



# Time Series Forecasting for Aerospace Defense Exports

Springboard Capstone 3  
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# Background

A producer of aircraft engines wants to know if expanding their business into aerospace defense exports is a smart business move.

Which known consumers should they be focused on selling to?

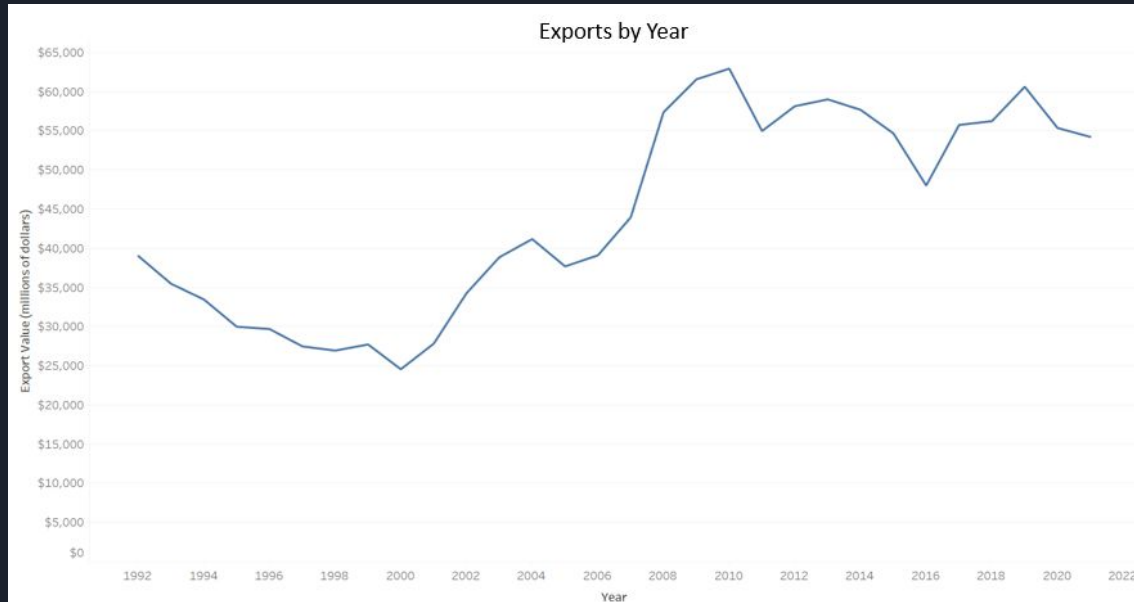


# Data

- US International Trade Administration of the Department of Commerce tracks US exports of aerospace defense items
- Dataset 1, yearly\_shipments:
  - Monthly export data from 1992-2021
- Dataset 2, specific exports:
  - Yearly data from 2010-2021
  - Broken into eight code for which the company already has products
  - Export values to countries for specific HS Codes

