AGEC 643
Fall 2010
Homework 4
Due December 2, 2010 in Class

1. Use the whole farm simulation model developed for Homework 2 Problem 2 to do a risk ranking for the scenarios simulated. You do not have to print the model. If your's is wrong use mine that O posted on the website. Use the following risk ranking methods to rank the risky scenarios.

    a. FSD
    b. SSD
    c. SDRF
    d. SERF (Neg Expo and Power utility functions)
    e. StopLight (explain the cut off values selected)
    f. CE
    g. You must calculate and justify the RAC's used for the relevant ranking tools.
    h. Explain the rankings across all tools.

2. Given the data in HWK4-2.XLSX answer this question. Simulate X assuming it is distributed Normal and empirical for years 11-15. This means you will have to forecast the deterministic component of X. You figure out the best model to forecast X.

    a. Explain why you picked the model you selected to forecast X and to whiten the data.
    b. Simulate X without correction for constant coefficient of variation (CV) stationarity.
    c. Simulate X corrected to be CV constant.
    d. Simulate X with a 25% increase in the CV each year.

    e. Print the forecast model, the X-hats, the models you developed to simulate parts b, c, and d. Explain how each model worked to achieve its objective for the CV.
    f. Explain your answers using one Table of the summary statistics for the probabilistic forecasts in b, c, and d.

3. Build a simulation model to estimate "best" number of acres to contract energy cane feedstock for a cellulosic ethanol plant which is owned by a risk adverse decision maker. (Note we will ignore collection and transportation costs to assemble the feedstock at the plant.) The historical yields per acre for farmers in the study area are provided in HWK4-3.XLSX. The information for the cellulosic firm is:

    - annual fixed cost is $2 million
    - variable production cost per gallon is $1.50
    - gallons of ethanol per ton of feedstock is GRKS at: 180, 200, 225
    - plant size of is 25 million gallons per year. This is the maximum ethanol that can be produced per year
    - the plant contracts for feedstock at $75/ton for all production on the contracted acres

For this problem the "best" number of acres to contract for is the acreage level that gives the greatest expected utility (CE) for decision makers with risk aversion levels between neutral and extremely risk averse.

Hint: I used the scenario function and SERF.

Print the model, all calculations for simulating random variables and the summary statistics for net returns over the scenarios analyzed as well as the SERF rankings. Explain your model and the results, and justify your RAC's. Be sure Excel is in Expected value mode when you print the model.

4. Use the stochastic ethanol model in problem 3 and set it up as an optimal control problem. Maximize profits by changing acres using the stochastic optimal control feature in Simetar. Once you find the optimal acres, simulate the model with fixed acres and report pdf and cdf of profits and summary statistics.

   Print your model for this problem and summary statistics for both simulation runs. Be sure Excel is in Expected value mode when you print the model.

   Hint for the O.T.C. simulation you need to constrain the control variable to be positive and less than 12,000. Next you will need to delete the rows in SimData where the simulator gave you 0 or 12,000 for acres.

5. Use the historical yield data in problem 3 to calculate the fair premiums for yield insurance premiums on energy cane yield. Assume the price farmers would receive is a fixed contract price of $75/ton. The yield coverage levels are 50%, 60%, 70%, 80% and 85% of the historical average yield.

   Print your model in expected value mode) and a summary table of the statistics of the insurance simulations. Explain your results.