

Forecasting Export Volume

Using Ocean Freight Data to Drive Decision
Making

by Michael Weber

github.com/MichaelWeber2050

linkedin.com/in/michael-m-weber/

Who Uses Container Forecast Models?

Forecasting is central to many activities within any organization

- ❖ **Ports**
 - Equipment and personnel planning
 - Spatial and expansion needs
- ❖ **Shipping Carriers**
 - Route, demand, capacity planning
 - “Roll” percentage calculation
- ❖ **Importers and Exporters**
 - Supply Chain and Inventory planning
 - Spoilage
- ❖ **Economists**
 - Economic metrics like GDP per capita influenced by net exports



Bill of Lading Data

- ❖ Over 100 million import observations
5 years 2014-2018
- ❖ Enigma Public - Bill of Lading Imports
- ❖ BOL data includes
 - port of origin, vessel name, destination, arrival date, harmonized tax code, description of contents

❖ Port of LA & Long Beach —>

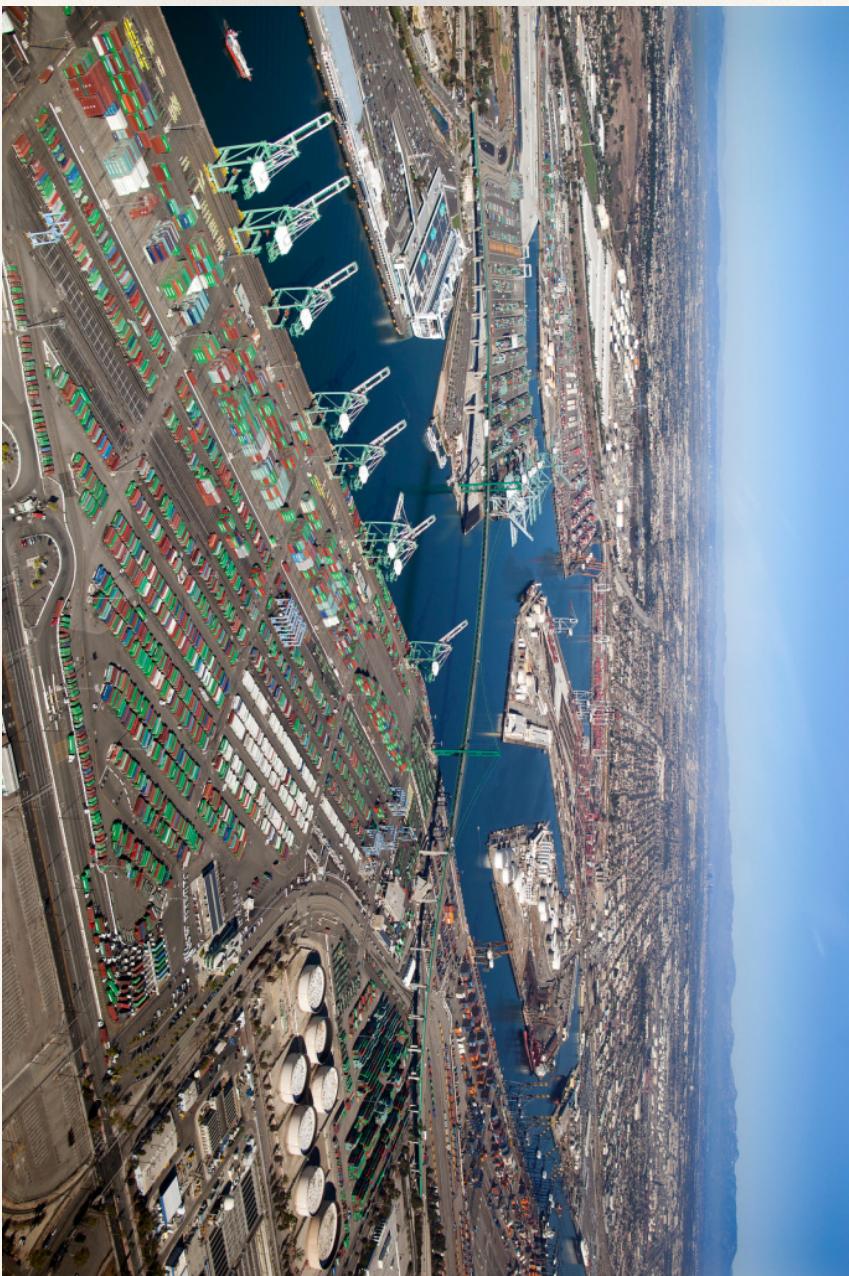
enigma ⚒ public



Tools used:

