BOEING & DIAMOND
MAKE THE SAFEST AIRCRAFT (PASSIVE)

Will & James

MEET THE TEAM

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Data Wizard

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Data Warlock

Summary

- Purpose of the study: determine recommendations on aircraft for the company to expand investment into. Focused on small-scale aircraft.
- The National Transportation Safety Board's Aviation Accident Database was used to examine safety and viability.
- Limitations to data: No indication of relative frequency of each model, manufacture and sales data was cross-referenced
- Recommendations:
  - Confidence in safety due to reduction in crashes over time despite industry-wide stability in sales and manufacture
  - Diamond models have the lowest fatality rate
  - Recommended models: Diamond (DA40 & DA42), Cessna 172, Piper PA28 Series

Outline

- Business Problem
- Data
- Methods
- Results
- Conclusions

Business Problem

Data

IDENTIFYING LOWEST RISK AIRCRAFT

Private
(Rentals, Flight School, Taxi)

Commercial
(Large flights, miliary)

WE ANALYZED ACCIDENT DATA

- 90k airplane accidents from 1948 to 2022

- We used Python & Tableau to visualize trends

- Manufacture and sales data was cross-referenced to determine popularity

Note: The dataset did not include flight data

WE WILL FOCUS ON PASSIVE SAFETY

Passive

Vs.

Active

The features of an aircraft that protects the passenger upon an accident

The features of an aircraft that helps the pilot avoid an accident

OUR PASSIVE SAFETY METRIC IS FATALITY RATE

Fatality Rate: Fatalities / Total Passengers

Methods

# Accident Data Set Methods

- Data Cleaning (Python):
    - Handling missing data
    - Focusing on professionally made aircraft in the USA
    - Cleaning up categorical data with a focus on the make & model

- Exploratory Data Analysis (Python):
    - We identified the top 5 makes by 2020 sales to find current popular brands
    - We explored how make & model affected the deadliness of accidents (fatality rate)
    - We quickly explored cleaned data in Tableau to gain quick insights

- Interactive Dashboard (Tableau)
    - We imported the cleaned data into Tableau to create the dashboard

