



# **Growth of BEV's within Washington**

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# Premise



Making transition to clean energy in every facet possible



Washington's one of the leading state in the EV initiative



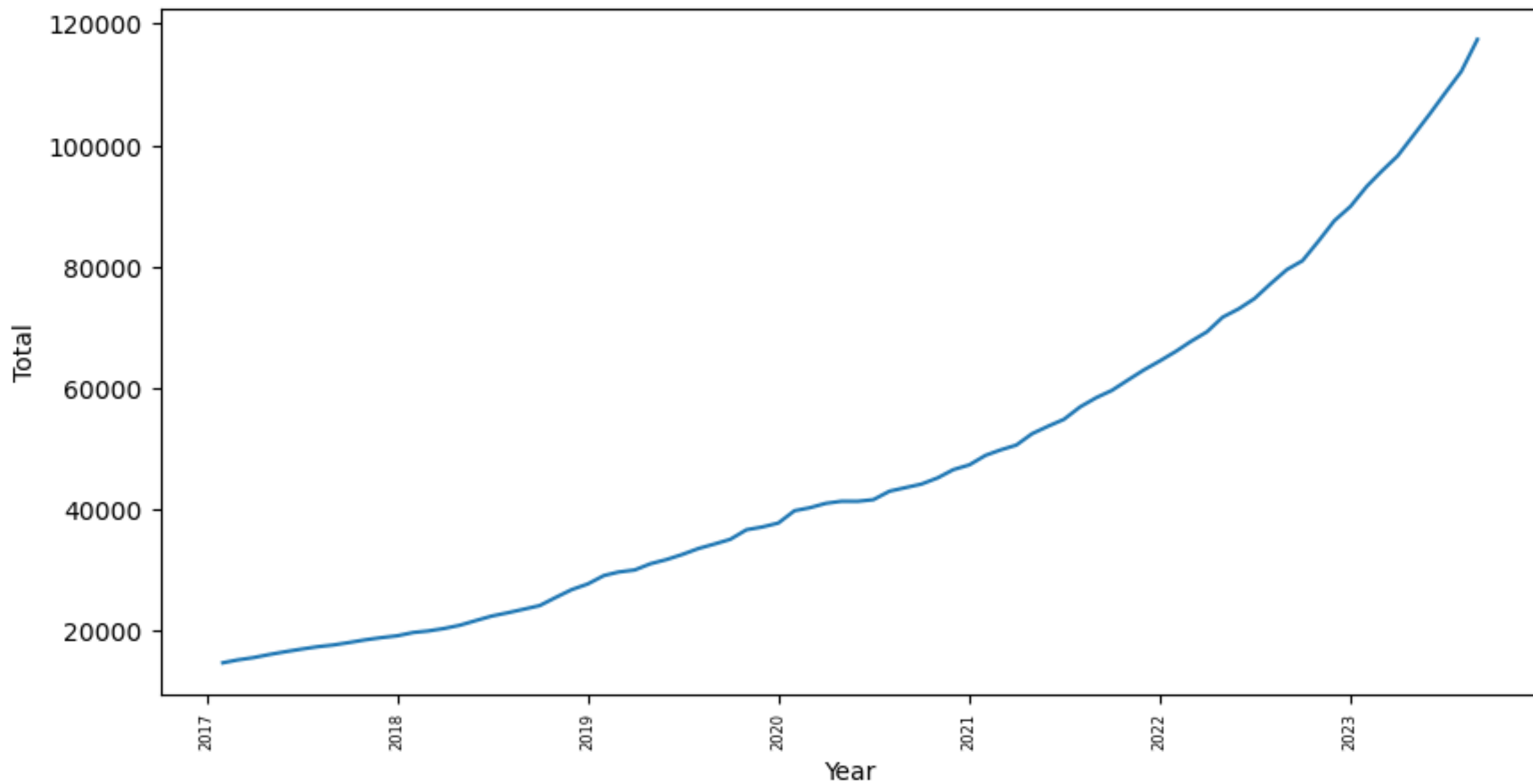
Goal is too project the growth of BEV's within the state of Washington, and see any other insights we can draw

