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

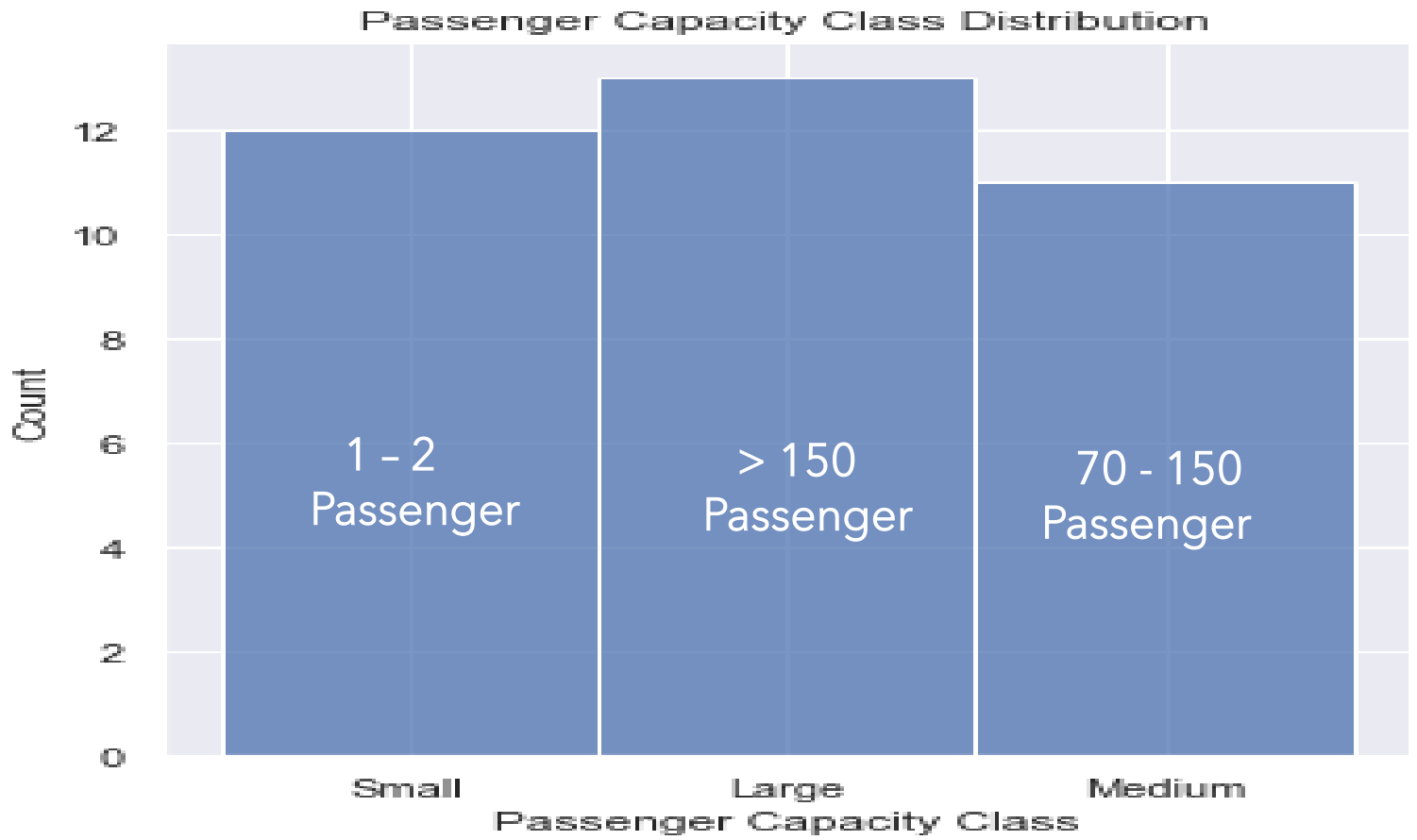
- The company is interested in purchasing and operating airplanes for commercial and private enterprises and needs recommendation from a safety perspective.

