Forecasting U.S. Imports of Goods by Customs Basis from Canada

Introduction

This project examines U.S. imports of goods from Canada to understand patterns and predict future trends. Data was sourced from the Federal Reserve Economic Data (FRED), covering monthly records from January 1985 to February 2023. Given Canada's status as a key trading partner, forecasting import trends has significant implications for economic planning and policy.

Data Analysis and Exploratory Data Analysis (EDA)

The dataset revealed notable trends:

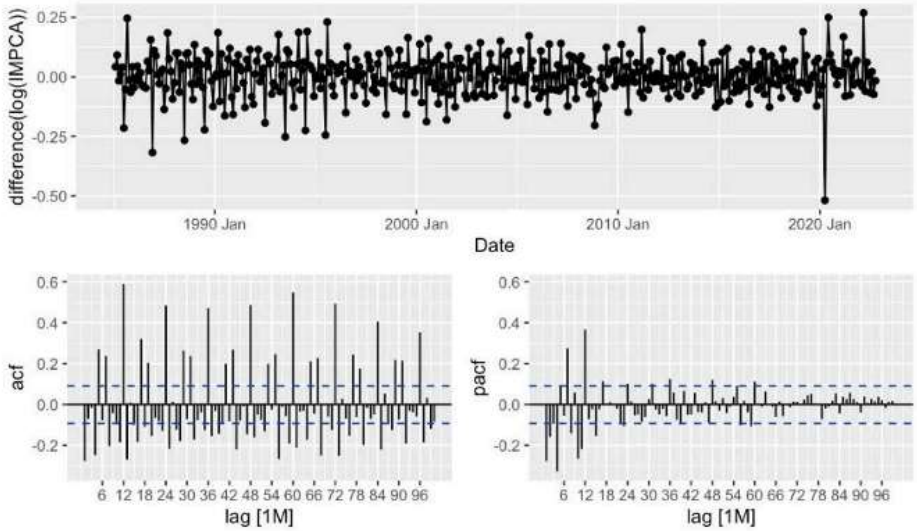
- **Volatility**: Imports show an increasing volatility pattern over time.
- **Economic Events**: Significant declines were observed around 2010 and 2020, likely due to economic recession and the COVID-19 pandemic.
- **Correlation with CPI**: Import levels appear to influence the Consumer Price Index (CPI), as changes in import volume affect the supply of goods.

Modeling and Forecasting

1. **SARIMA Model**:
    - The SARIMA model was explored first, with transformations applied to address non-linear trends and volatility.
    - **Best Fit Model**: SARIMA(0,1,1)(3,0,3), based on AIC and BIC values.
    - **Limitations**: Although effective, SARIMA had difficulty handling recent data volatility.

SARIMA:

