**Research Project Information**

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MIS581: Capstone: Business Intelligence and Data Analytics

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# Research Project Information

The critical thinking assignment is to submit the programming code, data analysis outcomes screenshots, and a link to your Github account. The project is to be uploaded to Github (Colorado State University Global, 2023).

# Programming Code

SAS Studio routines were used for data file loading and analysis.

## File loading:

/\* Generated Code (IMPORT) \*/

/\* Source File: ProjectDatasetM.xlsx \*/

/\* Source Path: /home/u58757880/sasuser.v94 \*/

/\* Code generated on: 9/9/23, 7:24 PM \*/

%web\_drop\_table(WORK.IMPORT);

FILENAME REFFILE '/home/u58757880/sasuser.v94/ProjectDatasetM.xlsx';

PROC IMPORT DATAFILE=REFFILE

DBMS=XLSX

OUT=WORK.IMPORT;

GETNAMES=YES;

RUN;

PROC CONTENTS DATA=WORK.IMPORT; RUN;

%web\_open\_table(WORK.IMPORT);

## Descriptive Statistics:

/\*

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\* Task code generated by SAS Studio 3.8

\*

\* Generated on '9/9/23, 7:26 PM'

\* Generated by 'u58757880'

\* Generated on server 'ODAWS02-USW2-2.ODA.SAS.COM'

\* Generated on SAS platform 'Linux LIN X64 3.10.0-1062.12.1.el7.x86\_64'

\* Generated on SAS version '9.04.01M7P08062020'

\* Generated on browser 'Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_15\_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/116.0.0.0 Safari/537.36'

\* Generated on web client 'https://odamid-usw2-2.oda.sas.com/SASStudio/main?locale=en\_US&zone=GMT-06%253A00&ticket=ST-65986-tYiVHMhaq4PdEFBRHEbS-cas'

\*

\*/

ods noproctitle;

ods graphics / imagemap=on;

proc means data=WORK.IMPORT chartype mean std min max n vardef=df;

var 'Model Year'n 'Headline CPI'n 'Real-World MPG'n 'Real-World CO2 (g/mi)'n

Target 'CPI New Car'n 'New Car Cost'n 'Adjust for overall inflation'n

'CPI Gasoline'n 'Gasoline Price per Gallon'n

'Adjust for overall inflation\_1'n 'One Year of Gas'n 'Cost of Gas per Year'n

'Gas Cost Car Lifespan'n 'Total Cost of Car Ownership'n 'Annual TCO'n

'Average Household Income'n 'Percentage of car cost of annual'n consumption

production imports exports 'net imports'n 'Emissions WRI'n;

run;

proc univariate data=WORK.IMPORT vardef=df noprint;

var 'Model Year'n 'Headline CPI'n 'Real-World MPG'n 'Real-World CO2 (g/mi)'n

Target 'CPI New Car'n 'New Car Cost'n 'Adjust for overall inflation'n

'CPI Gasoline'n 'Gasoline Price per Gallon'n

'Adjust for overall inflation\_1'n 'One Year of Gas'n 'Cost of Gas per Year'n

'Gas Cost Car Lifespan'n 'Total Cost of Car Ownership'n 'Annual TCO'n

'Average Household Income'n 'Percentage of car cost of annual'n consumption

production imports exports 'net imports'n 'Emissions WRI'n;

histogram 'Model Year'n 'Headline CPI'n 'Real-World MPG'n

'Real-World CO2 (g/mi)'n Target 'CPI New Car'n 'New Car Cost'n

'Adjust for overall inflation'n 'CPI Gasoline'n 'Gasoline Price per Gallon'n

'Adjust for overall inflation\_1'n 'One Year of Gas'n 'Cost of Gas per Year'n

'Gas Cost Car Lifespan'n 'Total Cost of Car Ownership'n 'Annual TCO'n

'Average Household Income'n 'Percentage of car cost of annual'n consumption

production imports exports 'net imports'n 'Emissions WRI'n / normal(noprint);

inset mean std min max n / position=nw;

run;