# Data Acquisition

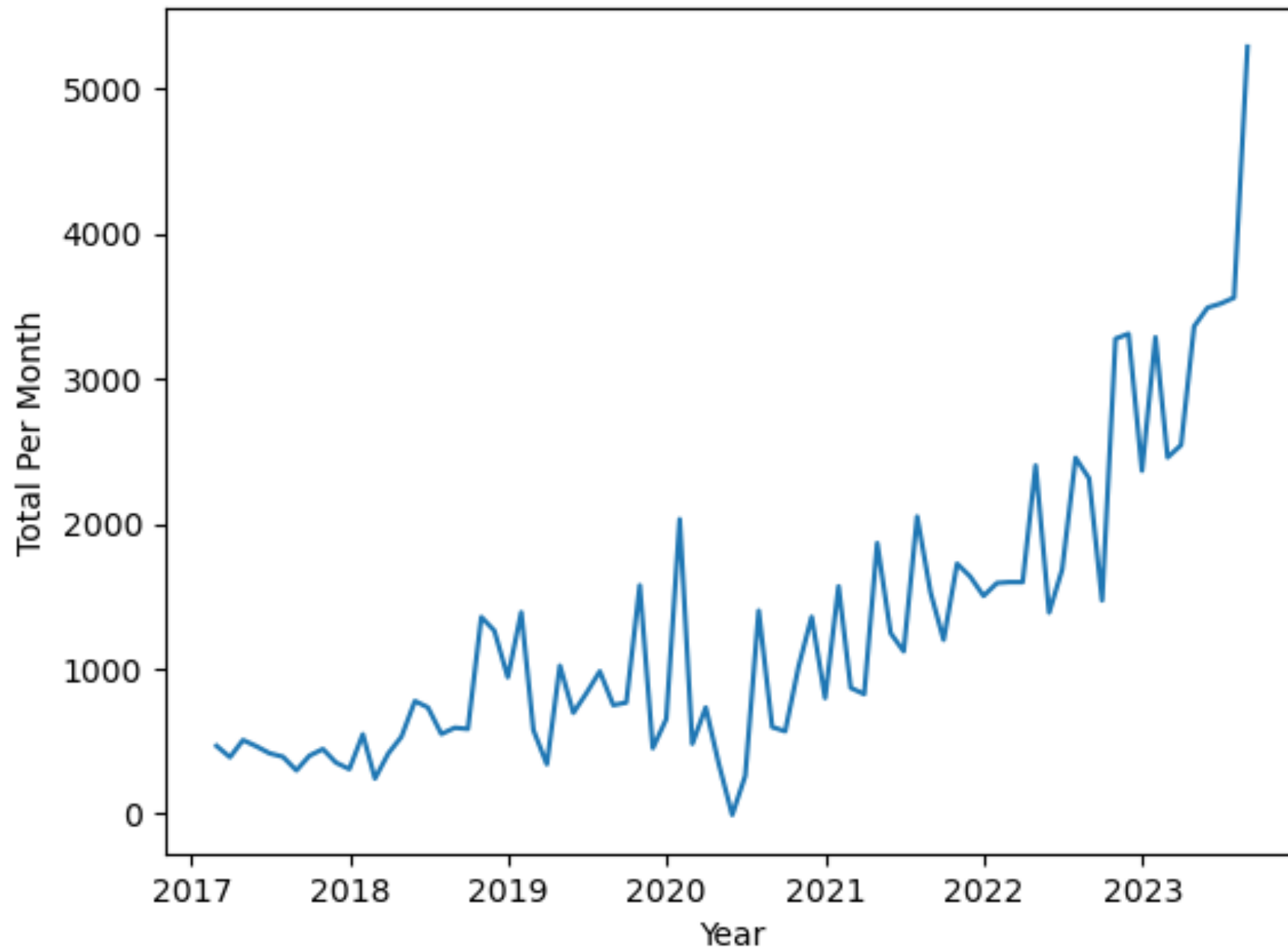


All data collected from 2017-01-01 to 2023-08-31