- This assessment will recommend aircraft based on historical injury outcomes by aircraft model.

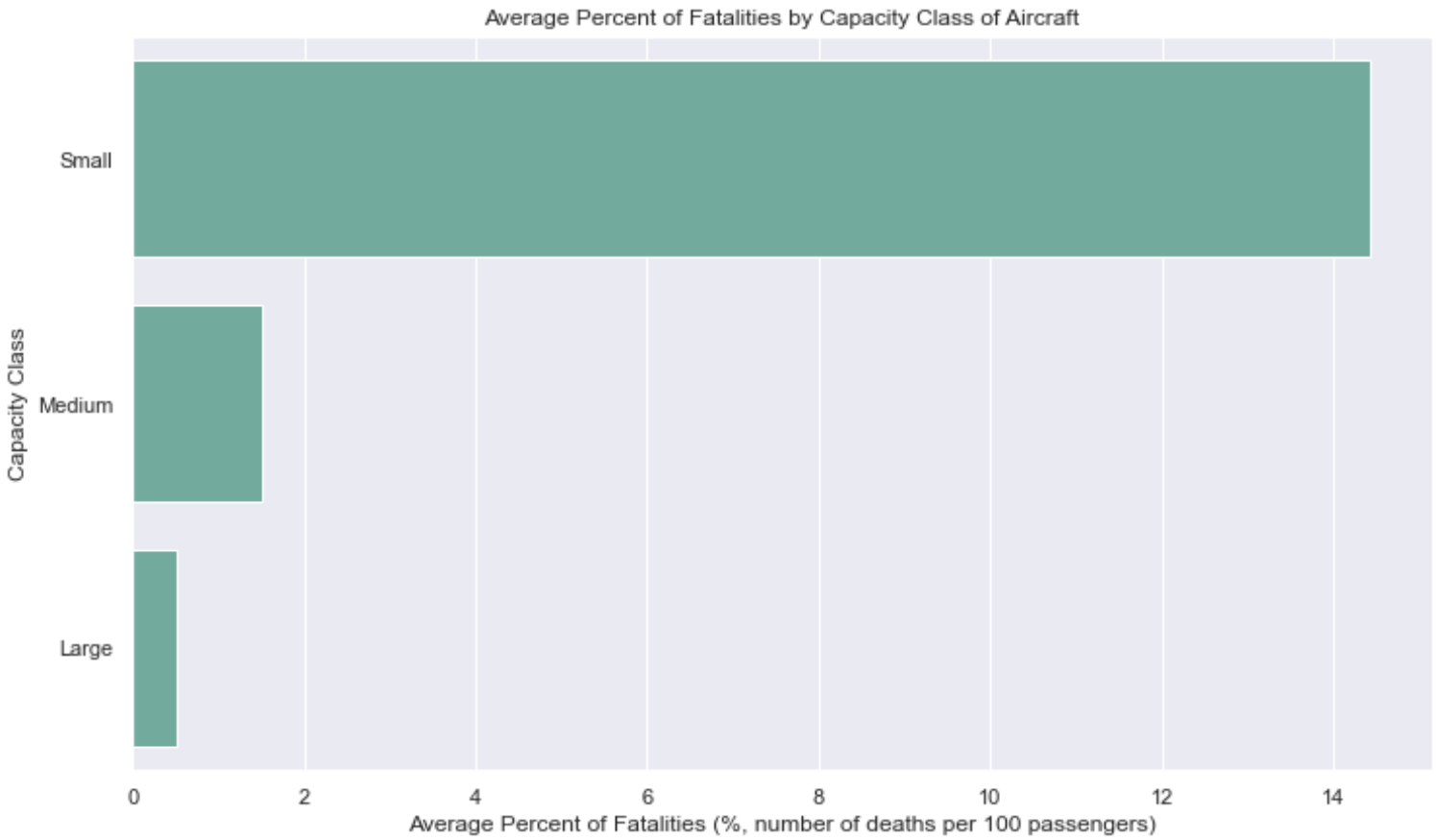
