Agribusiness Analysis and Forecasting
Parameter Estimation and Validation

Henry Bryant
Texas A&M University
Overview

- Parametric distributions have fixed functional forms.
- Estimate their parameters with Simetar’s Theta icon.
- Simulate candidate distributions and pick the distribution that, in some sense, most closely reflects the historical observations.
- Perform simulation analysis using the chosen distribution.
Parameter Estimation with Theta

Select MLE and "Stochastic Variables" options
Comparing distributions

- CDFDEV is a Simetar function to compare the CDFs of two data samples.
- CDFDEV calculates the integral between two distributions with a penalty for the two distributions being different.

\[
\int_{-\infty}^{\infty} (F_1(x) - F_2(x))^2 + w(x) \, dx
\]
Comparing distributions
Calculating CDFDEV

- Create simulated samples from candidate distributions
- Use CDFDEV to compare those simulated samples to the historical data
  sample: =CDFDEV(sample_1, sample_2)
- Select the distribution that has the lowest CDFDEV value.
Comparing distributions

Another tool: visually compare empirical CDFs
What is the Next Step?

- After choosing a parametric distribution...
- It’s a good idea to validate that the characteristics of the simulated data match those of the original historical data.
- Use statistical tests to check that the means variances are not significantly different from one another.
- Check if the minimum and maximum values are realistic.
- Can also visually check the shape of the CDF and PDF.
Statistical Tests for Validation

**Student \( t \) test**
- \( H_o \): Historical Mean = Simulated Mean.
- \( H_a \): Historical Mean \( \neq \) Simulated Mean.

**\( F \) test**
- \( H_o \): Historical Variance = Simulated Variance
- \( H_a \): Historical Variance \( \neq \) Simulated Variance.
Validation Tests in Simetar

- Compare Two Series: Historical Data vs. Simulated Values
  - 1st Data Series is history
  - 2nd Data Series is simulated
- Simetar Icon is

\[ H_0: \mu = \]  
\[ H_1: \mu \neq \]  

Hypothesis Tests

<table>
<thead>
<tr>
<th>Distribution Comparison of Normal Corn price &amp; Corn price</th>
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<tbody>
<tr>
<td>Confidence Level</td>
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<tr>
<td>Test Value</td>
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<tr>
<td>2 Sample t Test</td>
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<tr>
<td>F Test</td>
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