

DSO 529 Homework 2

Due by 2pm on Tuesday, April 11th on Blackboard

1. (Dataset: *Climate.xlsx*) There has been a lot of press recently about *climate change* and CO₂ emissions¹. The data series for this problem contains data on *Global CO₂ Equivalent Emissions* (Giga-tons of CO₂ per year) from 1900 – 2016. The 2015 Paris Agreement pledge was to lower emissions by at least 26 percent below 2005 levels by 2025.
 - a. Create a solid time series model for this data and include your final output here. Briefly list the steps you took to come to this model.
 - b. Calculate a prediction for 2025 if the emissions trend continues the same way.
 - c. What is a 95% interval for your above prediction? Do you think there is a chance to meet the Paris Agreement pledge if steps aren't taken?

2. (Dataset: *Unemployment.xlsx*) The following variables represent the Help Wanted Index and Unemployment Rate in the USA from the years 1969 through 2000.

HWI: National help wanted index
 UNRATE: Unemployment rate %

 - a. Based on *just* the top Time Series plot in JMP, do either of these series look stationary?
 - b. Use our standard statistical procedures to determine if the *HWI* variable is stationary.
 - i. Include here your basic output results (no graphs are necessary here) and your decision.
 - ii. If your series is NOT stationary, what do you need to do to fix it? Prove that your modification creates stationarity.
 - c. Use our standard statistical procedures to determine if the *UNRATE* variable is stationary.
 - i. Include here your basic output results (no graphs are necessary here) and your decision.
 - ii. If your series is NOT stationary, what do you need to do to fix it? Prove that your modification creates stationarity.
 - d. Now create a simple regression model using *UNRATE* to predict *HWI* without any modifications, but be sure to include a constant.
 - i. What is your regression equation?
 - ii. Test this model for the possibility of *cointegration* and report your statistical results. What do you determine?

3. (Dataset: *PlantExpenditures.xlsx*) The goal of this question is to use a *distributed lag*, or *dynamic regression* model to determine the parameters of the long and short-run impact of manufacturing sales (*Sales*, in billions of seasonally adjusted dollars) on the investment in equipment (*Expend*, also in billions of seasonally adjusted dollars).
 - a. Use the *Koyck Approach* to estimate the parameters you need. What is your output for this model?
 - b. What is the short-run impact of a one-unit (one billion dollar) increase in *Sales*?
 - c. What is your long-run demand function for expenditures?
 - d. How many lags of *Sales* would you suggest including? (Explain why)

¹ See https://www.nytimes.com/interactive/2017/03/28/climate/trumps-executive-order-pushes-the-us-climate-pledge-further-out-of-reach.html?_r=0 for the article that led me to this question, if you want!