Results
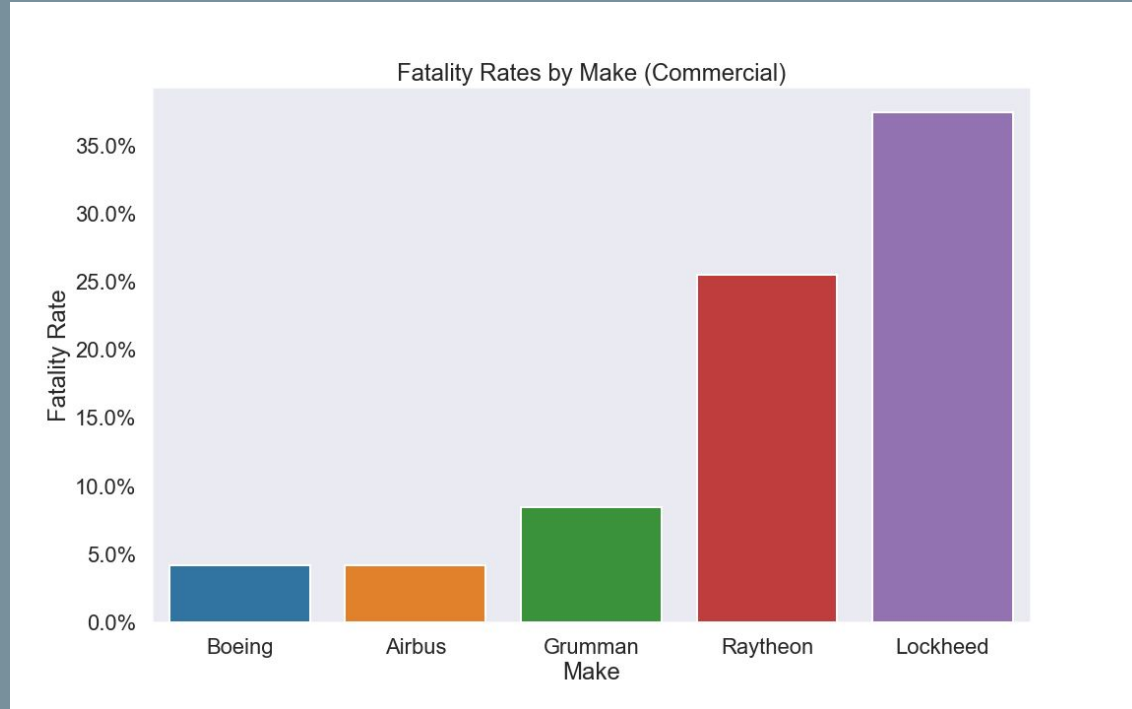
DIAMOND IS THE SAFEST FOR PRIVATE
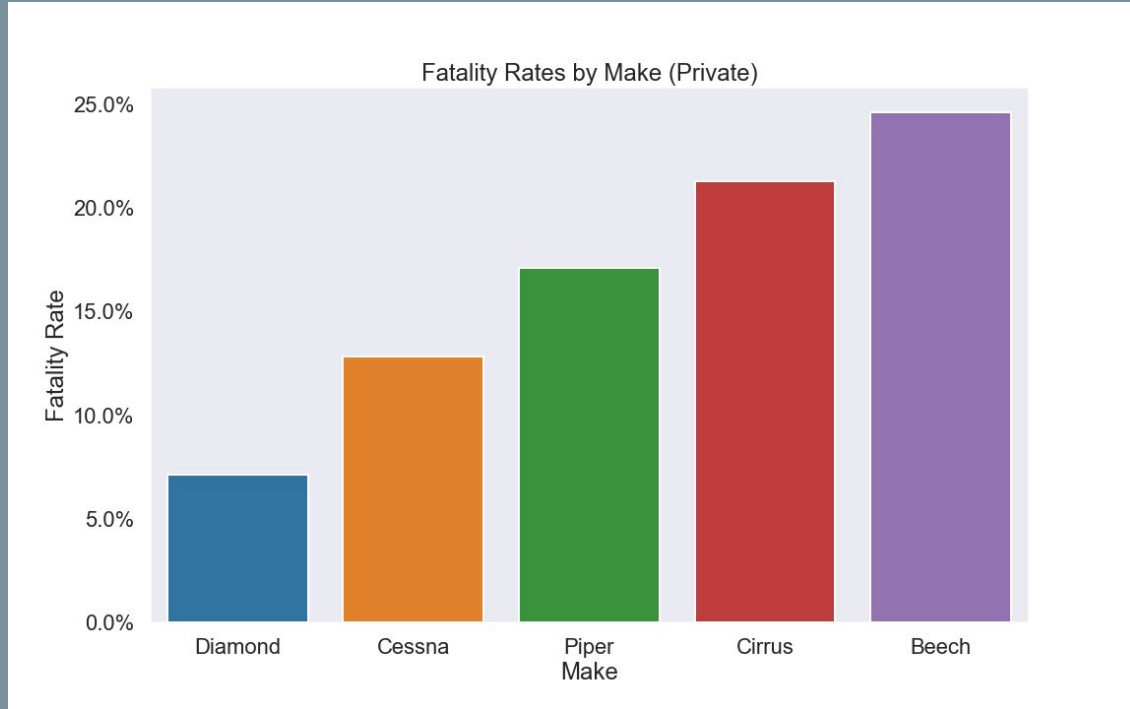
DIAMOND 20, 40, 42 ARE SAFEST MODELS