Data Analysis

- 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

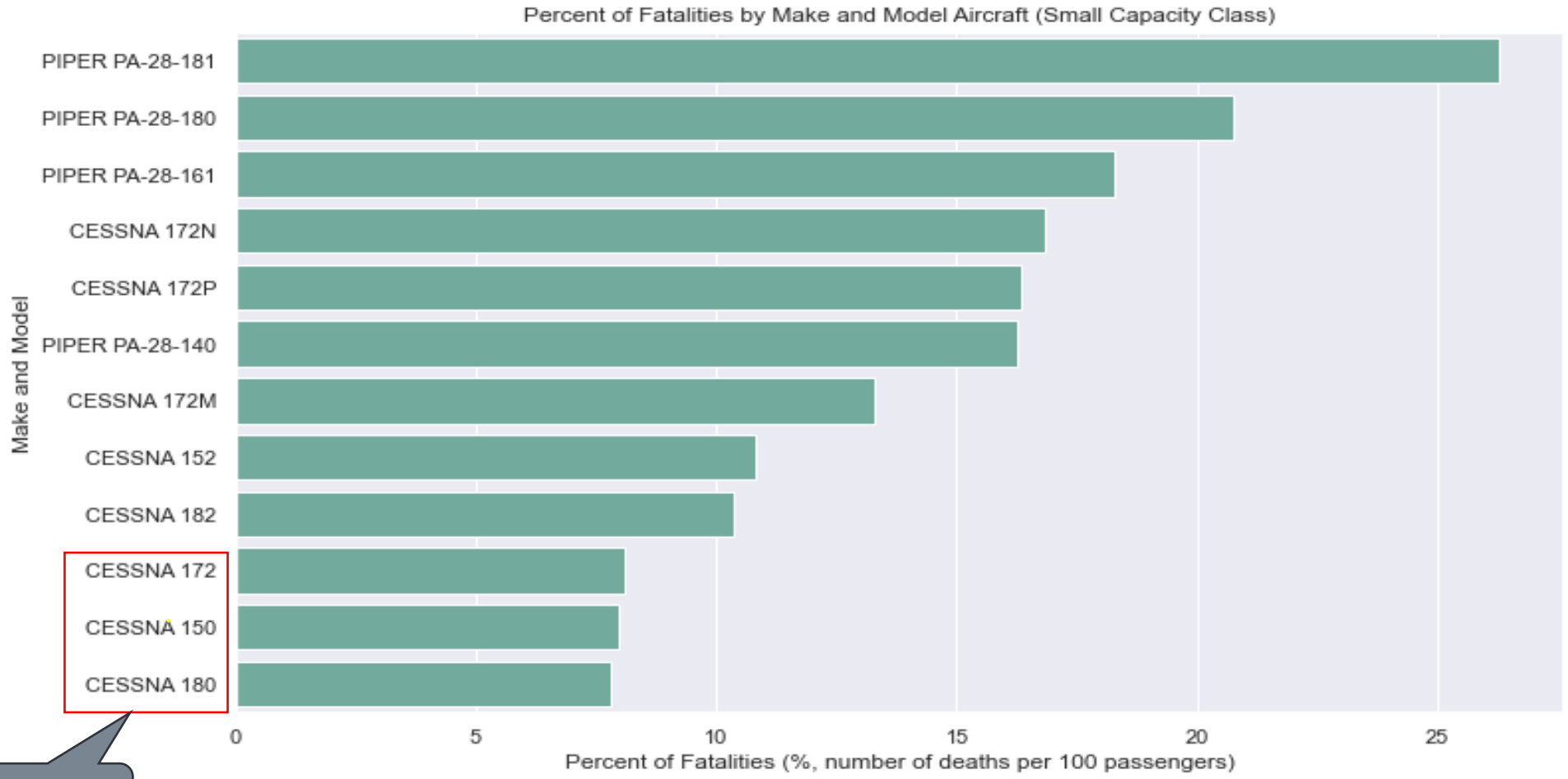


Results – Fatality Rates by Class



