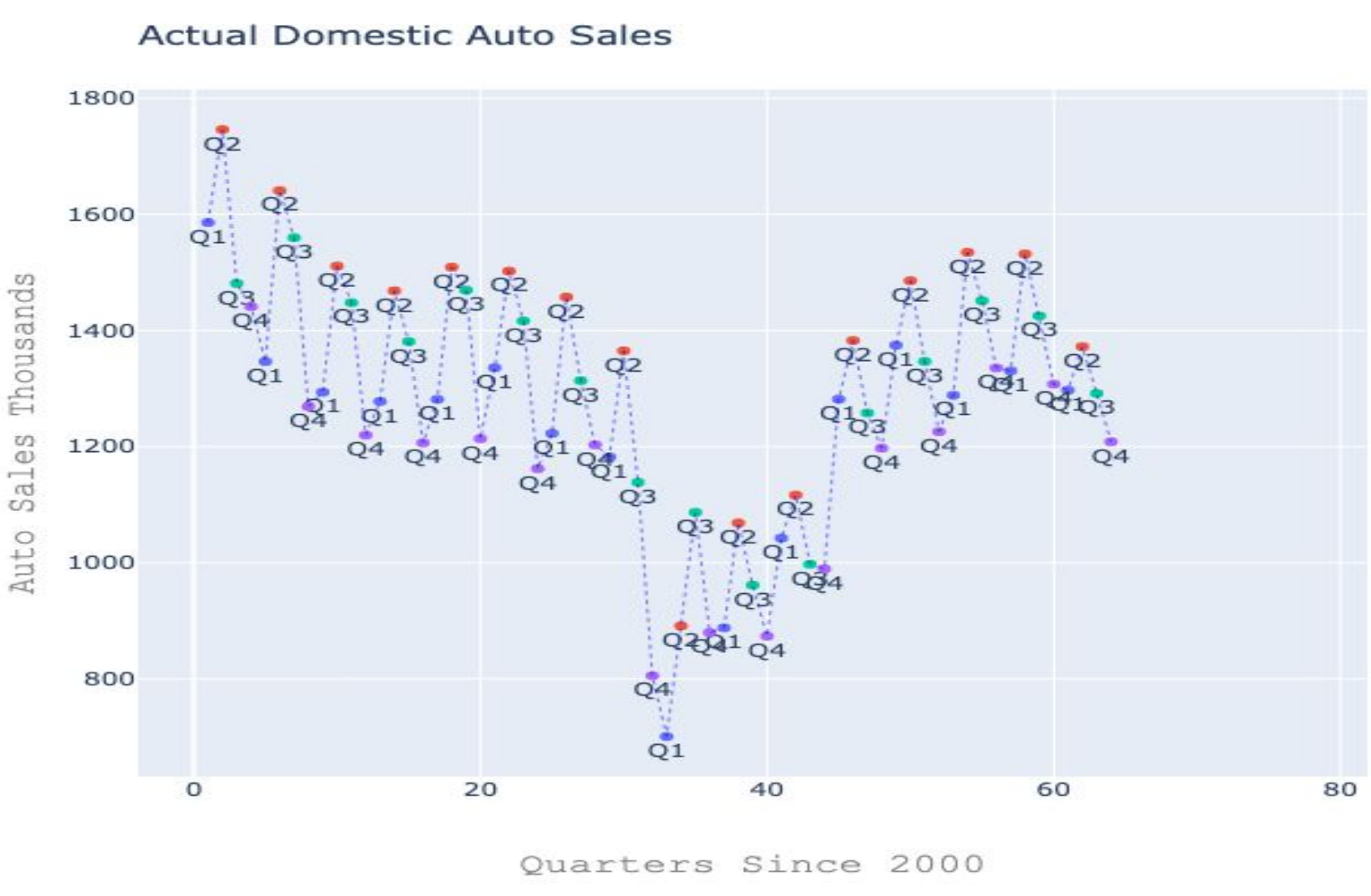
Domestic Auto Sales Forecast Q4 2016 to Q1 2020

Tim Mango


Actual Domestic Auto Sales
Auto Sales Thousands
1800
1600
1400
1200
1000
800
0
20
40
60
80
Quarters Since 2000