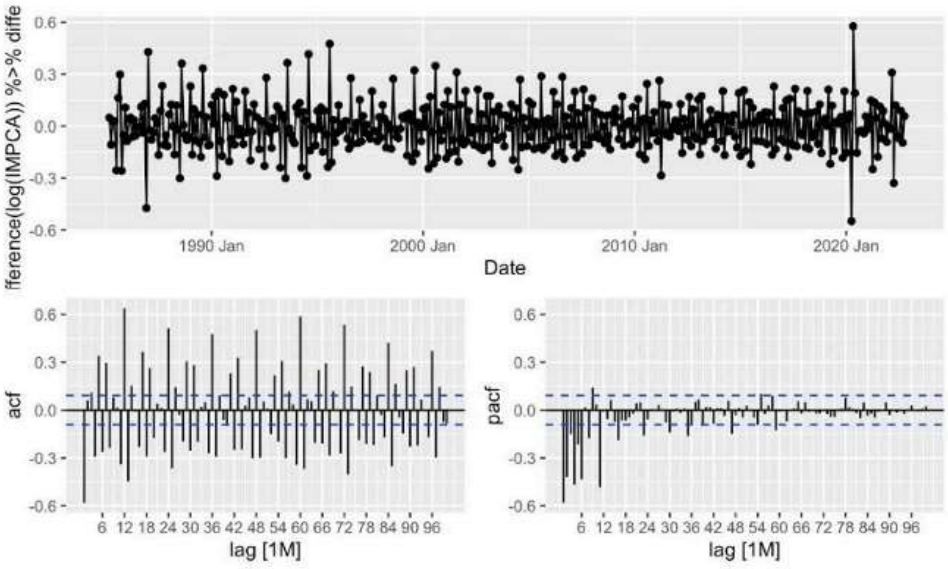
ACF AND PACF



2. **Neural Network Model**:
   - Neural networks were then implemented due to their capacity to capture complex, non-linear relationships.
   - **Performance**: This model showed a lower RMSE than SARIMA, demonstrating higher accuracy for recent data points and a closer alignment with observed trends.

2nd Method: Neural Nets

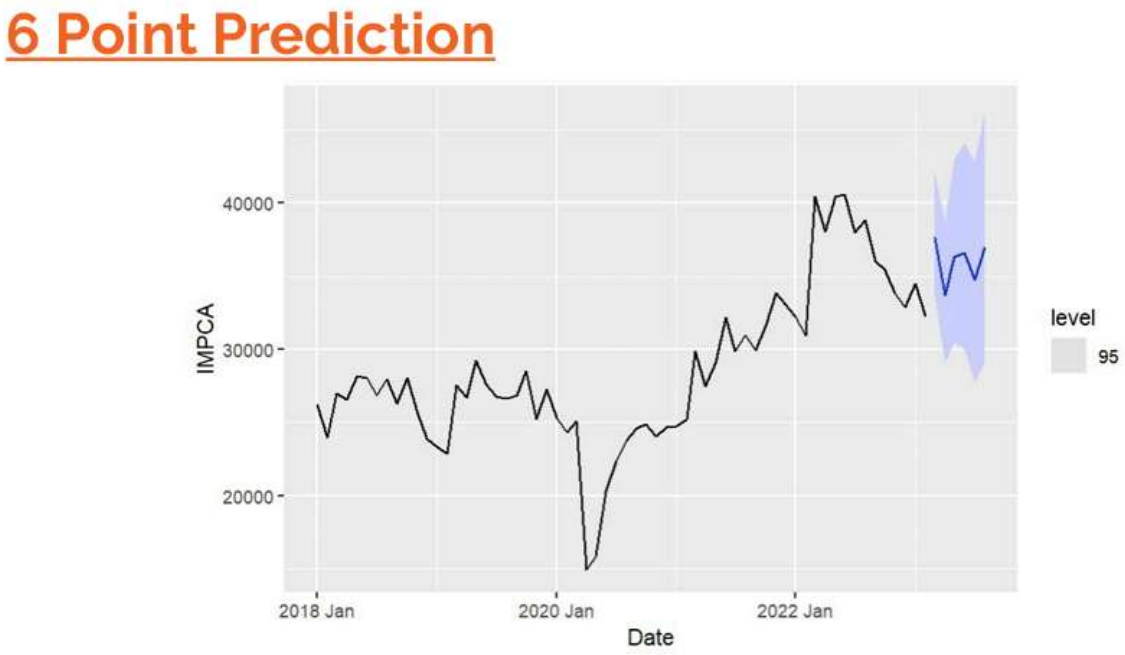
ACF AND PACF



Chosen Model: The neural network was selected for its superior predictive accuracy and ability to adapt to recent data patterns, offering more reliable short-term forecasts.

6-Month Forecast

Using the neural network, a 6-month import forecast was produced, providing actionable insights for trade and policy stakeholders.



Recommendations and Decision Impact

This forecasting framework supports strategic planning for:

- **Businesses**: Adjusting production and inventory to match anticipated import trends.
- **Government**: Crafting economic policies based on expected changes in international trade.
- **Investors**: Leveraging forecasted trade data to inform market decisions.

Conclusion

The analysis underscores the value of neural networks in forecasting complex economic indicators like imports, offering robust predictive power to support decision-making in trade and policy.