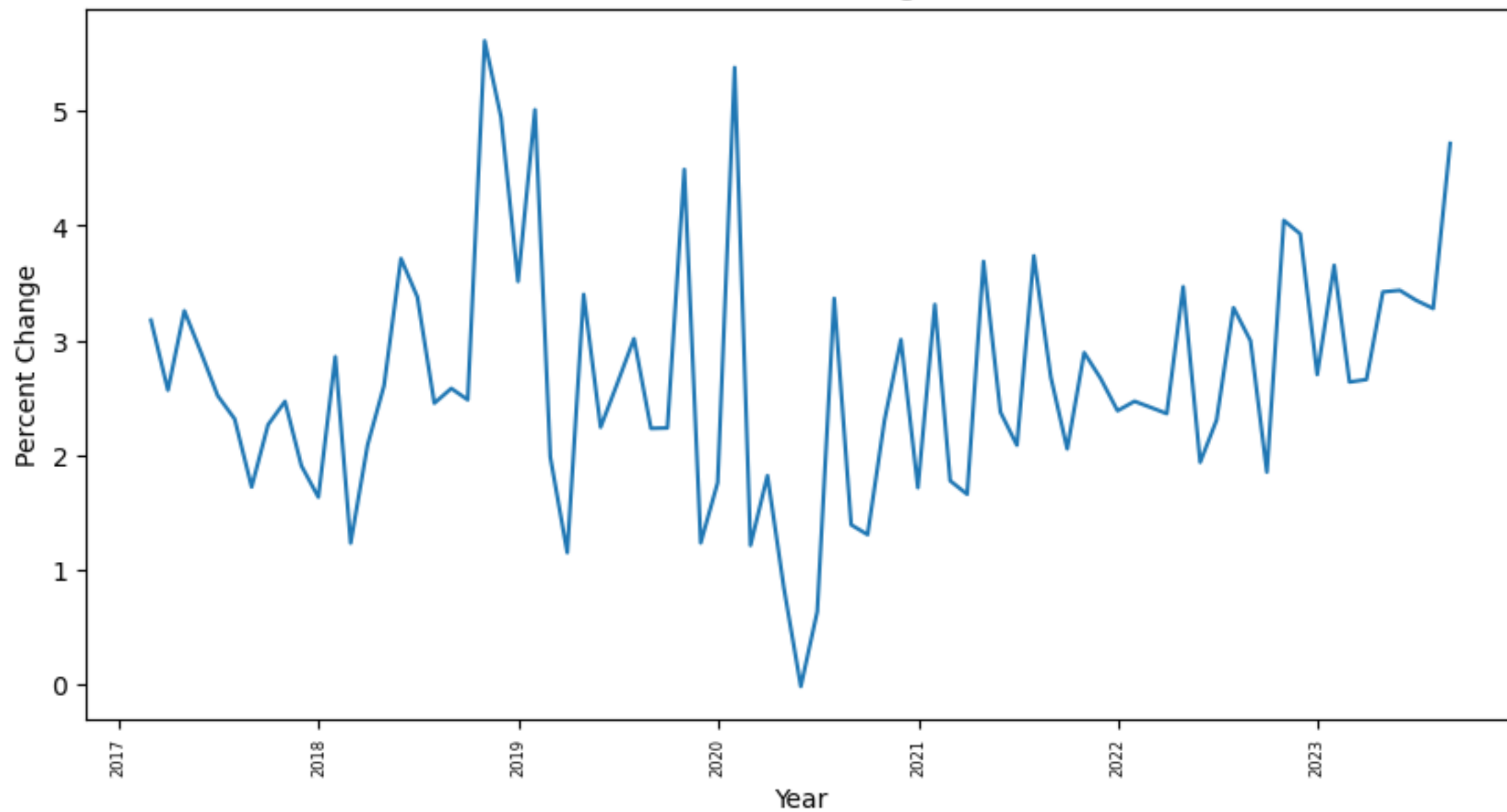
Total Amount of BEVs

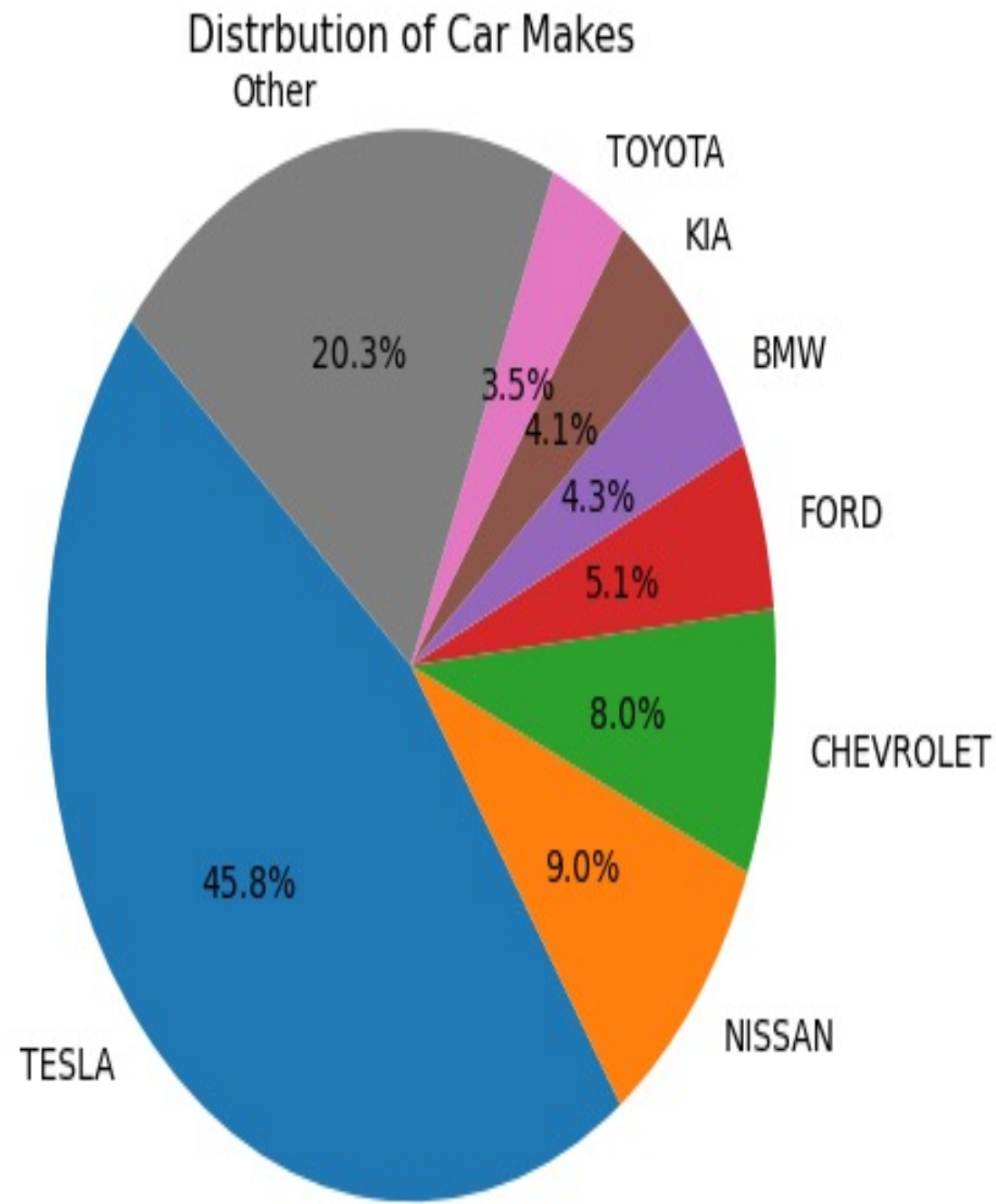
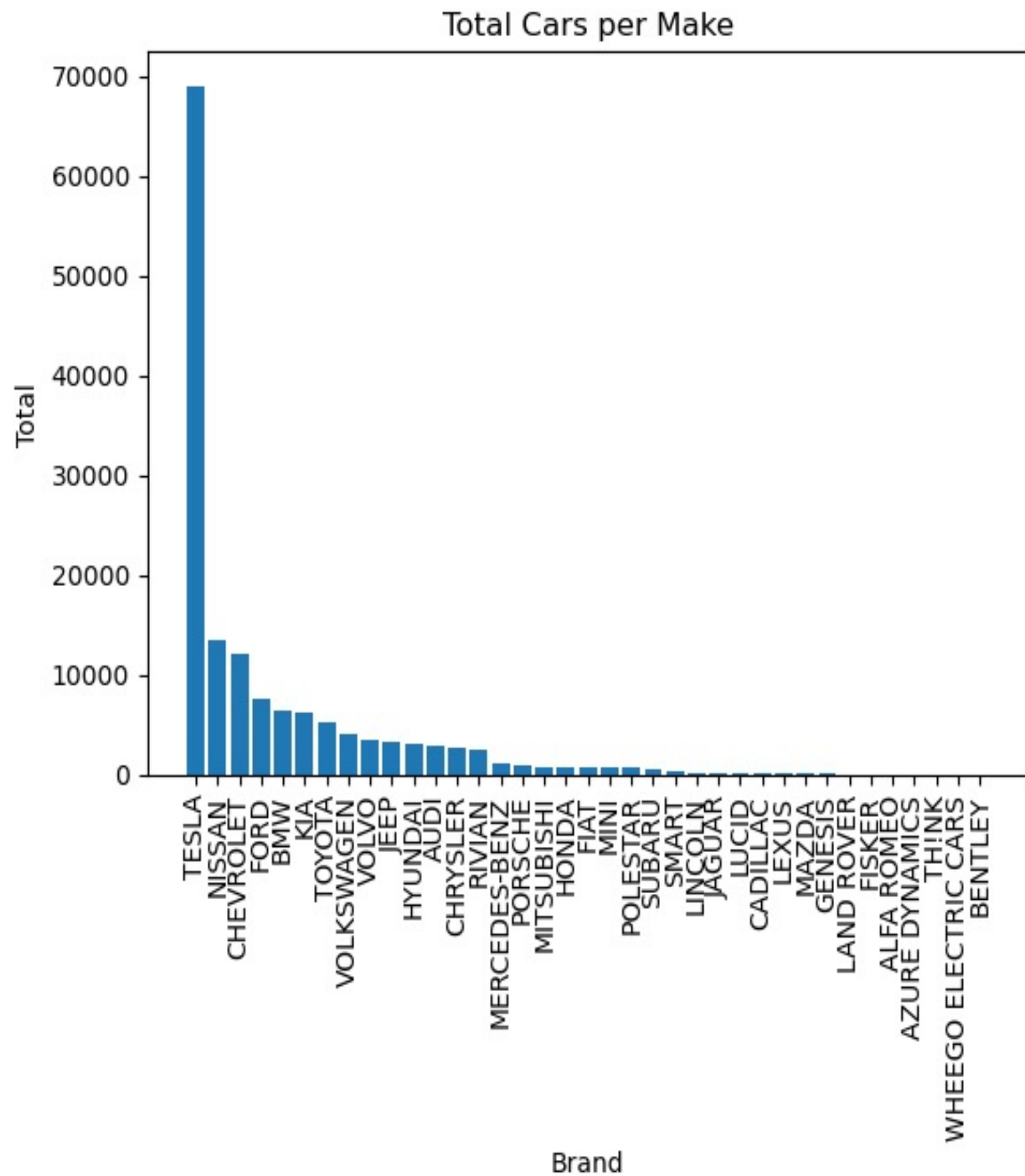