Forecasting Approach

Technical

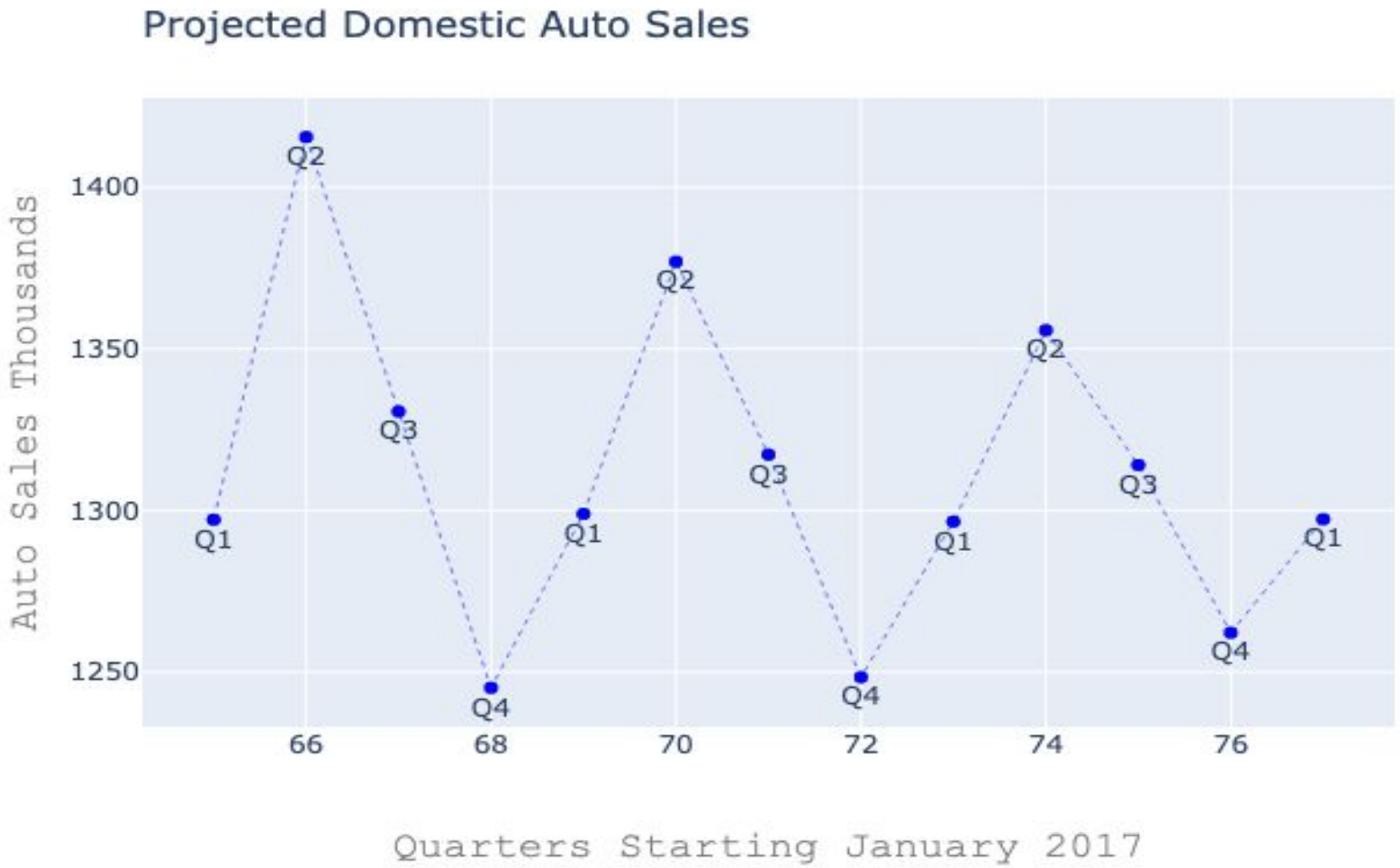
- Perform Johanson's Cointegration Test to determine variables that have relationship with auto sales over time.
- Drop variables with a negative cointegration test.
- Evaluate remaining variables for Correlation.
- Drop explanatory variables that are highly correlated.
- Use Augmented Dickey-Fuller (ADF) Test to test stationarity of remaining variables.
- Transform variables with a first difference to make them stationarity.
- Repeat ADF Test to confirm stationarity of variables.
- Check for optimal lag number for Vector Autoregression (VAR) model evaluated by AIC metric.
- Use VAR model with optimal lags (this model used 3).
- Obtain estimates from VAR model.
- Transform estimates to original units.
- Plot and report results.

