Forecasting International Movements of Reusable Supply Chain Platforms

Motivation / Background

Inter-Regional Flows

Company XYZ is seeking to improve the forecasting accuracy of inter-regional flows

Key Questions

Can inter-regional flows be accurately forecasted utilizing traditional time series methodologies?

- Will accuracy improve by incorporating exogenous variables such as:
  - Labor Rates, Fuel Rates
  - Inter Regional Trade Growth Rates, Sector Growth Rates
- Will forecasting accuracy improve by utilizing returnable transport item aggregate returns

Approach

- Develop different Time Series Forecasting Models and compare their Accuracy using MAPE and RMSE
  - Utilizing Historical Data
    - Holt-Winter Model
    - Simple Exponential, Double Exponential, \( \hat{X}_{t+1} = \alpha X_t + (1 - \alpha) \hat{X}_{t-1} \)
    - Least Squares Regression, \( \hat{Y}_{ESUCD} = a_0 + a_1 t + \sum_{j=1}^{12} b_j t_j \) where \( t_j = \{Jan|Feb|Mar\} \ldots |Dec \)
    - Regression with Simple Exponential, \( \hat{Y}_{DeltaES} = \hat{Y}_{ESUCD} - \hat{Y}_{CAMEX} + \hat{X}_t \)
    - Box-Jenkins ARIMA = (Autoregressive Integrated Moving Average)
  - Utilizing Historical & Exogenous Macro Variables
  - Econometrics

Expected Contribution

This thesis will:

- Create and evaluate several different forecasting strategies to propose application in a closed loop supply chain setting
- Improve forecasting accuracy for our research partner firm, allowing for better business planning and execution
- Identify macro variables influencing Cross Border Movements of Reusable Supply Chain Platforms

Initial Results

Regression with Simple Exponential Smoothing

Forecast Vs. Actual

MAPE

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<th>Training</th>
<th>Validation</th>
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Relevant Literature