Quantitative Method

Assignment 9

Due January 3, 2006

Data on the weekly sales of a major brand of canned tuna by a supermarket chain in a large Midwestern U.S. city during a recent calendar year are contained in the file *tuna.xls*. The variables are

 *SAL*1: Unit sales of brand no. 1 canned tuna.

 *PR*1: Price per can of brand no. 1 canned tuna.

 *PR*2: Price per can of brand no. 2 canned tuna.

 *PR*3: Price per can of brand no. 3 canned tuna.

 Disp: A dummy variable that takes the value 1 if there is a store display for brand no. 1 during the week but no newspaper ad; 0 otherwise.

 DispAd: A dummy variable that takes the value 1 if there is a store display and a newspaper ad for brand no. 1 during the week; 0 otherwise.

(1) Estimate, by least squares, the log-linear model

$$ln(\textbf{\textit{SAL}}1) = \beta_1 + \beta_2 \textbf{\textit{PR}}1 + \beta_3 \textbf{\textit{PR}}2 + \beta_4 \textbf{\textit{PR}}3 + \beta_5 \textbf{\textit{Disp}} + \beta_6 \textbf{\textit{DispAd}} + \varepsilon$$

(2) *Discuss* and *interpret* the estimates of β_2, β_3, and β_4.

(3) Use the variance inflation factor (VIF) to examine the presence of multicollinearity.

(4) Are the **signs** and **relative** magnitudes of the estimates of β_5 and β_6 consistent with economic logic?

(5) Test, at the $\alpha = 0.05$ level of significance, each of the following hypotheses:

  (a) $\textbf{\textit{H}}_0 : \beta_5 = 0$

  (b) $\textbf{\textit{H}}_0 : \beta_5 = \beta_6 = 0$

  (c) $H_0 : \beta_2 = \beta_5 = \beta_6 = 0$

  (d) $\textbf{\textit{H}}_0 : \beta_6 \leq \beta_5$

  (e) $H_0 : \beta_5 \leq 2$

  Discuss the relevance of these hypothesis tests for the supermarket chain's executives.