Month on Month Added BEVs

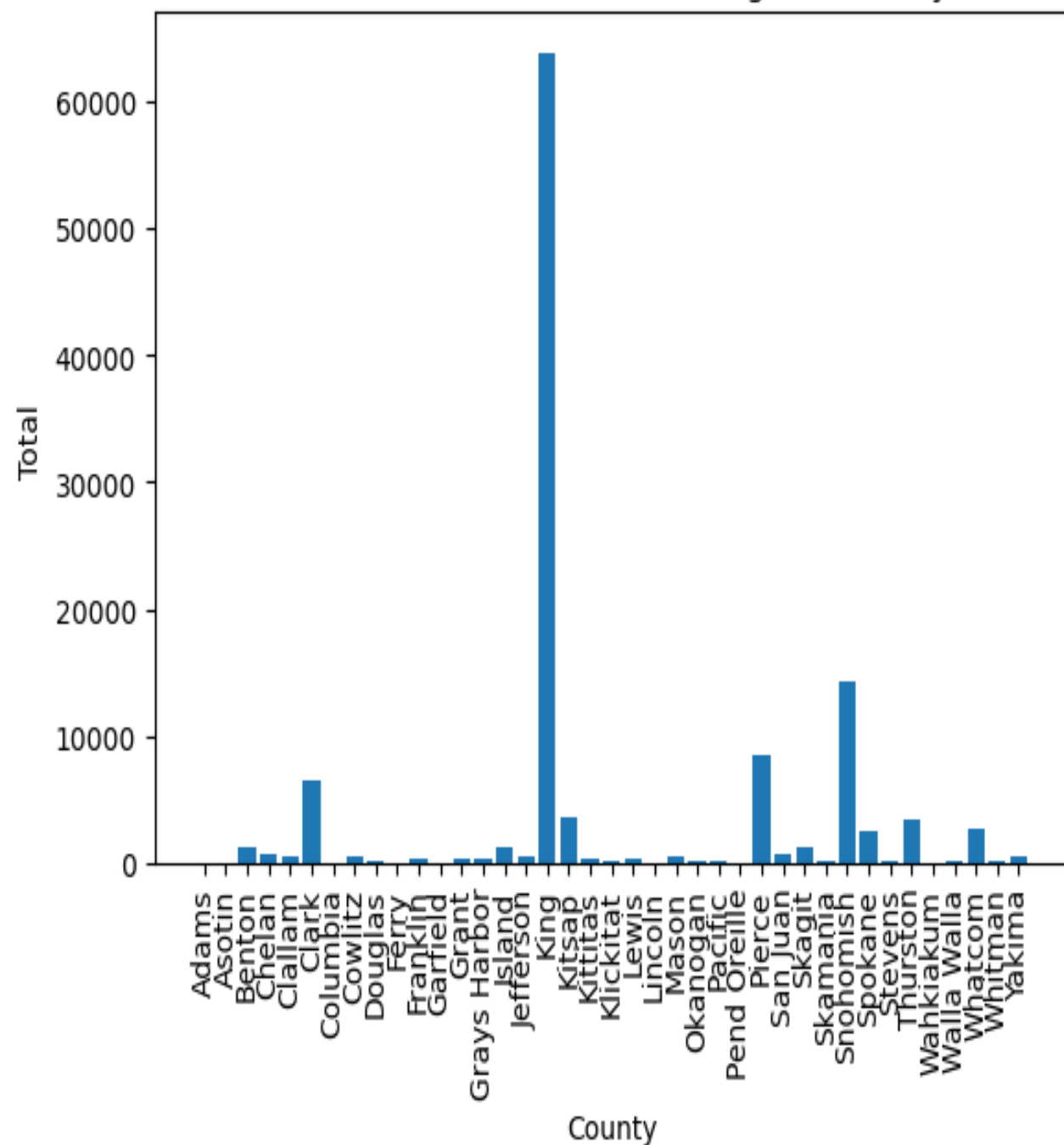


Month on Month Percent Change in BEV Growth

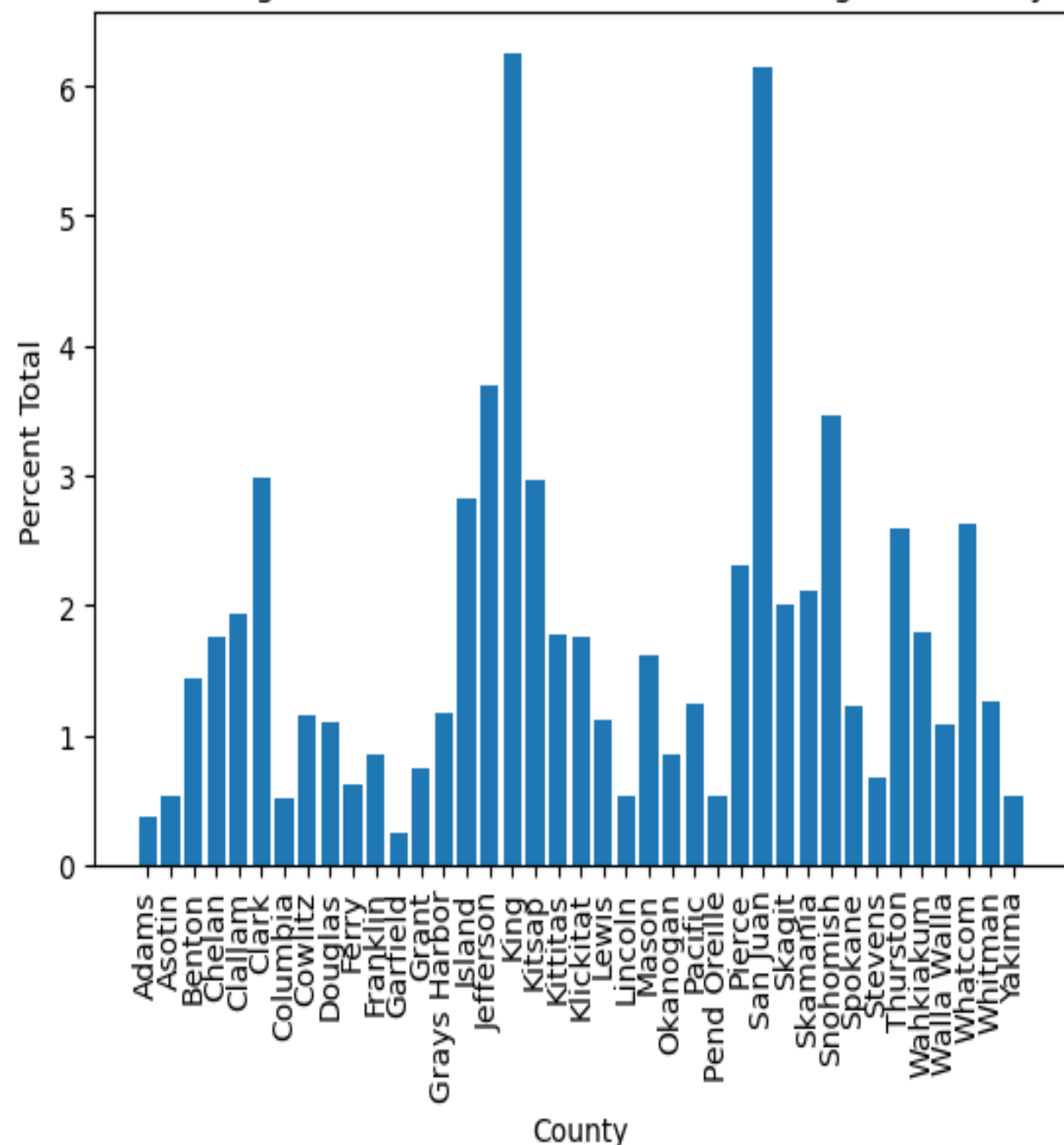




Total Number of BEVs within a given County



Percentage of Cars which are BEVs within a given County

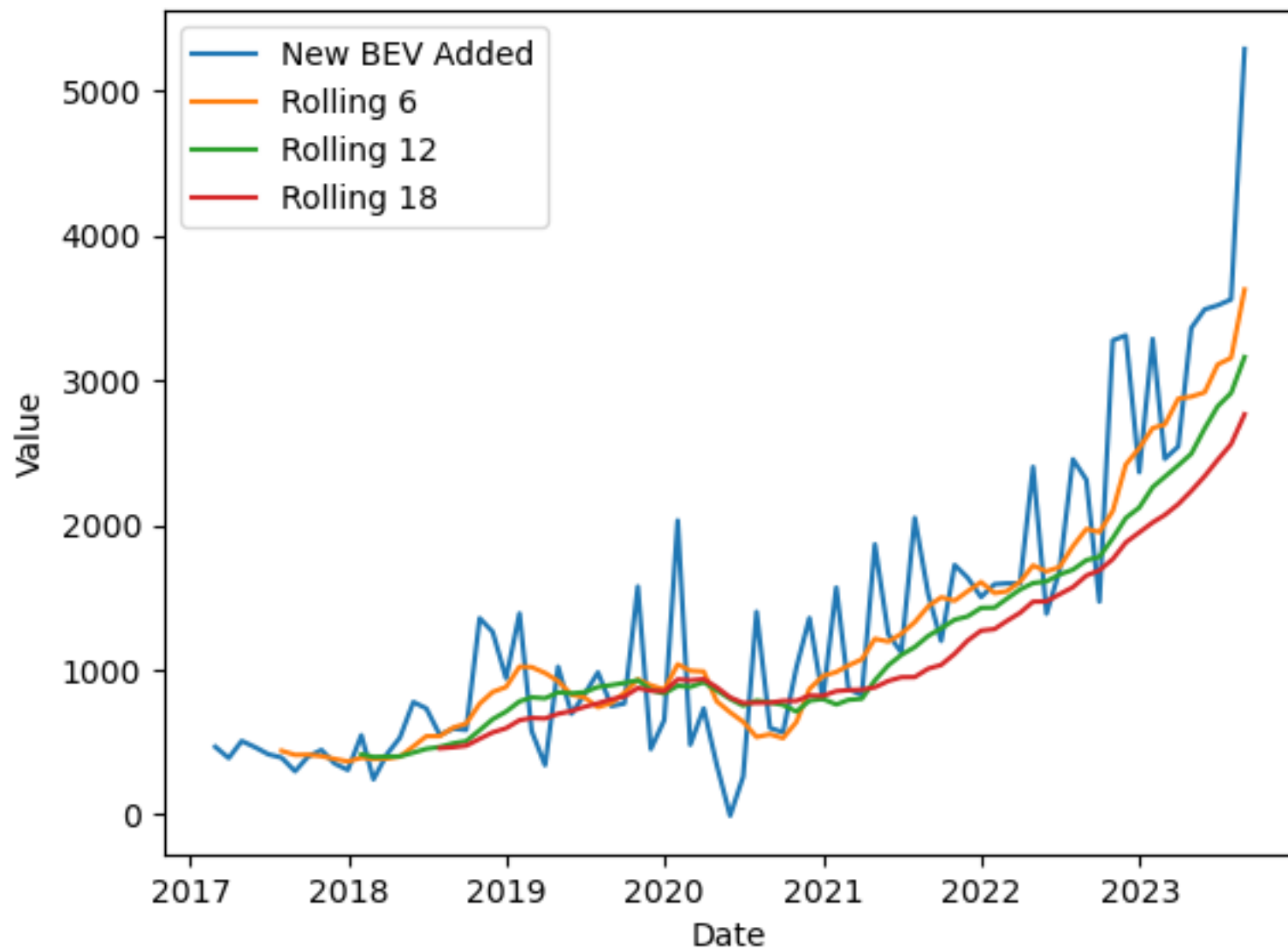




# Modelling

- Time Series Analysis
  - Univariate (ARIMA)
  - Multivariate (VAR)
- Variables
  - CPI (Consumer Price Index)
  - PPI (Producer Price Index)
  - CCI (Consumer Confidence Index)
  - 48 Month Loan Interest Rate
  - 60 Month Loan Interest Rate
  - S&P500
  - New BEVs Added

