AGEC622 - Agribusiness Analysis and Forecasting
05_Exercises

- Complete the exercises in the provided notebook "05_exercises.xlsx".

- If there is more than one question, note that each will have its own tab in the workbook.

- Work vertically down the sheet within your notebook. Separate the individual parts of the question(s) (a, b, c, ...) using dividing rows like the blue example dividers in the file.

- Submit your completed .xlsx file via Canvas.

Question 1. The overall objective of this question is to use an AR model to characterize the probability of corn price falling below or above per bushel at various times following the last available historical observation.

a) **Determine differences**. Use the DF test to determine a number of differences that will render the data stationary.

b) **Generate Dickey-Fuller t-statistics manually.** Run the OLS equation that was estimated to calculate the DF test statistic in part a) and show that the values of t-statistics of these two approaches are the same.

c) **Determine the optimal number of lags**. Use SAC approach to determine the optimal number of lags.

d) **Estimate the AR model**. Use Simetar's "Time Series" wizard. Use the appropriate values from the previous step to specify the model. Ask Simetar for three "forecast periods".

e) **Simulate the price**. Use the AR model, including a stochastic error/innovation term (use NORM() for this, with mean of zero and using the standard deviation of the residuals from the AR model), to simulate the price for three periods ahead. Check that the mean stochastic values for each period are close to the deterministic forecasts that Simetar generated.

f) **Answer the main questions**:

  - What is the probability that price in April will be less than $7.5 per bushel?

- What is the probability that price in May will be more than $8 per bushel?

- What is the probability that price in June will be between $7.5 and $8.5 per bushel?

- Create a "Fan Graph" for the three simulated series. Format the vertical axis with the minimum value of 6 and the maximum of 9.

- Create a PDF of the 3 simulated series (all in one graph). Format the horizontal axis by giving the minimum value of 6 and the maximum of 10.5.

  By looking at both graphs, is this what you expected? Explain.