- PostgreSQL
- Facebook Prophet

PROPHET



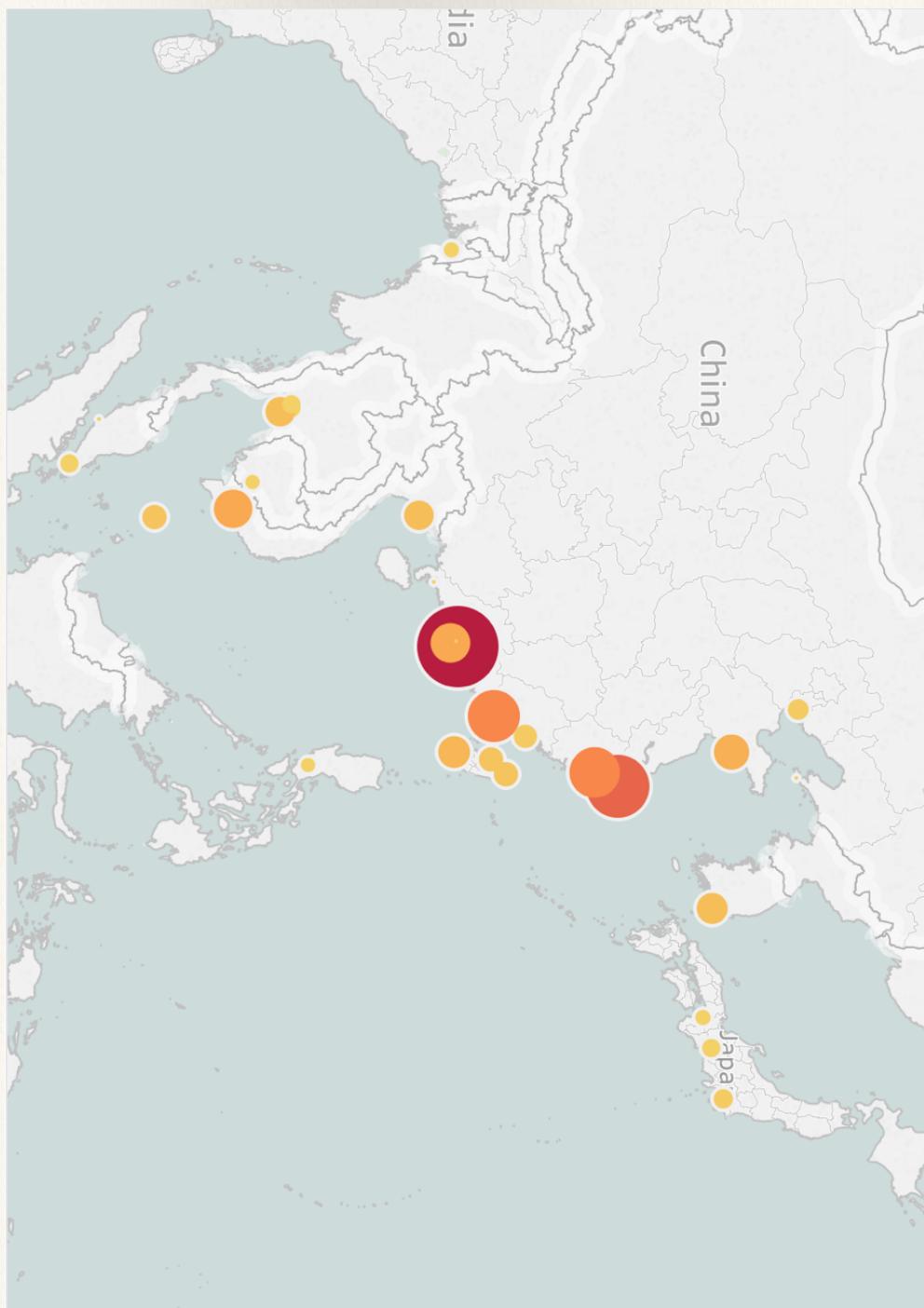
Port of Origin Map

Where do ocean imports come from?

