Introduction to Price Forecasting

Reasons Why?

• Better understand the patterns of prices over the previous time periods
• Use economic intuition to aid in model development
• Help us Hedge (Speculate) more successfully
What to Use for Forecasting

- Economic (Supply/Demand) Models
- Time Series Models
Regression

- Assumptions
  - $e \sim N(0, \sigma^2)$
- Strong correlation between X’s and Y
- Y is the variable you want to forecast
- X’s are what you use to explain Y
- Developed around concepts of linear relationships, but can be modified
Estimation of Demand Curves

• Specification of model or demand relationship is vital to accuracy of model.
  – Use economic intuition to select variables that will determine the quantity demanded.
    • Beef example: use price of pork, chicken, etc… But wouldn’t use amount of electricity consumed by Non-Utility Generators (GM car plant).

• Regression (Least Squares) Analysis
  – Easily computed by “any” computerized software and many calculators.
What Kind of Demand Curve?

- Linear Curve - easy to estimate, but what do the results really tell us about the true demand function?
- Non-Linear Curve - ability to capture more complex relationships that we may not be able to model with linearity
  - Use Math Tricks to simplify estimation!!!
Linear Demand Curves

\[ Q_D^B = \beta_0 + \beta_1 P_{Beef} + \beta_2 P_{Chicken} + \beta_3 P_{Pork} + \beta_4 P_{Veg} + \]
\[ \beta_5 P_{O.A.G.} + \beta_6 P_{NFG} + \beta_7 Inc + \beta_8 Yr \]
Quadratic (Non-Linear) Demand Curves

\[ Q_D^B = \beta_0 P_{Beef}^{\beta_1} P_{Chicken}^{\beta_2} P_{Pork}^{\beta_3} P_{Veg}^{\beta_4} P_{OAG}^{\beta_5} P_{NFG}^{\beta_6} Inc^{\beta_7} Yr^{\beta_8} \]
Non-Linear to Linear Trick of the Trade….

\[ Q_D^B = \beta_0 P_{Beef}^{\beta_1} P_{Chicken}^{\beta_2} P_{Pork}^{\beta_3} P_{Veg}^{\beta_4} P_{OAG}^{\beta_5} P_{NFG}^{\beta_6} Inc^{\beta_7} Yr^{\beta_8} \]

Take Natural Logs of both sides of the equation.

\[ \ln Q_D^B = \ln \beta_0 + \beta_1 \ln P_{Beef} + \beta_2 \ln P_{Chicken} + \beta_3 \ln P_{Pork} + \beta_4 \ln P_{Veg} + \beta_5 \ln P_{O.A.G.} + \beta_6 \ln P_{NFG} + \beta_7 \ln Inc + \beta_8 \ln Yr \]

Let \( \ln \beta_0 = \alpha_0 \)

\[ \ln Q_D^B = \alpha_0 + \beta_1 \ln P_{Beef} + \beta_2 \ln P_{Chicken} + \beta_3 \ln P_{Pork} + \beta_4 \ln P_{Veg} + \beta_5 \ln P_{O.A.G.} + \beta_6 \ln P_{NFG} + \beta_7 \ln Inc + \beta_8 \ln Yr \]

This equation is now in a easy multiple regression form.
Coefficients will give us the Elasticity at the means for each variable.
Now Let EXCEL do the Work

Run Regression:

a. Tools
b. Data Analysis (if not there -- Add Ins)
c. Regression
Now Let EXCEL do the Work

2. Run Regression (cont):
   d. Input Y range = ln Quantity Beef Demanded
   e. Input X range = All other variables
   f. Labels, use them -- they help you remember what is what.
   g. Output range: Always SAFE to select New Worksheet Ply.
   h. Click OK.
Output - What to Look at?

- $R^2$ - how good is the model you selected, maximum is 1.00, good models are about 0.80 and larger.
- Significance of F - F statistic also tells you how good your model fits the data you gave it to analyze. Can use tables but the smaller the Signif. of F, the better fit you have.
- t stats for coefficients - greater than 2 or smaller than -2 is great. Tells you that the coefficient is important in the model you selected.
- Estimation is not exact, are the results backed by theory? Elasticities, Homogeniety Condition, …
Homework

• Regress your commodity price series on:
  – previous year’s supply
  – 2 farm related products
  – CPI
  – DUE 3/5/98

• Price 4 options with R.O.O.P - DUE 2/26/98
Homework (cont.)

• Assignment Due Thursday April 3.
• Only hand in a “Report Style” document, just printouts are not acceptable.
• Estimating Demand functions is not a perfect science, give an economic interpretation of your results.