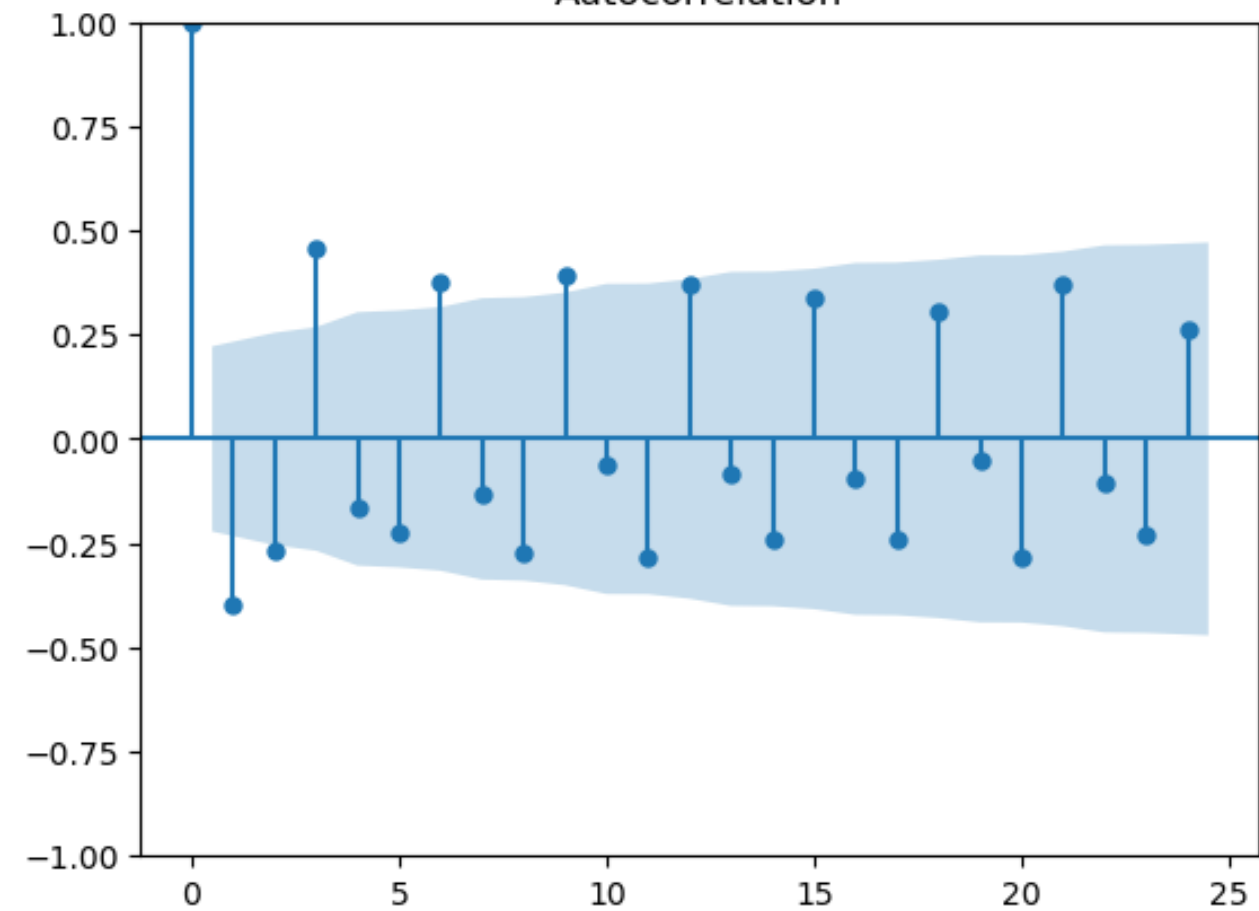
New BEVs Added w/Rolling Avgs



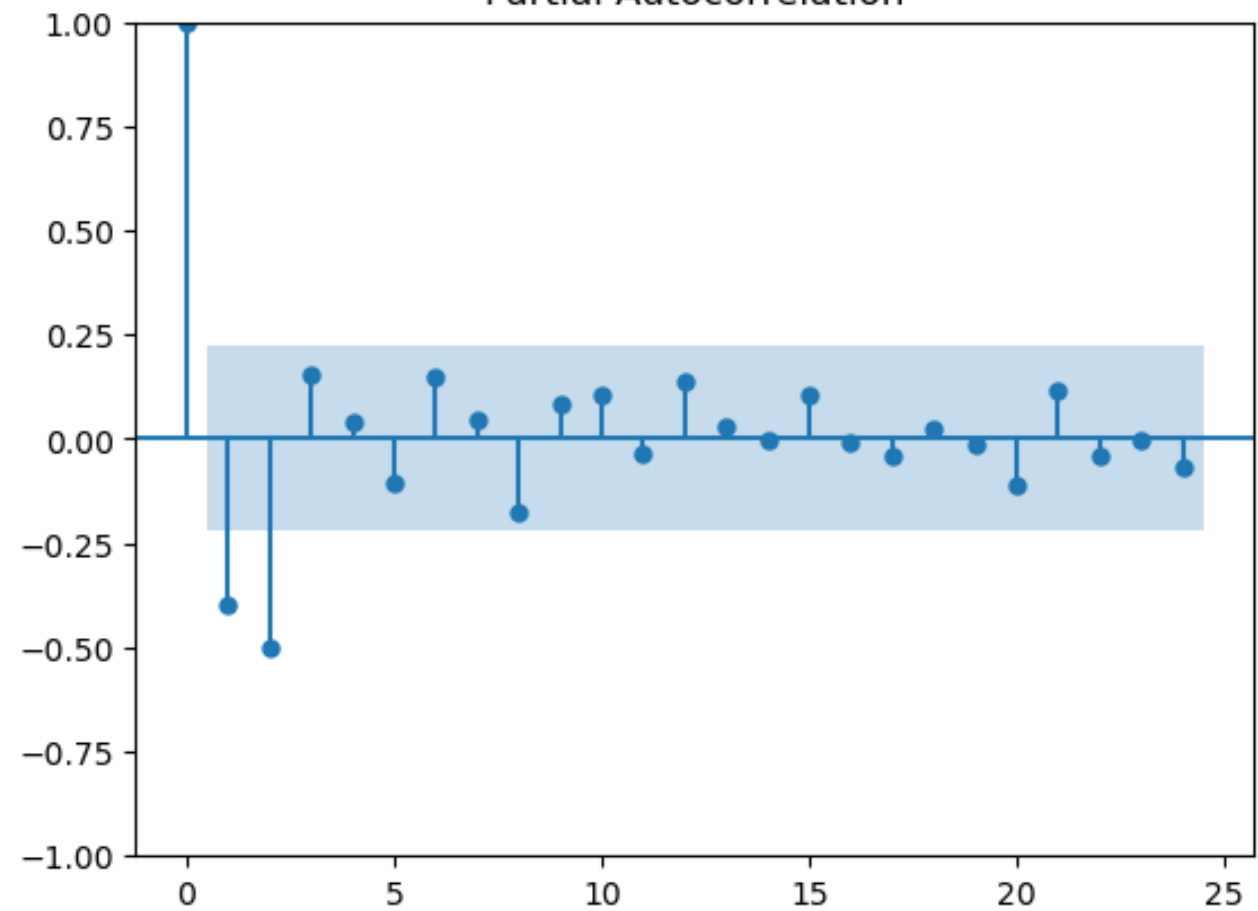
# Univariate Time Series Analysis & Forecasting w/ARIMA

Difference	ADF Test p value	KPSS Test p value	Stationarity
0	0.998739 (fail to reject null)	0.0100 (reject null)	Non-stationary
1	6.120288e-25 (reject null)	0.073043 (fail to reject null)	Stationary