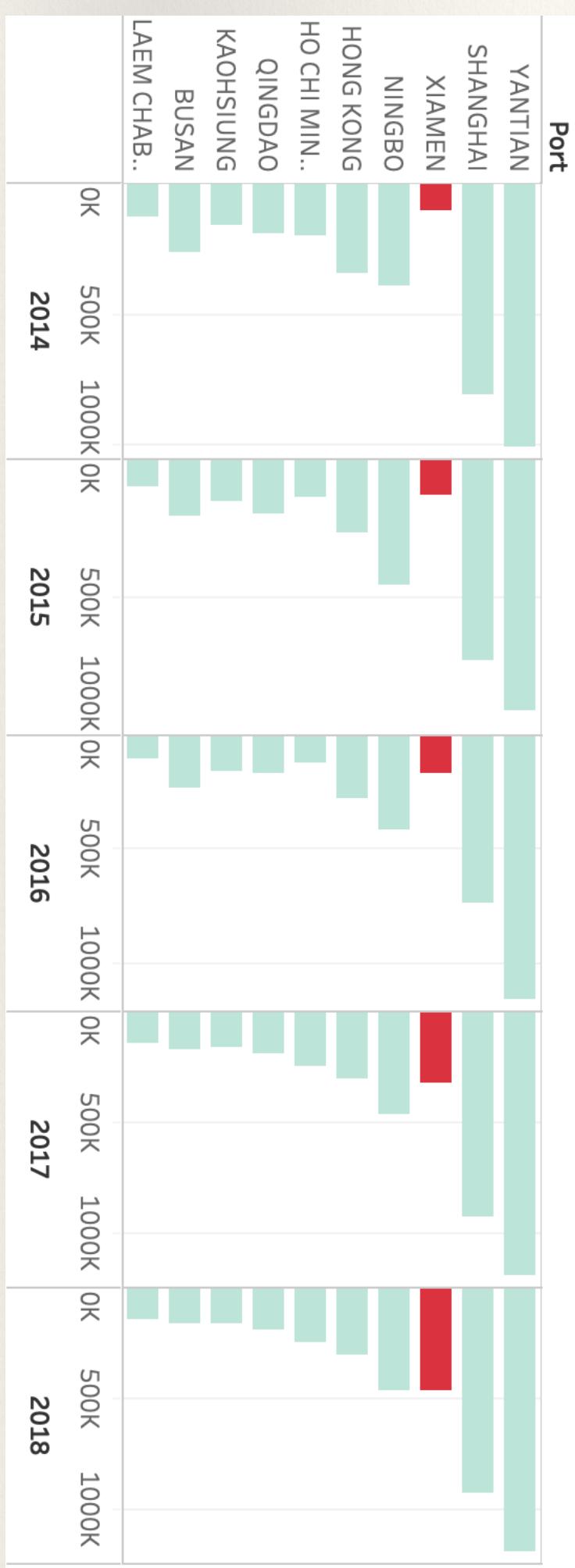
China surpassed Canada as USA's #1 trade partner in 2007