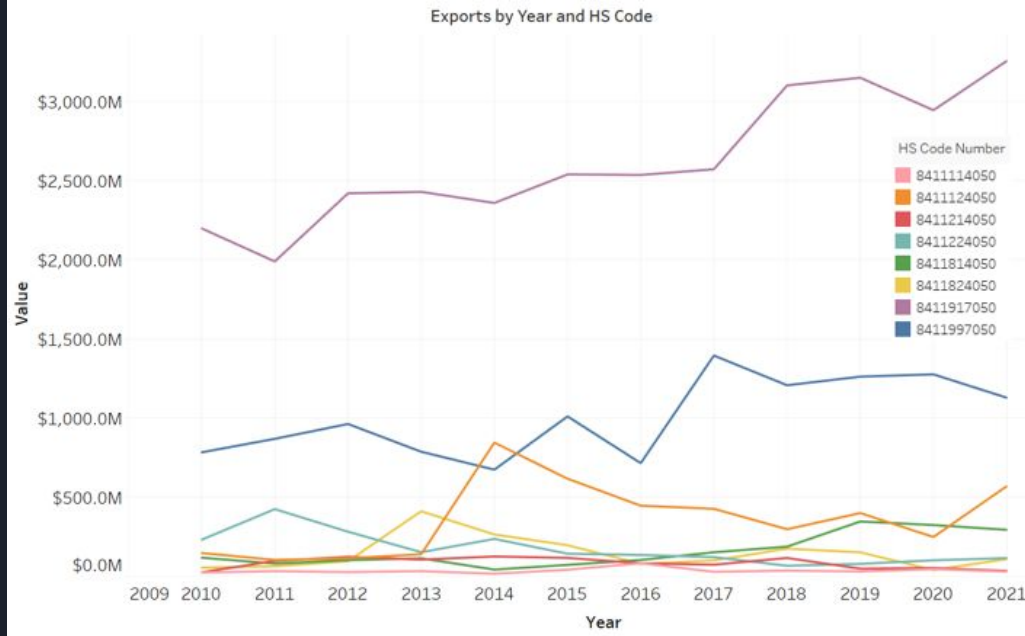


# Data Analysis



One big initial takeaway: exports heavily influenced by outside factors

# Data Analysis



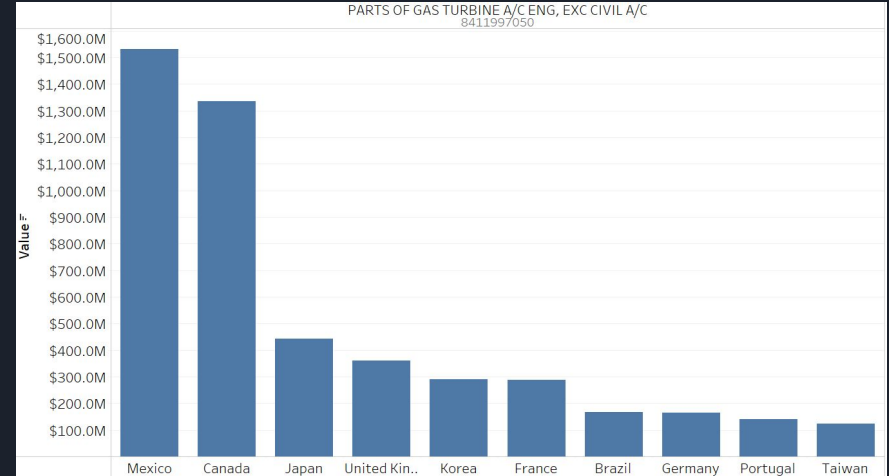
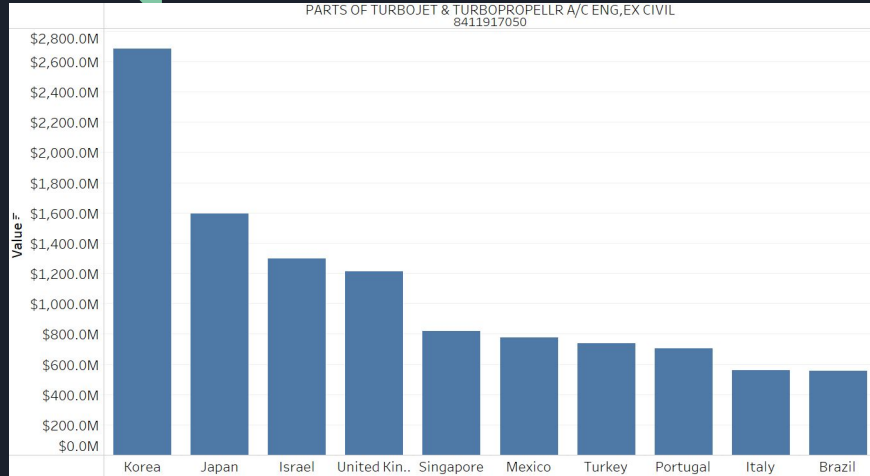
## Top Two 2021 Export Categories

