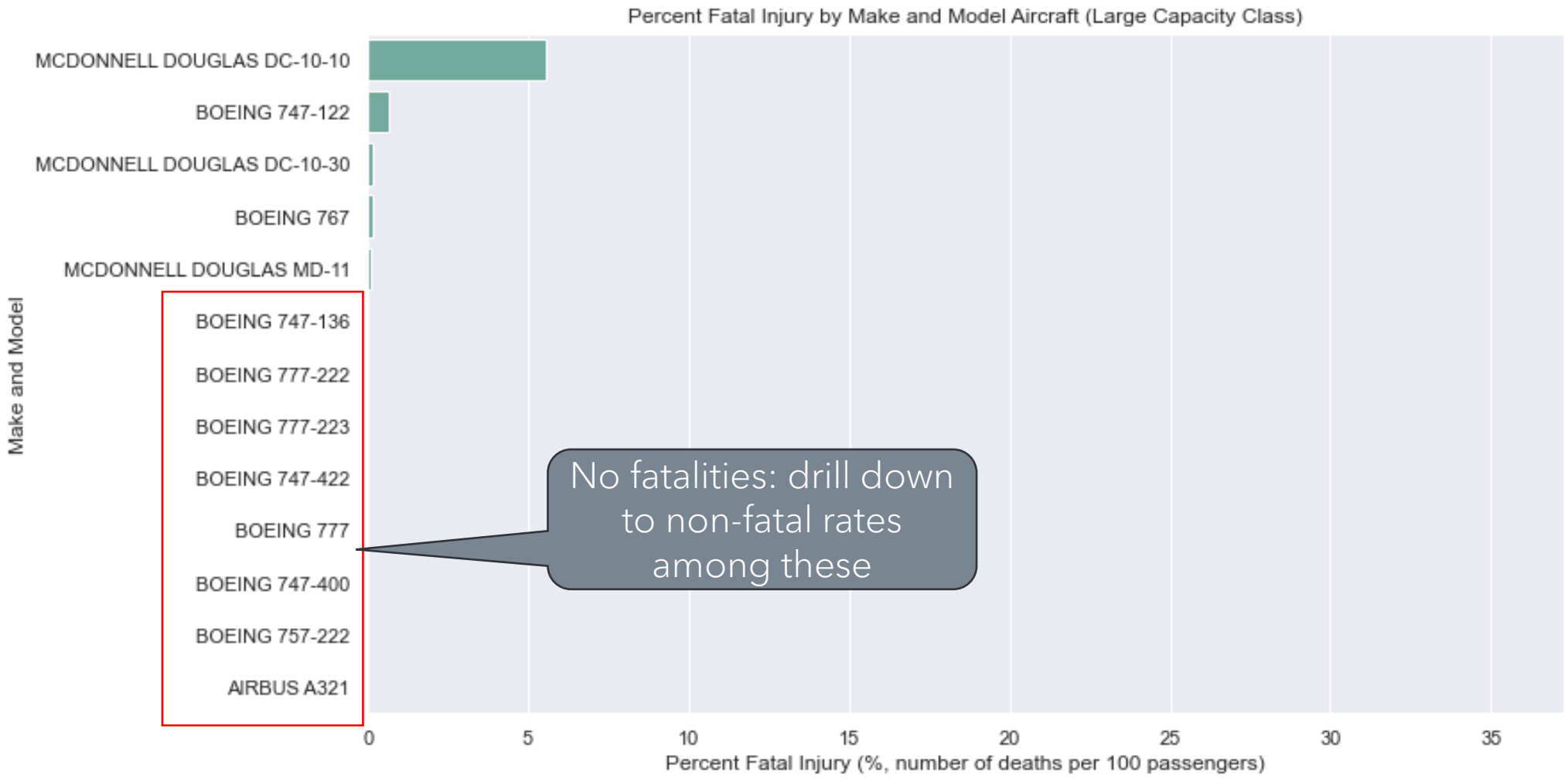


Results – Non-Fatal Injury Rates for Medium Class

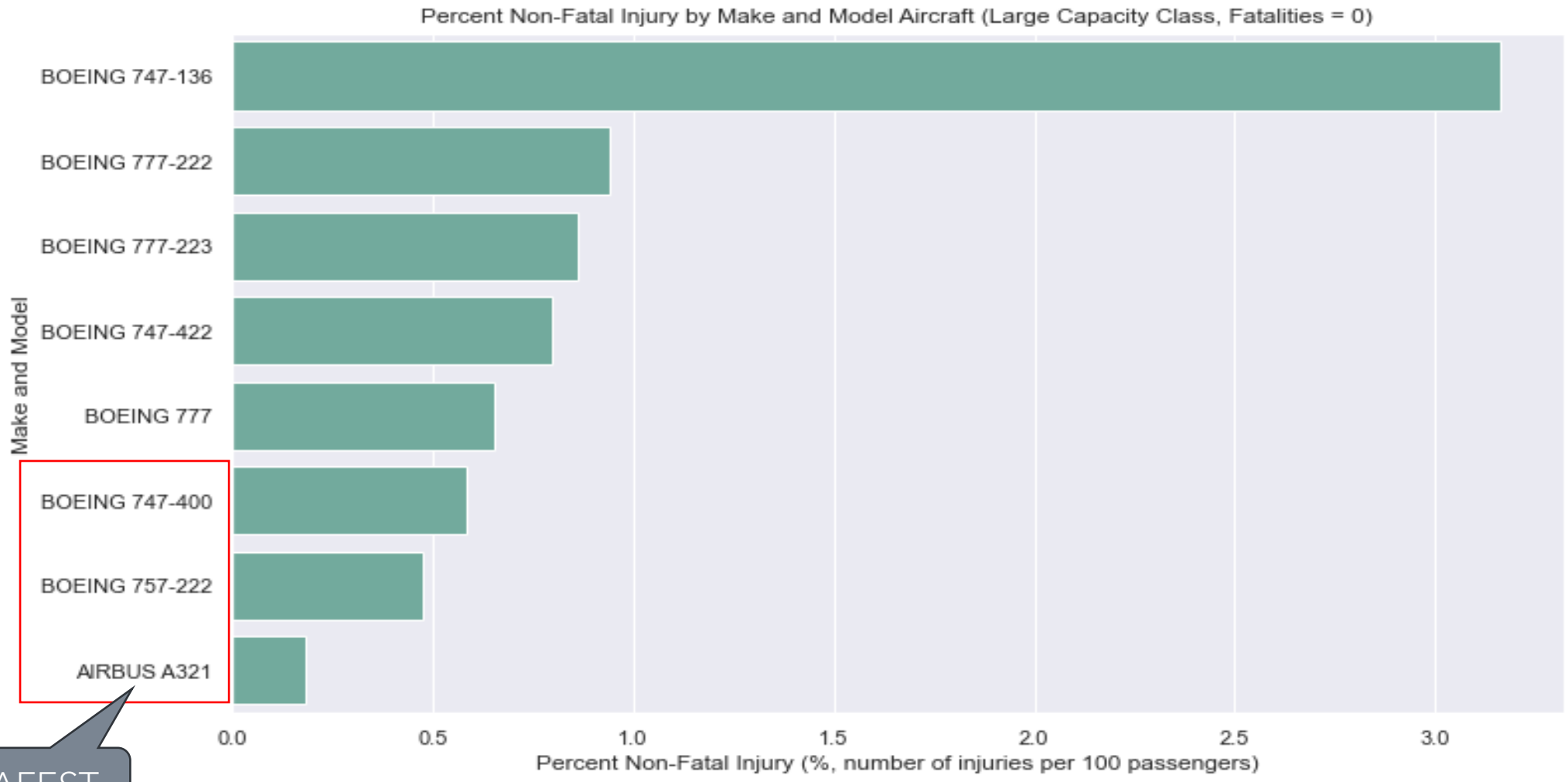


SAFEST

Results – Fatality Rates for Large Class Models



Results – Non-Fatal Injury Rates for Large Class



Conclusions

- We do not recommend the use of Small Class planes because their fatality rate is much higher.
  - If necessary, safest aircraft are Cessna models 150, 172, 180
- For Medium Class, we recommend the following models:
  - Boeing 737, 737-7H4, 757-223
- For Large Class, we recommend the following models:
  - Boeing 757-222, 747-400
  - Airbus A321

Next Steps:

- Analyze geographic location effects for recommended models to optimize safety
- Acquire non-accident flight record data to analyze the volume of safe flights by model and potential markets
- Return on Investment (ROI) analysis based on MSRP data, purchase availability and loan rates for safe model recommendations

Thank You

Please direct any questions you may have to Dale DeFord and James Warsing

Dale DeFord: daledeford@gmail.com

Github: dman01337

James Warsing: warsingjt@gmail.com

Github: james-warsing