## Box Cox and Linear Regressions:

### TCO:

proc transreg data=WORK.IMPORT ss2 details

plots=(transformation(dependent) scatter

observedbypredicted);

model BoxCox('Annual TCO'n / lambda=-2 -1 -0.5 to 0.5 by 0.05 1 2

convenient parameter=2 alpha=0.00001) =

identity('Model Year'n);

run;

data work.transform;

set WORK.IMPORT;

'tr1\_Annual TCO'n='Annual TCO'n-1;

run;

ods noproctitle;

ods graphics / imagemap=on;

proc glmselect data=work.transform outdesign(addinputvars)=Work.reg\_design

plots=(criterionpanel);

model 'tr1\_Annual TCO'n='Real-World MPG'n / showpvalues selection=stepwise

(select=sbc);

run;

proc reg data=Work.reg\_design alpha=0.05 plots(only)=(diagnostics residuals

fitplot observedbypredicted);

ods select DiagnosticsPanel ResidualPlot FitPlot ObservedByPredicted;

model 'tr1\_Annual TCO'n=&\_GLSMOD /;

run;

quit;

proc delete data=Work.reg\_design;

run;

### CO2:

proc transreg data=WORK.IMPORT ss2 details

plots=(transformation(dependent) scatter

observedbypredicted);

model BoxCox('Real-World CO2 (g/mi)'n / lambda=-2 -1 -0.5 to 0.5 by 0.05 1 2

convenient parameter=2 alpha=0.00001) =

identity('Real-World MPG'n);

run;

data work.transform;

set WORK.IMPORT;

'tr1\_Real-World CO2'n=('Real-World CO2 (g/mi)'n\*exp(-1));

run;

ods noproctitle;

ods graphics / imagemap=on;

proc glmselect data=work.transform outdesign(addinputvars)=Work.reg\_design

plots=(criterionpanel);

model 'tr1\_Real-World CO2'n='Real-World MPG'n / showpvalues selection=stepwise

(select=sbc);

run;

proc reg data=Work.reg\_design alpha=0.05 plots(only)=(diagnostics residuals

fitplot observedbypredicted);

ods select DiagnosticsPanel ResidualPlot FitPlot ObservedByPredicted;

model 'tr1\_Real-World CO2'n=&\_GLSMOD /;

run;

quit;

proc delete data=Work.reg\_design;

run;

### Net Imports:

proc transreg data=WORK.IMPORT ss2 details

plots=(transformation(dependent) scatter

observedbypredicted);

model BoxCox('net imports'n / lambda=-2 -1 -0.5 to 0.5 by 0.05 1 2

convenient parameter=2 alpha=0.00001) =

identity('Real-World MPG'n);

run;

data work.transform;

set WORK.IMPORT;

'tr1\_net imports'n='net imports'n-1;

run;

ods noproctitle;

ods graphics / imagemap=on;

proc glmselect data=work.transform outdesign(addinputvars)=Work.reg\_design

plots=(criterionpanel);

model 'tr1\_net imports'n='Real-World MPG'n / showpvalues selection=stepwise

(select=sbc);

run;

proc reg data=Work.reg\_design alpha=0.05 plots(only)=(diagnostics residuals

fitplot observedbypredicted);

ods select DiagnosticsPanel ResidualPlot FitPlot ObservedByPredicted;

model 'tr1\_net imports'n=&\_GLSMOD /;

run;

quit;

proc delete data=Work.reg\_design;

run;

# Results:

The results are significantly large file sizes and not easily stored in MS Word. The screenshots and output PDFs are on GitHub at the following locations:

Summary Statistics: <https://github.com/theoriginalkitti/MIS581_Project/blob/main/Results_%20Summary%20Statistics.pdf>

TCO: <https://github.com/theoriginalkitti/MIS581_Project/blob/main/Results_%20Program%20BoxCox%20TCO.sas.pdf>

CO2: <https://github.com/theoriginalkitti/MIS581_Project/blob/main/Results_%20Program%20BoxCox%20NetImports.sas.pdf>

### Net Imports:

<https://github.com/theoriginalkitti/MIS581_Project/blob/main/Results_%20Program%20BoxCox%20CO2%20MOD.sas.pdf>