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

Results – Fatality Rates for Small Class Models



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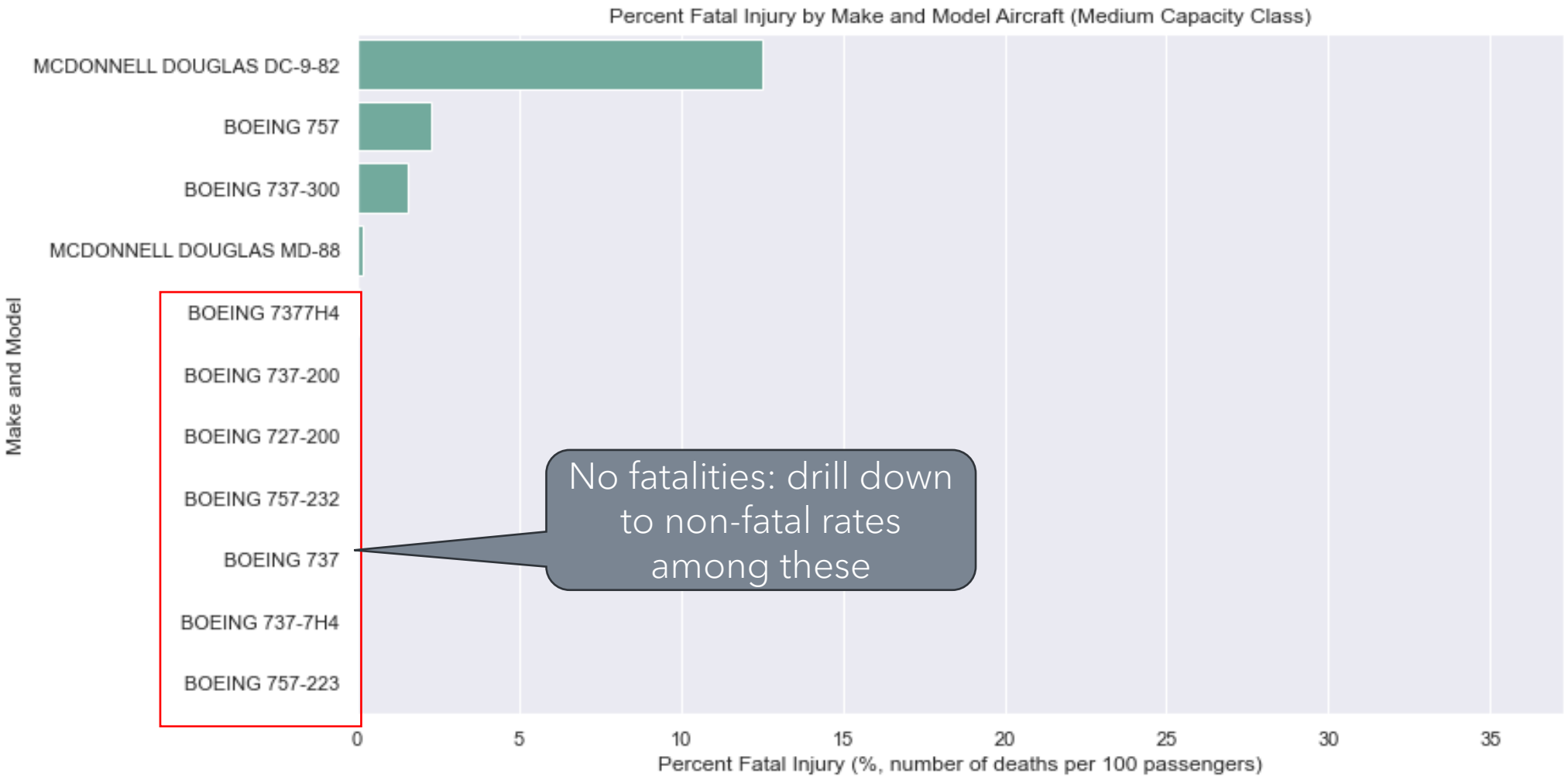
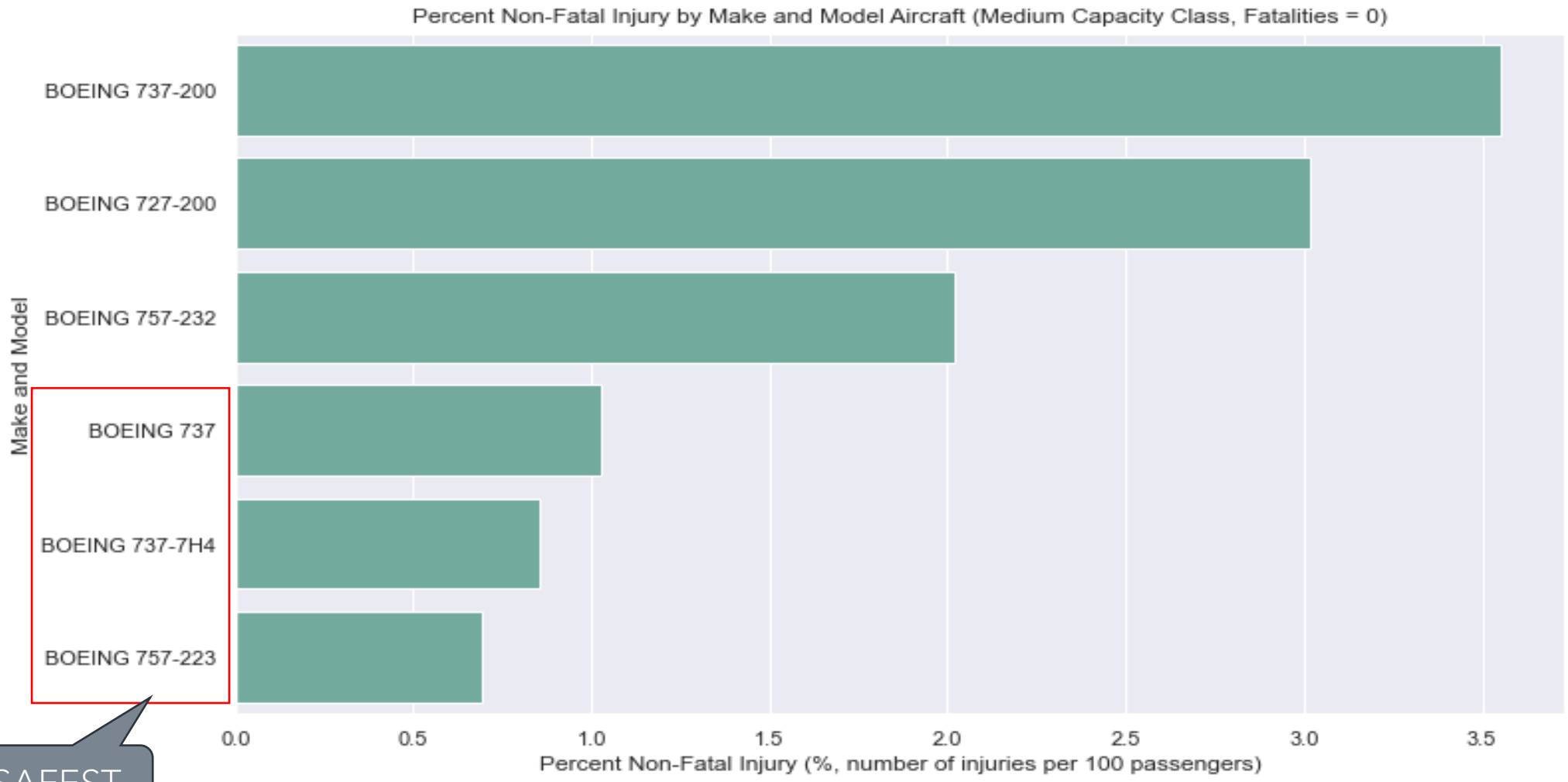
Results – Fatality Rates for Medium Class Models