Fatality Rates by Model (Private)
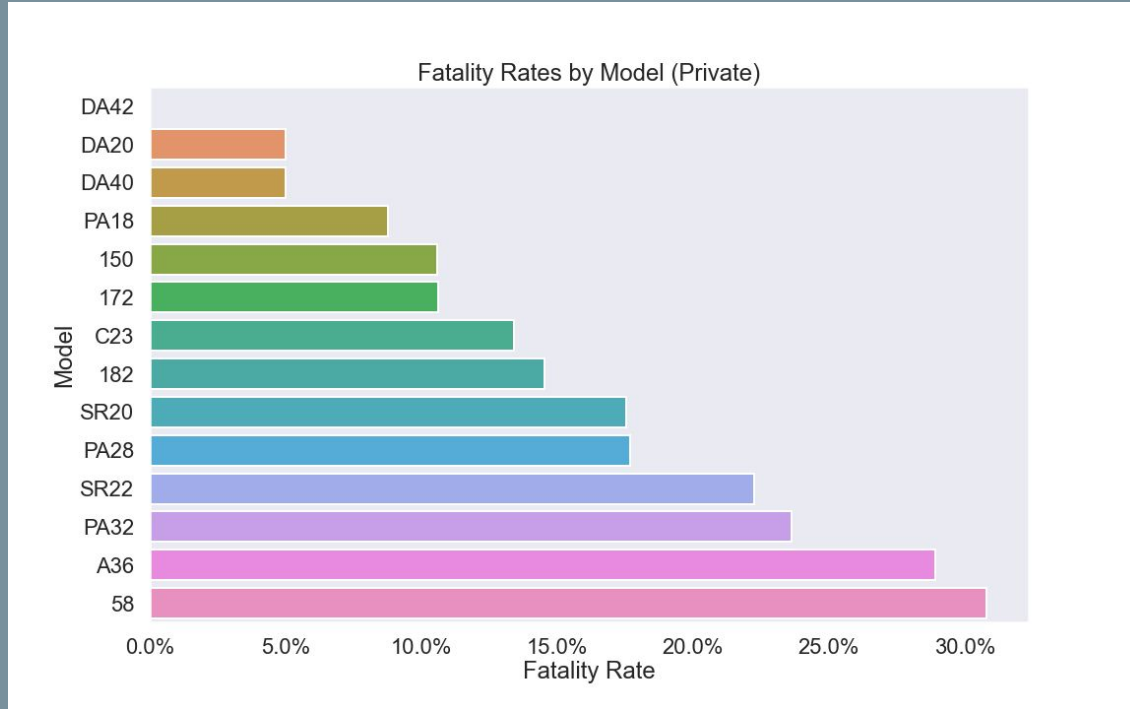
MODEL RECOMMENDATIONS (PRIVATE)

1. Diamond (20, 40, 42)

2. Cessna 172

3. Piper PA28 Series

BOEING IS THE SAFEST FOR COMMERCIAL

Fatality Rates by Make (Commercial)

MODEL RECOMMENDATIONS (COMMERCIAL)

1. Boeing (737 & 747)

2. Airbus A320

Conclusions

NEXT STEPS FOR THE COMPANY

- Analyze flight data to calculate activate safety metrics for models

- Analyze cost data to calculate risk from an investment standpoint
  - $ lost from Crashes / $ Invested
  - If a large aircraft crashes that's a much larger loss than a small aircraft

Thank You!

[Project Github Link](#)