Top Imports

1. Furniture
2. Auto Parts
3. Apparel
4. Electronics
5. Footwear



Annual Export Volume by Port



Free Trade Zone effect on Export Volume

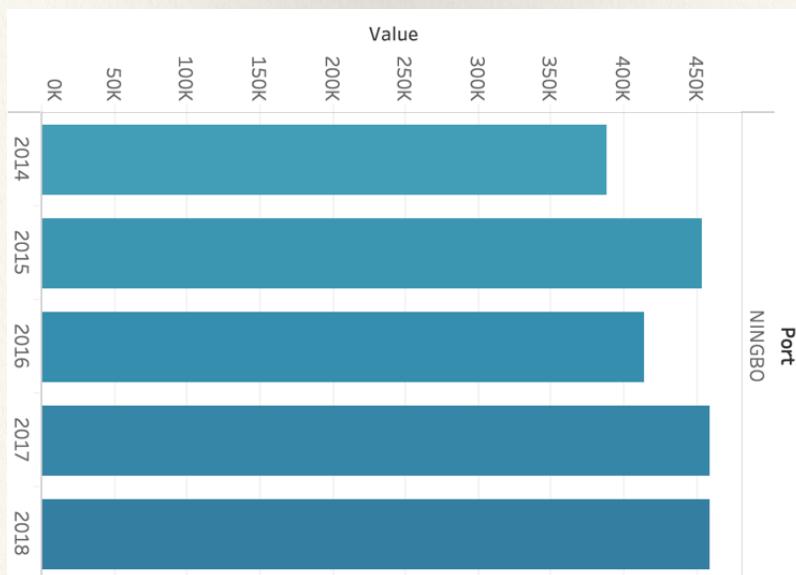
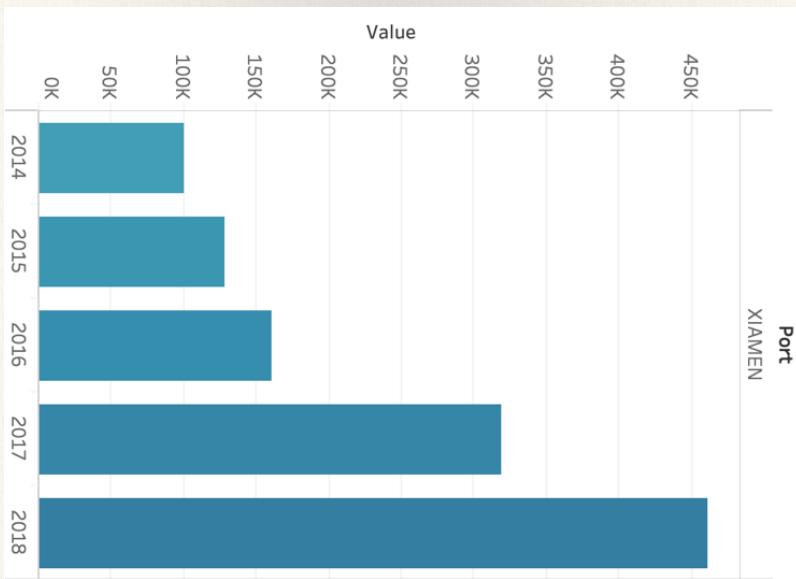
FTZ definition

- A geographic area where goods may be landed, stored, handled, manufactured and re-exported and generally not subject to customs duty.
 - Wikipedia

- Xiamen begins as FTZ April 2015

- New US presidency begins late 2016

- Can we accurately forecast ports with explosive growth?