Results – Non-Fatal Injury Rates for Medium Class



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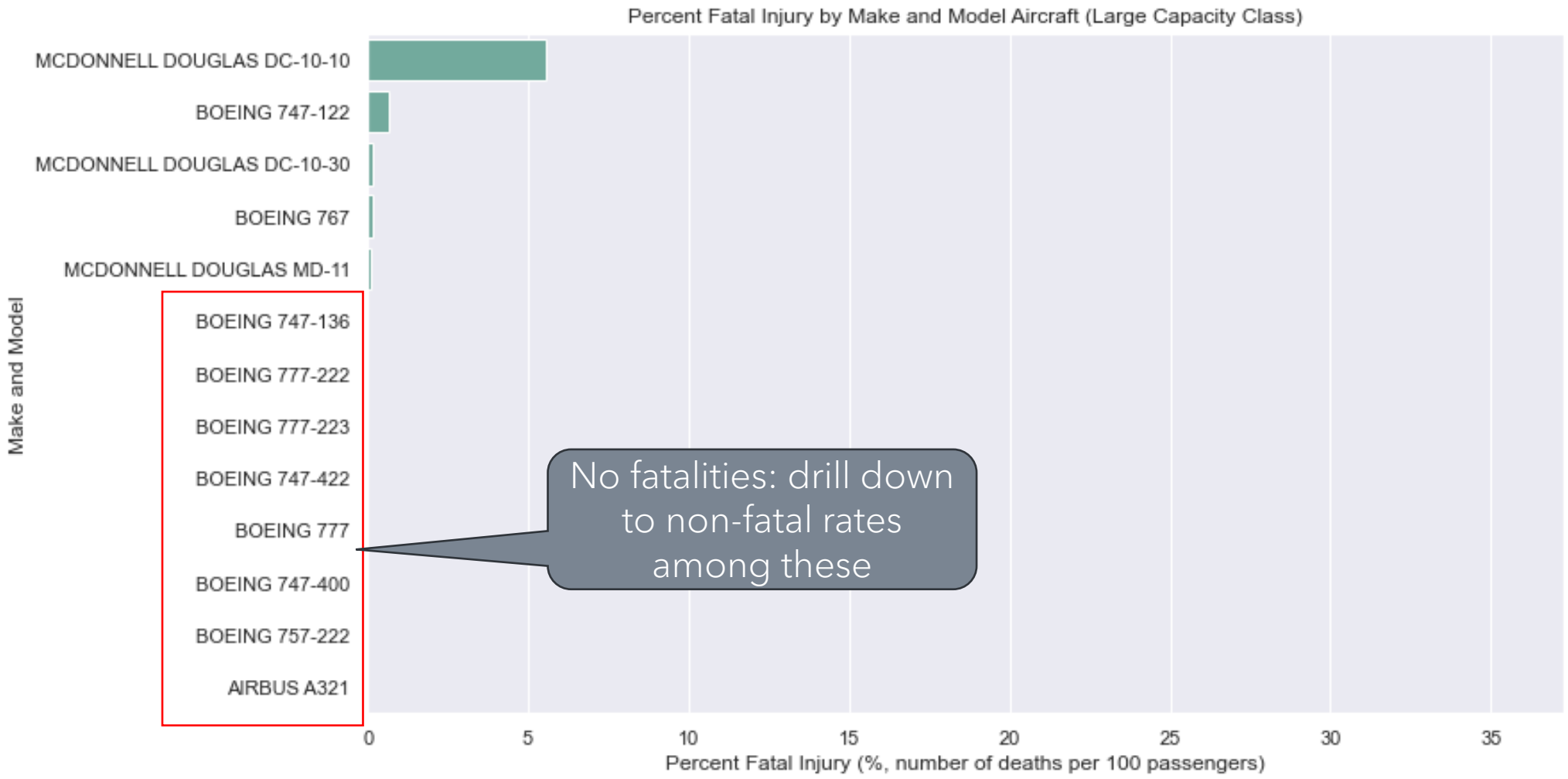
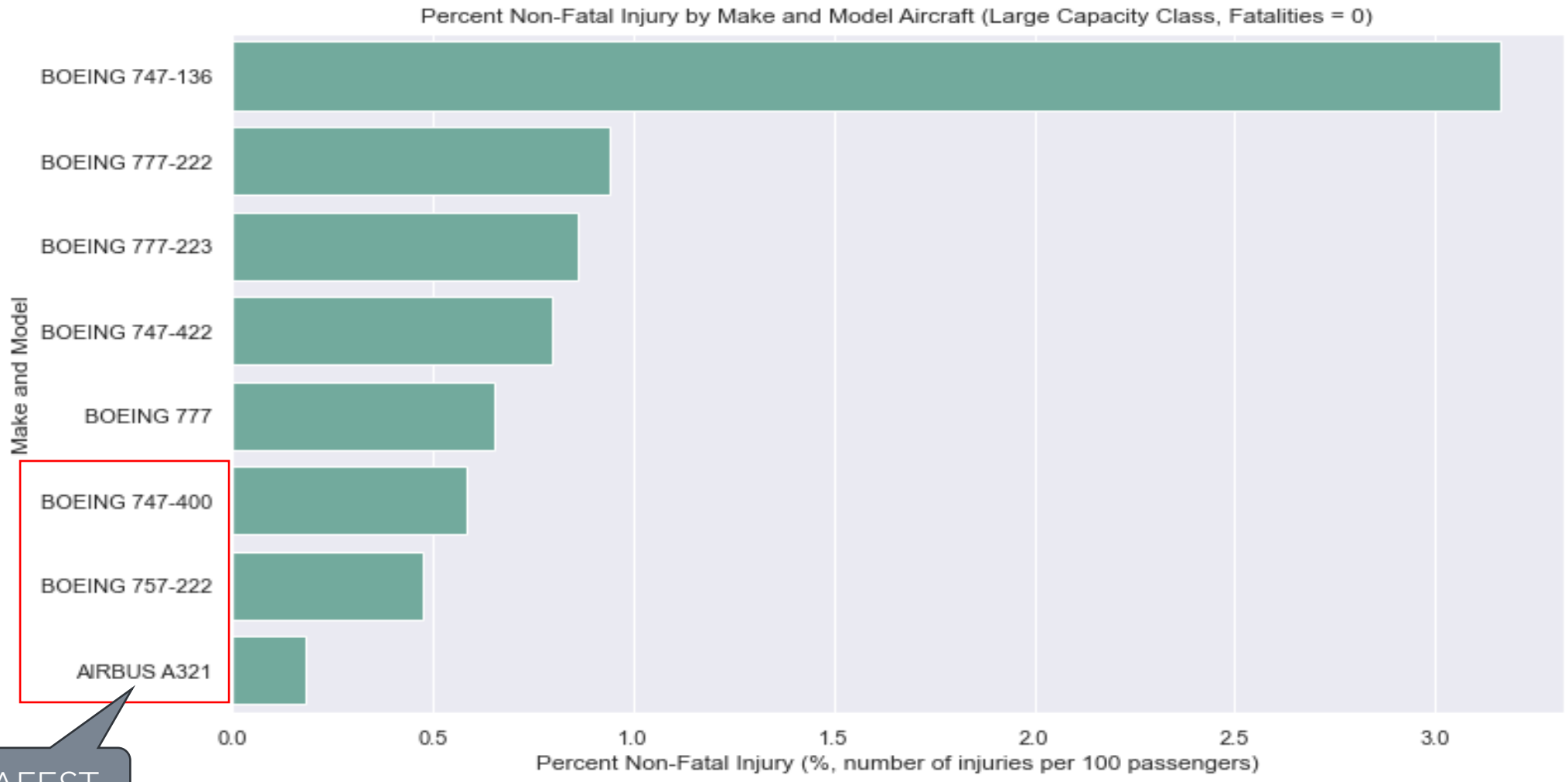
Results – Fatality Rates for Large Class Models



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

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