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Appendix

General Aviation Manufacturers Association

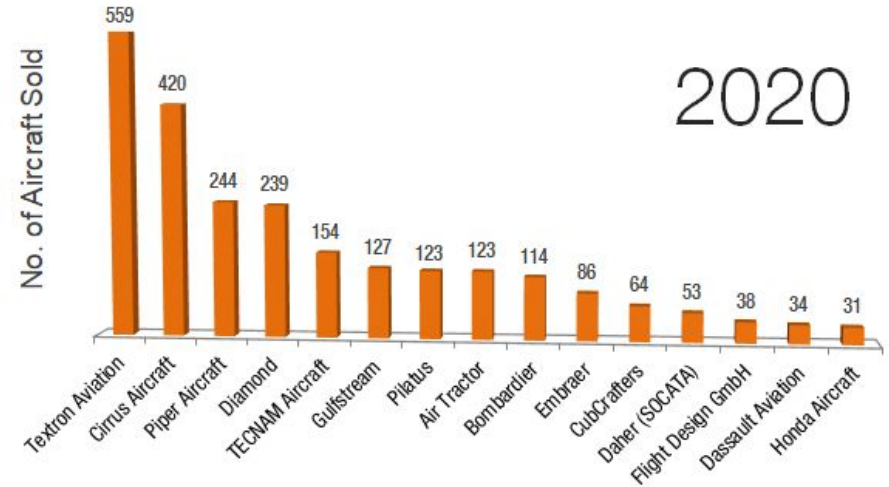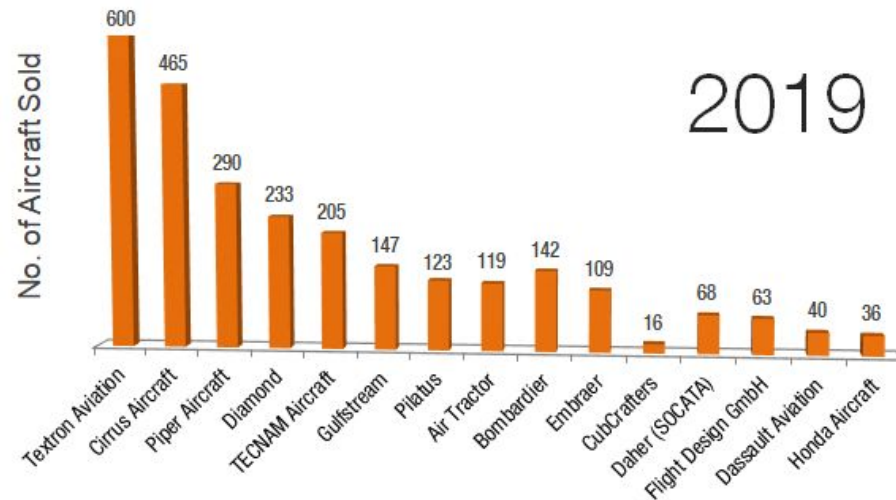- Overall manufacture and sales of aircraft remains strong
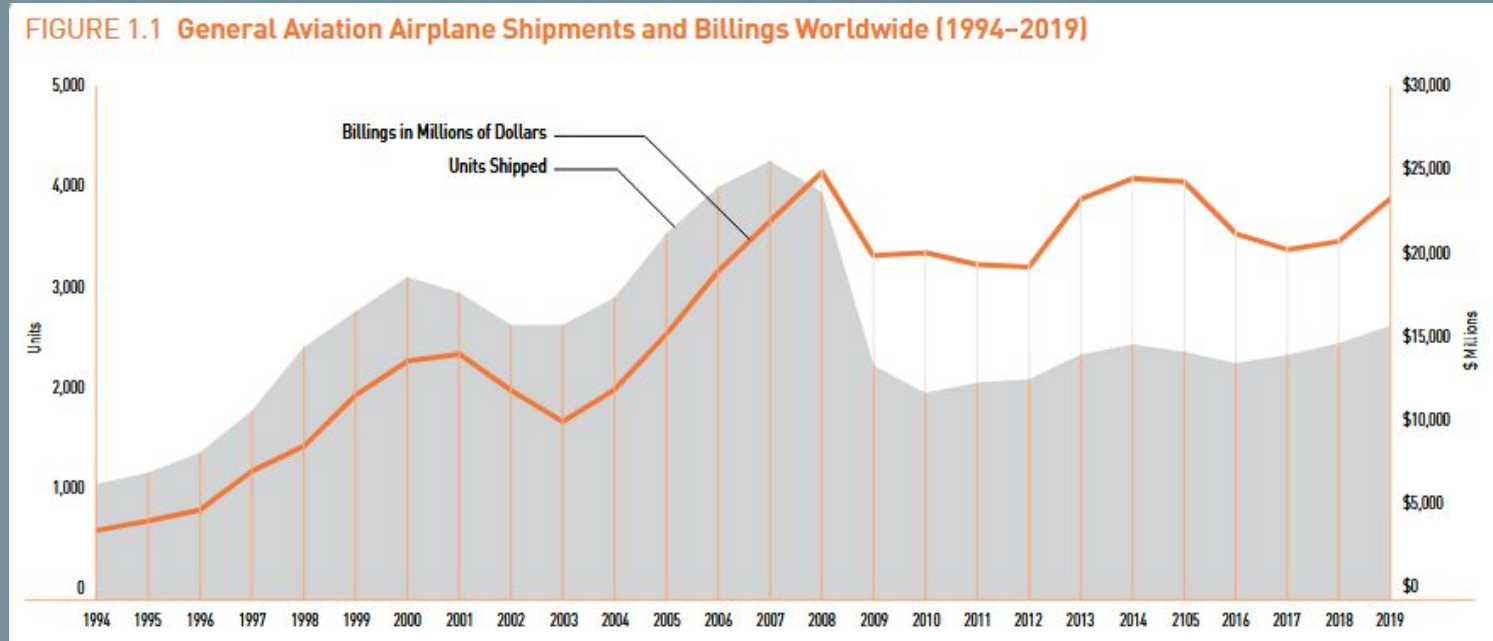
FIGURE 1.1 **General Aviation Airplane Shipments and Billings Worldwide (1994–2019)**