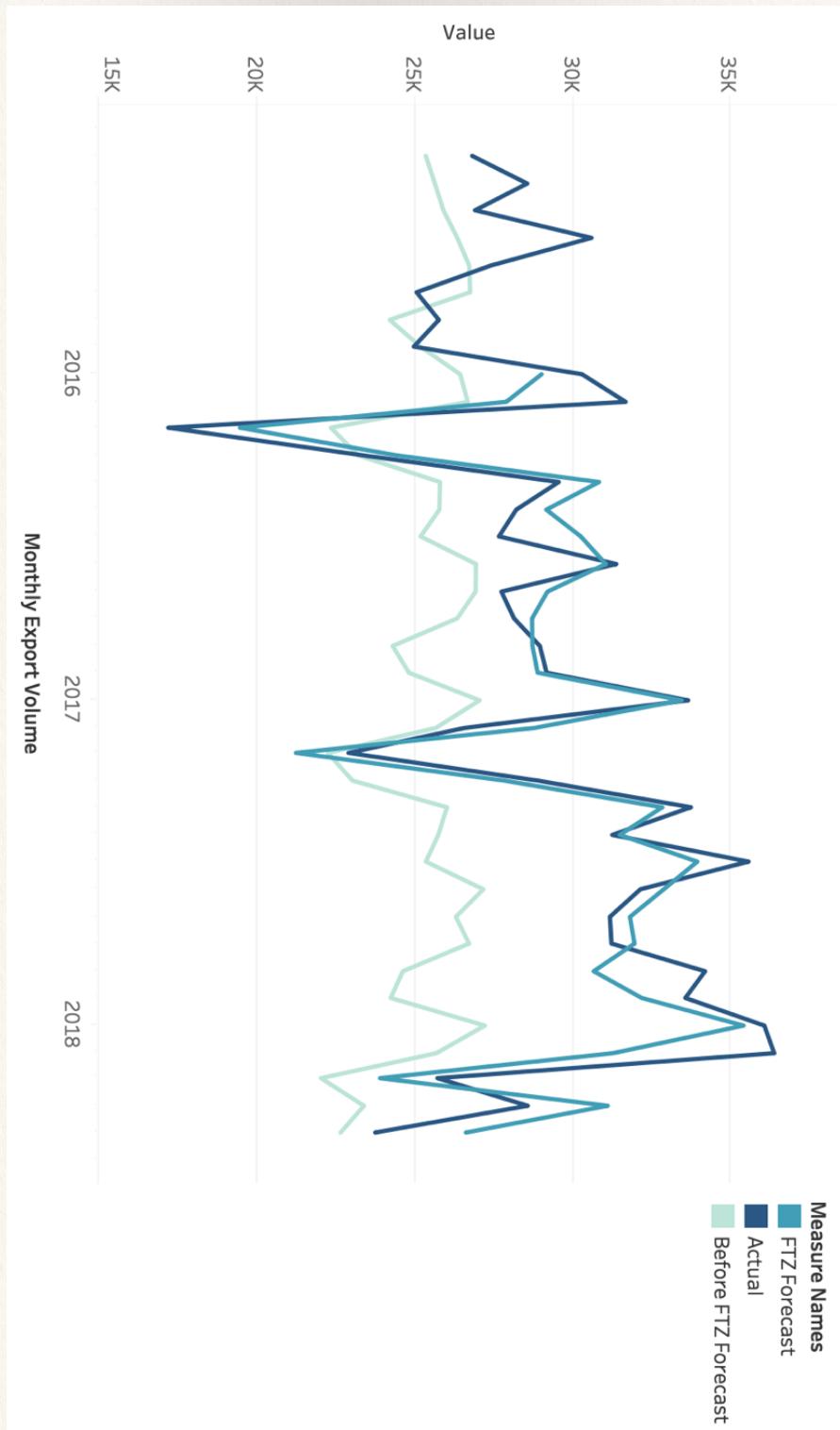


Forecast Model Results

Xiamen Forecasts vs Actual

Facebook Prophet Model

- Ease of use
 - Seasonality & Holiday handling
 - Performance
- RMSE 1,000 vs SARIMA 1,6000



Future Work

- ❖ Build Port Optimization model combining forecasting, classification and neural networks for reinforcement learning

Thank You

Michael Weber

References

GDP per capita numbers - <https://www.ceicdata.com/en/china/gross-domestic-product-per-capita-prefecture-level-city/cn-gdp-per-capita-fujian-xiamen>

Xiamen 2014 Free Trade test site - <https://www.globalsources.com/TRADESHOW/XIAMEN-EXPORT-BASE/OVERVIEW.HTM>

Long Beach Port Optimizer - https://www.joc.com/port-news/us-ports/port-long-beach/long-beach-port-optimizer-decision-raises-data-questions_20190313.html

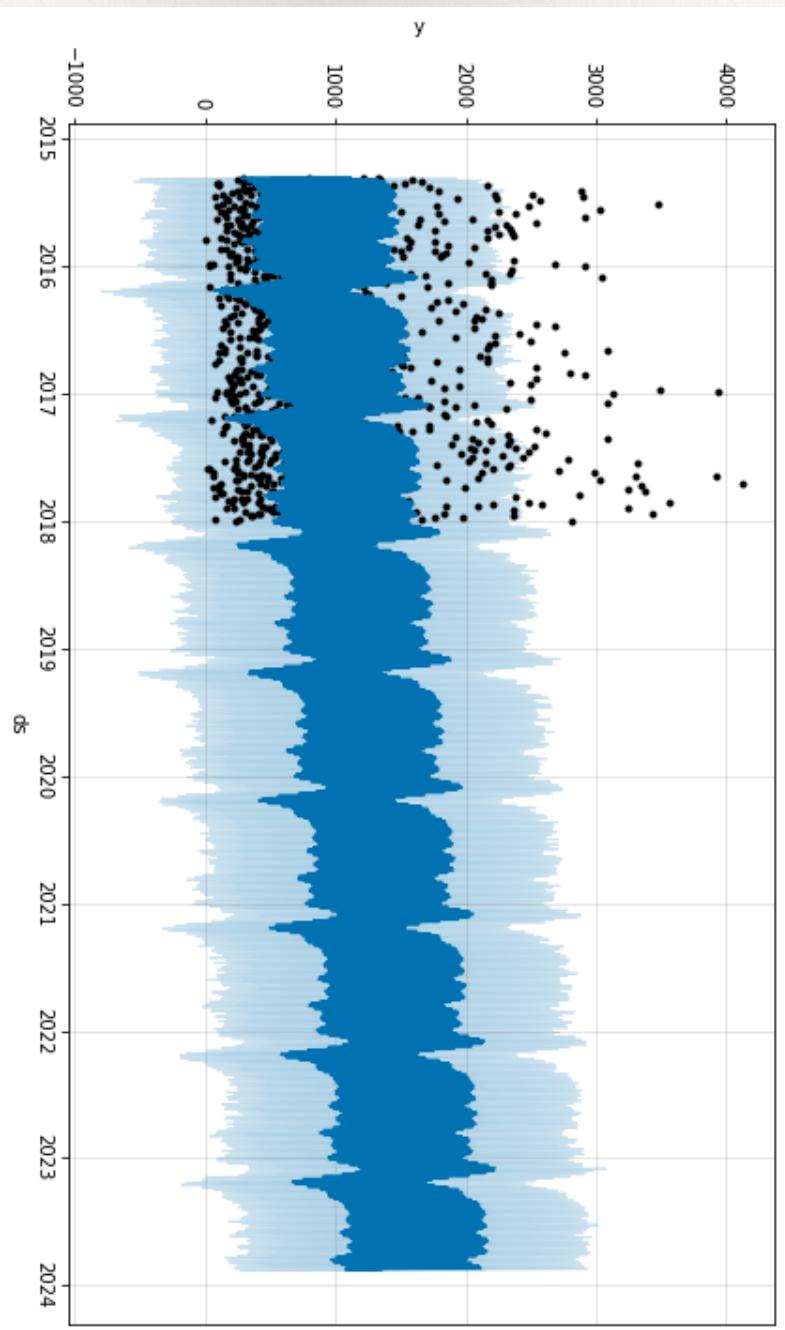
Tianjin Pilot Free Trade Zone - https://en.wikipedia.org/wiki/Tianjin_Free-Trade_Zone

