

# AGEC622 - Agribusiness Analysis and Forecasting

## 09\_Exercises

- Complete the exercises in the provided notebook “09\_exercises.xlsx”. a
- 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 repeat the analysis from the 07 and 08 exercises, but using the multivariate normal joint probability distribution for simulating the four underlying stochastic variables.

- a) **Build a model for the crop price.** Repeat step a) from the 07\_exercises, but do not yet generate the stochastic differences or the forecasts.
- b) **Build a model for the crop yield.** Repeat step b) from the 07\_exercises, but do not yet generate the stochastic residuals/errors/innovations or the forecasts.
- c) **Set up stochastic simulation for the gasoline price.** Repeat step c) from the 07\_exercises, but do not yet generate the stochastic log differences or the forecasts.
- d) **Build a model for variable cost ( $VC$ ).** Repeat step d) from the 07\_exercises, but do not yet generate the stochastic residuals/errors/innovations or the forecasts.
- e) **Jointly generate all stochastic variables.**
  - Collect all of the recovered historical differences/residuals/errors/innovations from parts a) through d) (all of the things we have been directly stochastically drawing) together in four columns. **Be sure to correctly align the observations** (for example, all of the observations for 2005 should be in the same row for all four variables). Calculate a vector of means for the four series. Calculate the sample covariance matrix for the range of dates where there are observations for all four series.

- Simulate these four series for 2022 through 2026 using the multivariate normal distribution.
  - Use the simulated differences/residuals/errors/innovations to calculate stochastic values for the crop price, crop yield, gasoline price, and variable costs for 2022 through 2026.
- f) **Simulate wheat price and yield for year 2022.** Simulate the two stochastic variables and run the correlation matrix from “Correlation Matrix” wizard. Interpret the result. Is this what you expected?
- g) **Calculate financial variables for the enterprise.** Calculate  $NR$  and ending cash (beginning cash +  $NR$ ) for each year for 2022 through 2026, following the approach and parameters for this purpose from the 07\_exercises.
- h) **Simulate 2026 ending cash.** Determine the following values:
- Expected ending (2026) cash
  - The probability ending (2026) cash is less than \$0
  - The probability ending (2026) cash is less than \$100,000
- i) **Interpret.**
- What differences in the results do you find?
  - Do you have more confidence in these results or those from the 07 and 08 exercises?
  - What problems, if any, do see with the revised model/analysis?