HS Code 8411917050, parts of turbojet and turbopropeller engines: \$3.2 Billion

HS Code 8411997050, parts of gas turbine engines: \$1.1 Billion

These would be the best categories for the company to move into first

# Data Analysis

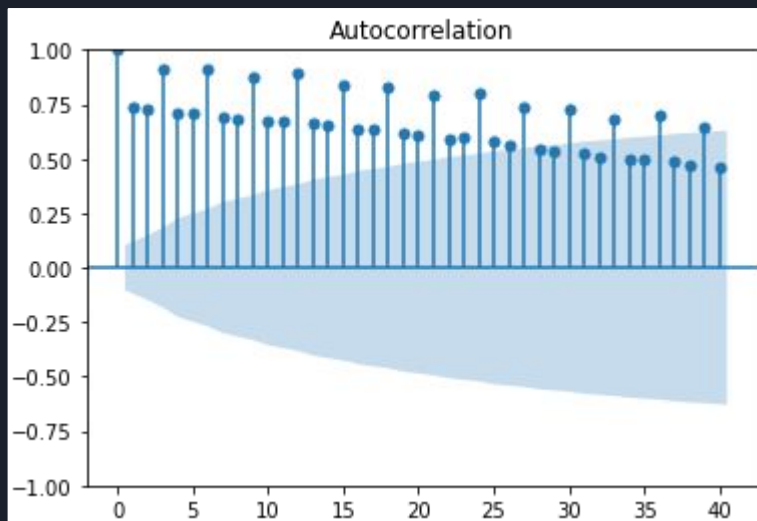


Overlapping countries: Korea, Japan, United Kingdom, Mexico, Portugal and Brazil

# Pre-Processing

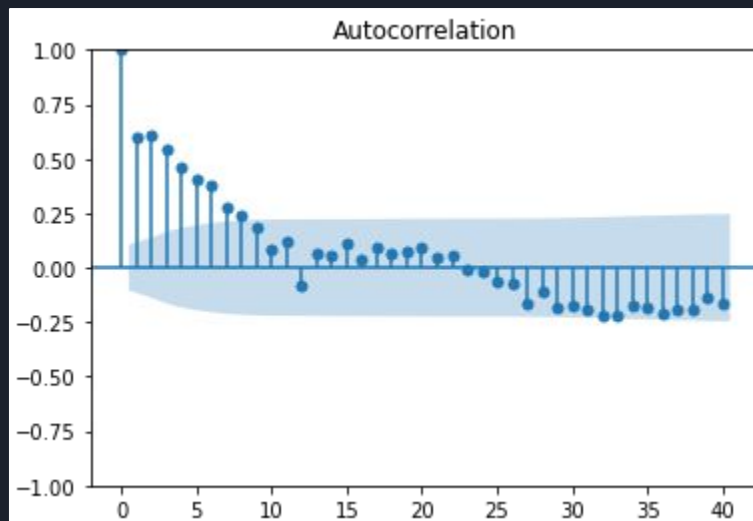
## Original Data

Dickey-Fuller Test Results:  
Test statistic (p-value) = 0.73



## Yearly Differenced Data

Dickey-Fuller Test Results:  
Test statistic (p-value) = 0.027





# Modelling

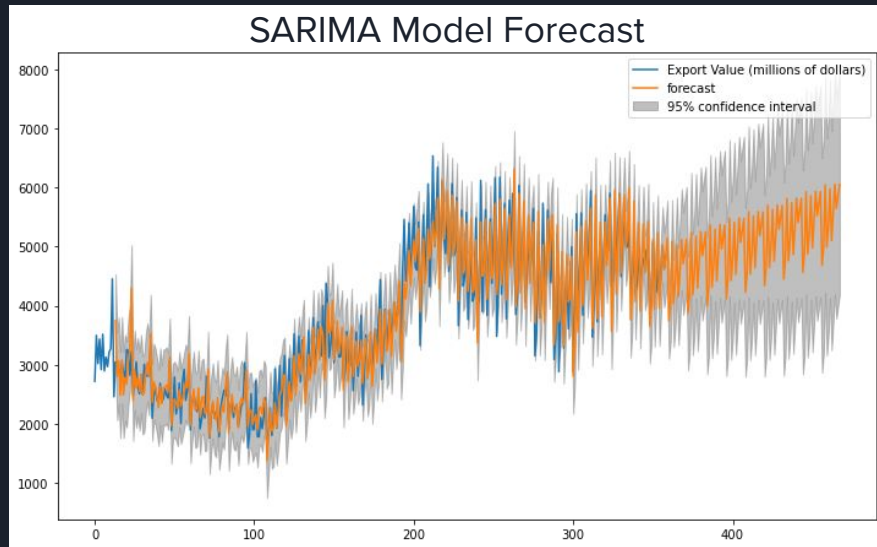
Model	Order	Seasonal Order	Data Used
AR	(3,0,0)	n/a	Year differenced
MA	(0,0,7)	n/a	Year differenced
ARIMA	(2,0,1)	n/a	Year differenced
Seasonal ARIMA	(1,0,2)	(0,1,1,12)	Original

Performance comparison criteria: Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC)



# Results

Model	AIC	BIC
AR	5116.5	5135.9
MA	5127.1	5162.1
ARIMA	5117.9	5137.3
SARIMA	5039.3	5062.4



# Future Work



- Further analysis on expanding into other export categories
- Spectral analysis to better understand the underlying periodic behavior of the data
- Collect additional data on outside factors:
  - US partnerships
  - Geographic location
  - Type of aircraft in each country's arsenal