TEU stands for Twenty-Foot Equivalent Unit which can be used to measure a ship's cargo carrying capacity. The dimensions of one TEU are equal to that of a standard 20' shipping container: 20 feet long, 8 feet tall

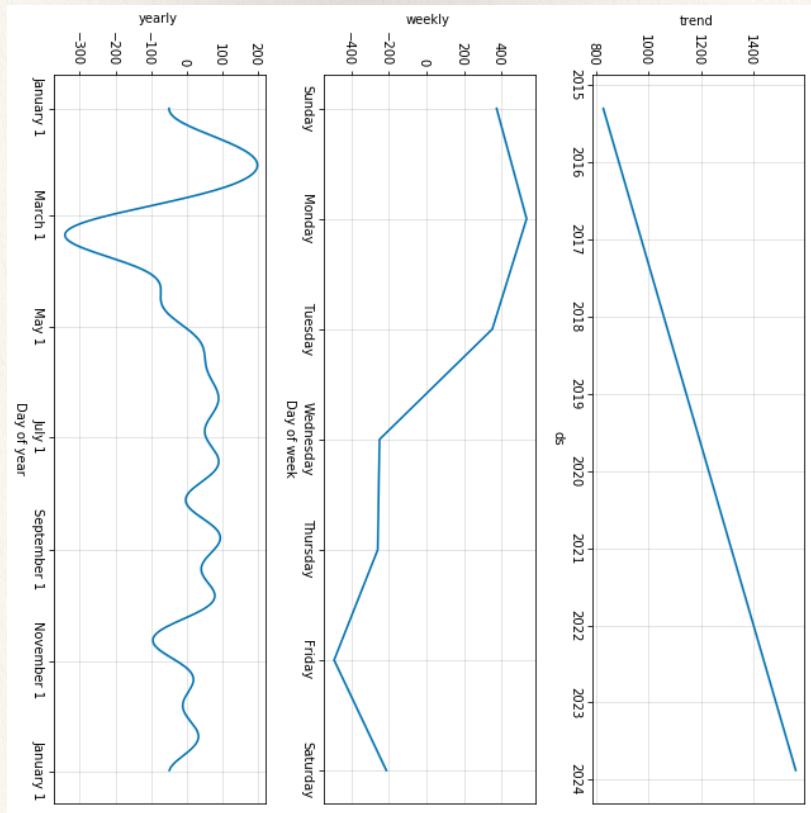
Xiamen biz report - https://build.export.gov/china/doingbizinchina/regionalinfo/secondtiercities/eg_cn_025698

GDP a good measure of well being - <https://voxeu.org/article/defence-gdp-measure-wellbeing>

Forecasting to 2024



Components graph



Seasonality & Holiday - CNY effect

Trend - High growth post FTZ status

Error - RMSE

52 months 4+ years of import data