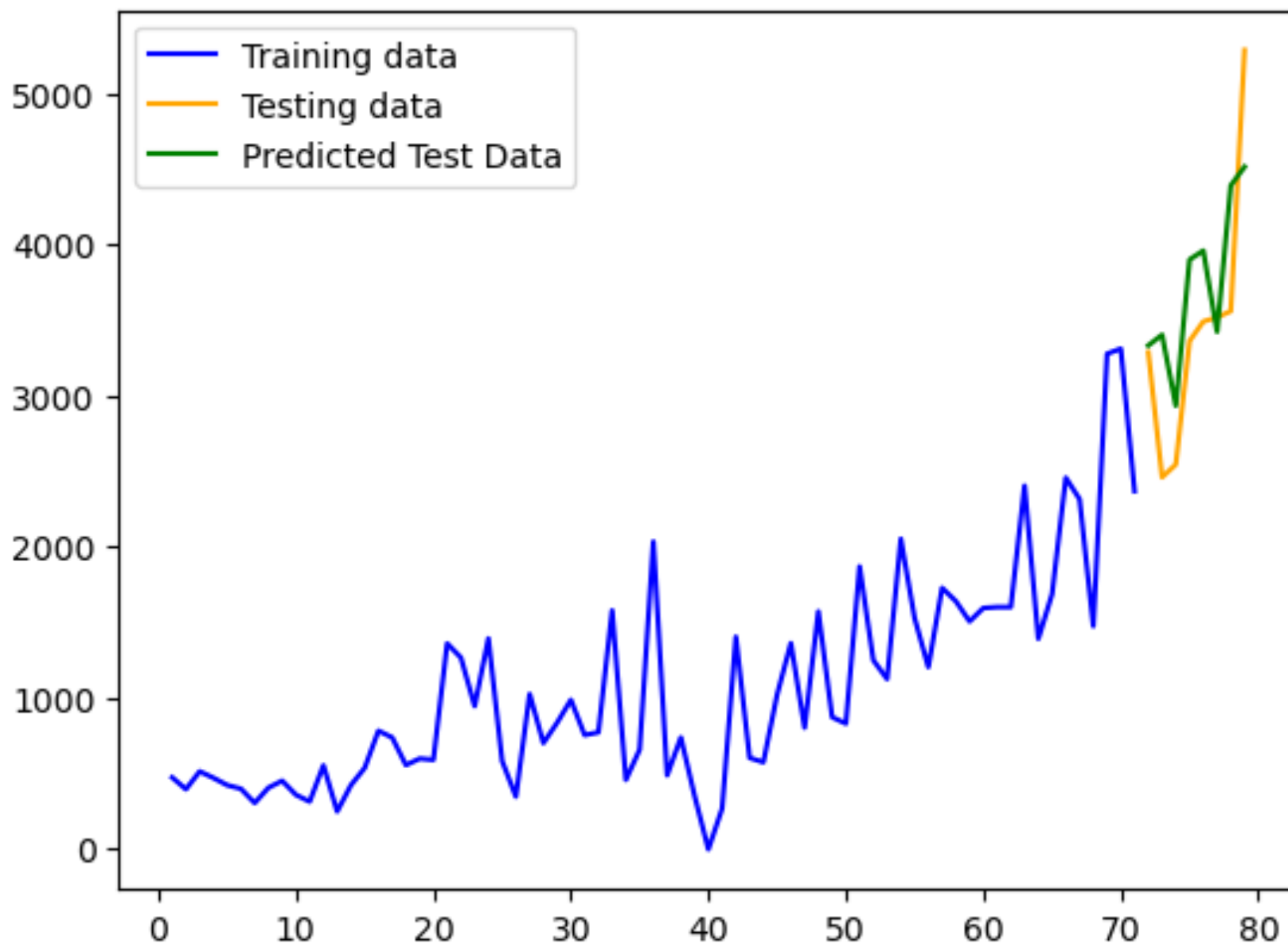
Autocorrelation



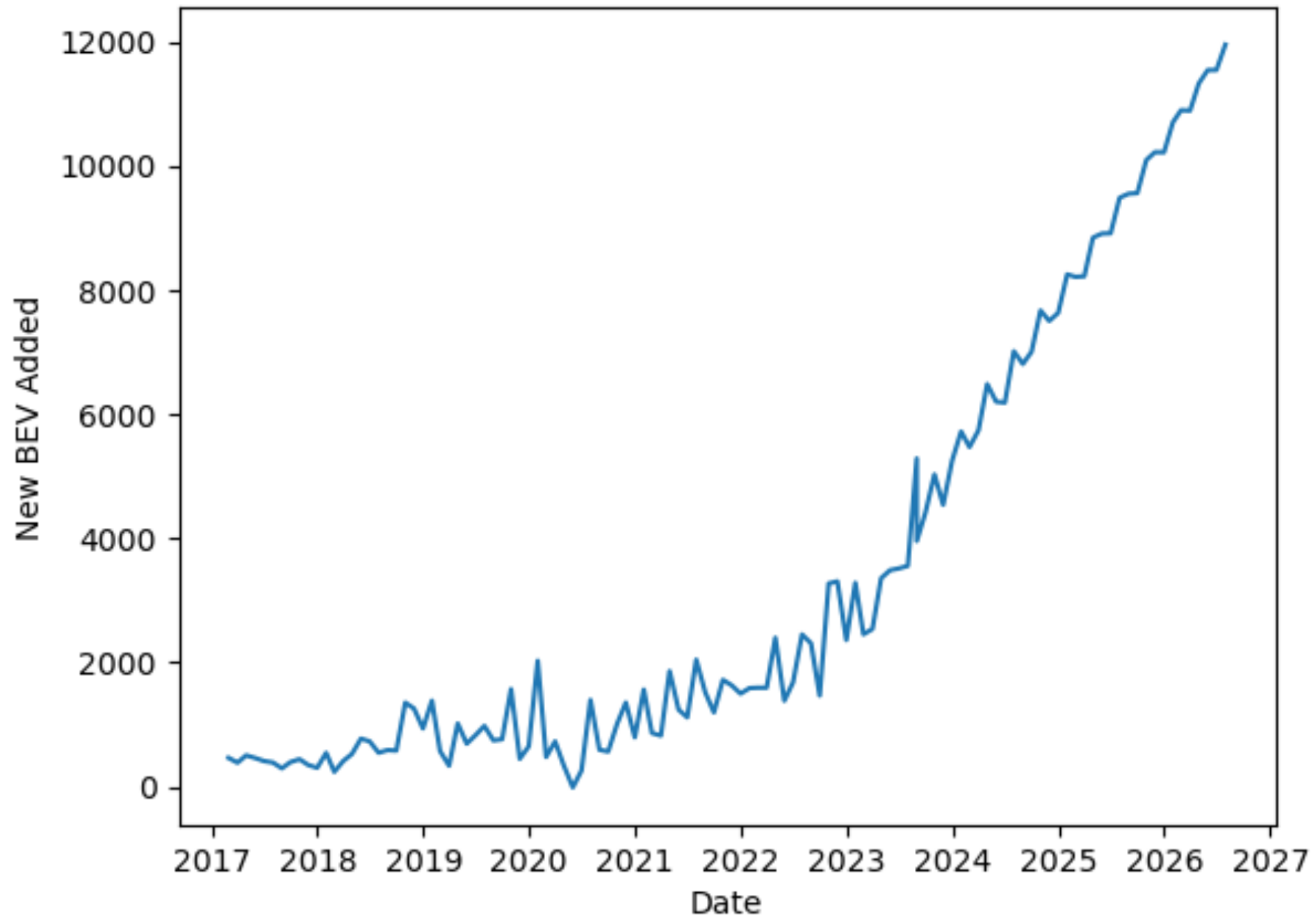
Partial Autocorrelation



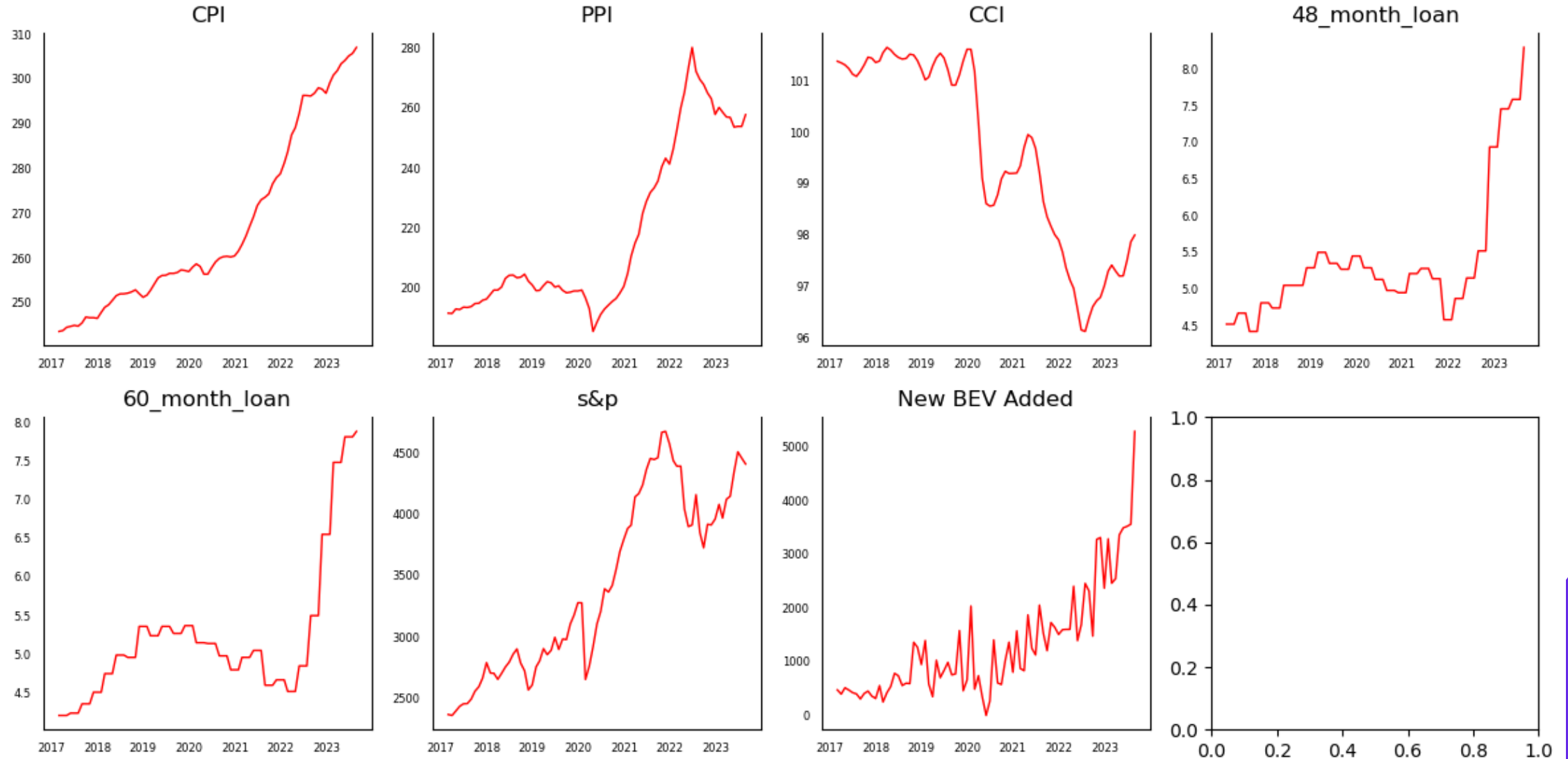
ARIMA(9, 2, 0)



New BEV Added Over Time (Actual and Predicted)



# Multivariate Time Series Analysis & Forecasting w/VAR



# ADF Test for Stationarity

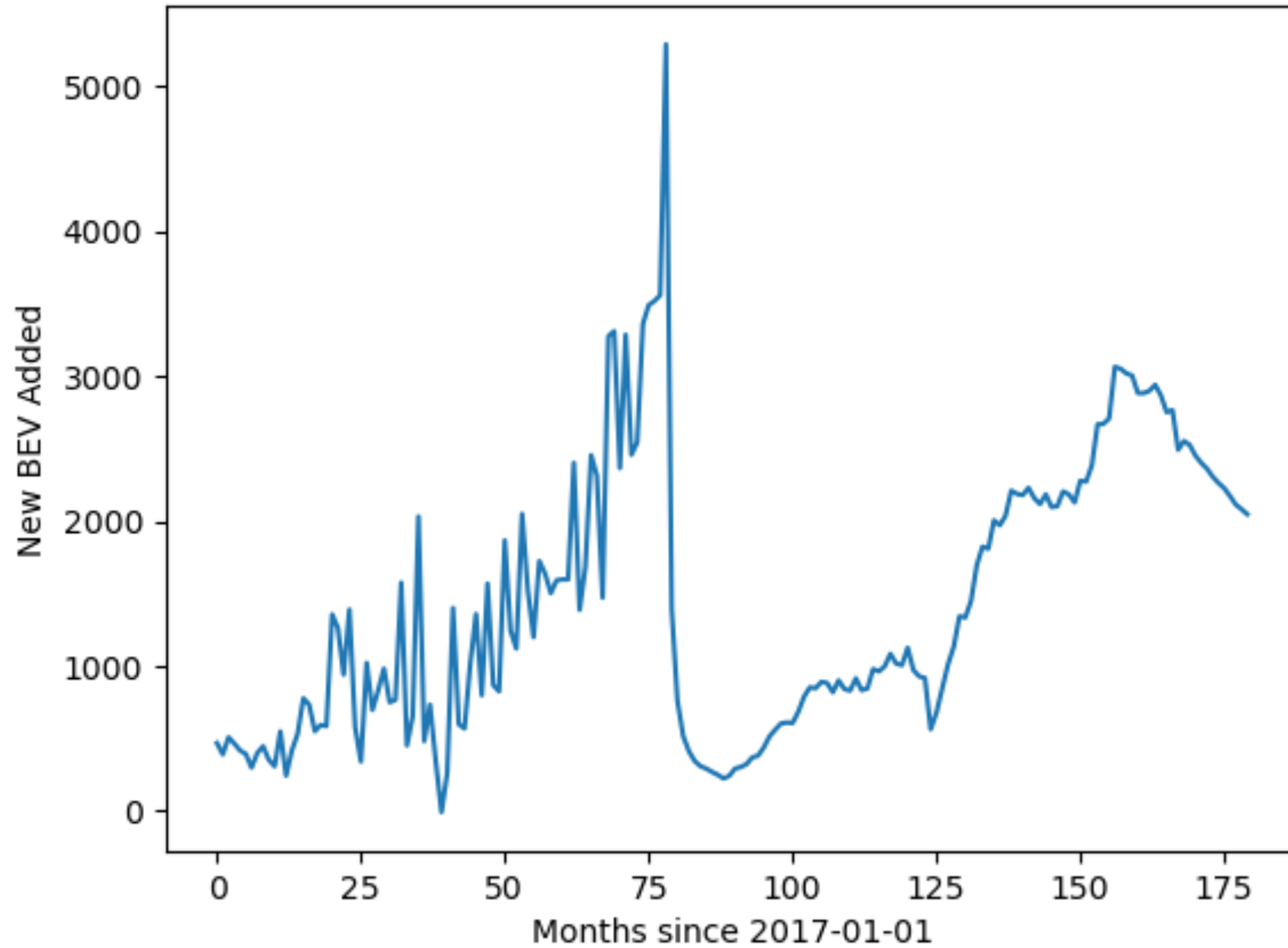
Variable	Differences until Stationary
CPI	2
PPI	1
CCI	1
48 Month Loan Interest Rate	1
60 Month Loan Interest Rate	2
S&P500	1
New BEV Added	1



# Granger Causality Test

Variable	Reject or Fail to Reject
CPI	Reject
PPI	Fail to Reject
CCI	Fail to Reject
48 Month Loan Interest Rate	Reject
60 Month Loan Interest Rate	Reject
S&P500	Reject

New BEV Added Over Time (Actual and Predicted)



# Streamlit



# Conclusion/Reflections

- Expect to see population of BEV's to continue to grow within the state & take market share from gas/diesel cars
- Further analysis into counties and car makes/models
- Further model tuning & model exploration (LSTM RNN for multivariate time series)
- Further exploration/research into the growth of Tesla