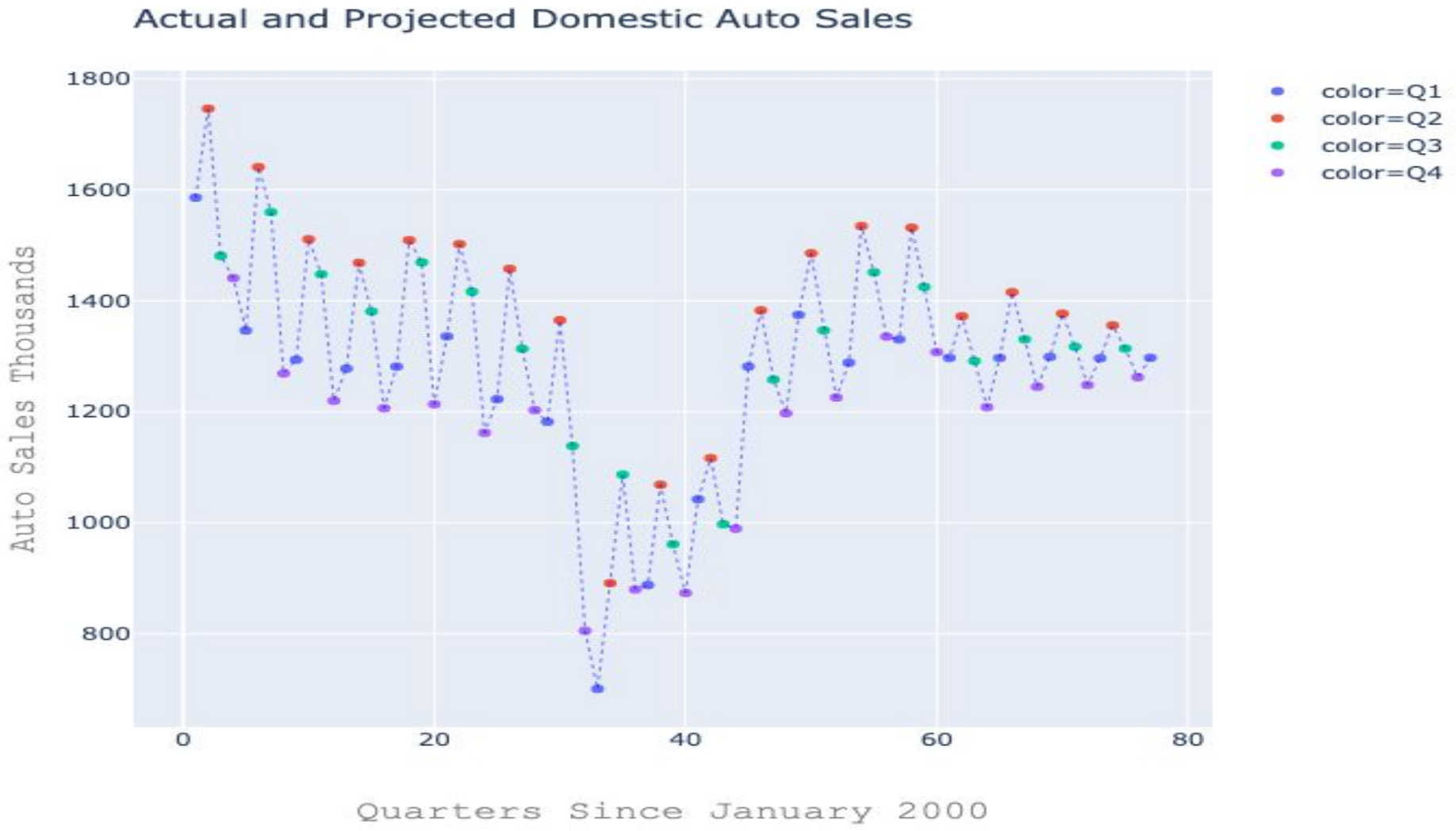
Non-Technical

There is a seasonal pattern in the data that needs to be removed before an optimal model can be applied.

Auto sales and relevant explanatory variables first go through a de-trending process.

A model is then fit to the data and results are reported in original units.


Projected Domestic Auto Sales
Auto Sales Thousands
1400
1350
1300
1250
Q2
Q3
Q4
Q1
Q2
Q3
Q4
Q1
Q2
Q3
Q4
Q1
66
68
70
72
74
76
Quarters Starting January 2017


Actual and Projected Domestic Auto Sales
Auto Sales Thousands
1800
1600
1400
1200
1000
800
0
20
40
60
80
Quarters Since January 2000
color=Q1
color=Q2
color=Q3
color=Q4

Appendix: Variables Used in Final Model

- Domestic Auto Sales (Autos)
- US Nominal GDP Growth (Var_02)
- US Nominal Disposable Income Growth (Var_04)
- US CPI Inflation Rate (Var_06)
- US 3-month Treasury Rate (Var_07)
- US Dow Jones Stock Market Index (Var_13)

*While these variables were chosen for the reported model, other variables may also affect auto sales.