Lab 4 Assignment

Pstat W 174/274

1. Reading the Data

We introduce the Time Series Data Library (TSDL) created by Professor Rob Hyndman.(https://rdrr.io/github/FinYang/tsdl/f/vignettes/tsdl.Rmd)

Run the following code to import quarterly Iowa nonfarm income in R:

```
#uncomment the next three lines when you first install tsdl library
#install.packages("devtools")
#install.packages("forecast")
#devtools::install_github("FinYang/tsdl")
library(tsdl)
library(forecast)
meta_tsdl$description[[1]]
iowa.ts <- tsdl[[1]]
```

2. Data Analysis

a. Plot the time series. What do you notice? Does the variance change over time? Is their a trend and/or seasonal components?

b. Apply a Box-Cox transformation to the time series, find the optimal λ, transform the data, and re-plot the transformed time series vs. original time series.

c. Calculate the sample variance and examine the sample ACF of the transformed data (set max.lag = 48 or 60). What do you notice? Access if there is trend in the data. If yes, remove trend components by using the diff() at lag=1. Plot the differenced time series. Does it look stationary? Re-calculate the sample variance.

d. If there is seasonality, determine the seasonal period and remove seasonal components by differencing the time series data from (c) using the diff() function. Re-calculate the sample variance.

e. For the stationary data you get, examine the sample ACF and sample PACF and pick significant lags for sample ACF and sample PACF.