Statista

- Manufacture rate of most produced aircraft models

The Most Produced Aircraft Of All-Time

Aircraft models with the highest estimated production figures in history*

Aircraft	Production run	Total produced
Cessna 172	1956-present	44,000
Ilyushin Il-2	1941-1945	36,183
Messerschmitt Bf 109	1936-1958	34,852**
Piper PA-28 series	1960-present	32,778
Cessna 150	1958-1986	31,500
Polikarpov Po-2	1928-1952	30,000
Supermarine Spitfire/Seafire	1938-1948	22,685
Cessna 182	1956-present	22,237
Focke-Wulf Fw190	1939-1945	20,051
Piper J-3 Cub	1938-1947	20,038

* Estimated figures.
** Production of Spanish derivatives ended in 1958
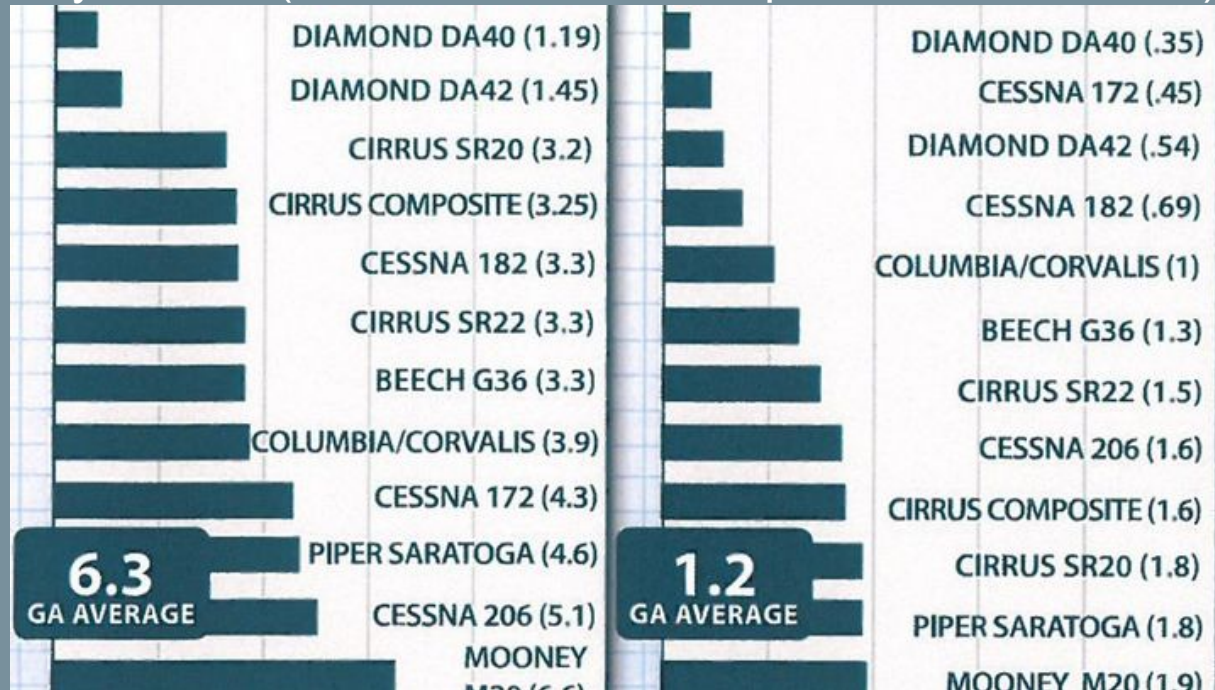Source: The Daily Telegraph

statista

Forecast International

- Annual sales rates by manufacturer

Aviation Consumer

- 2012 Safety Record (Accidents & Fatalities per 100k miles flown)

Top 10 Commercial Airplane Models

- Airbus A330
- Boeing 747
- Boeing 777
- Boeing 727
- CRJ Series
- Airbus A320
- Boeing 747
- Embraer E-Jet Family
- Boeing 737
- Douglas DC-3

Top 10 Private Airplane Models

- Cirrus SR22T
- Cirrus SR22
- Cessna Skyhawk
- Diamond DA40
- Cirrus SR20
- Piper Archer
- Tecnam LSA
- Diamond DA62
- Piper Pilot 100i
- Cessna Skylane