DEMAND ESTIMATION AND FORECASTING

Soft Drink Demand Estimation

1. The linear demand estimation is as follows:

QD= 514.2 + 2.93 TEMP + 1.22 INCOME – 242.9 PRICE R2 = 0.70

(4.12) (0.80) (–5.58) SSE = 38.26

and for the log-linear model,

log QD= 2.42 + 1.12 log TEMP + 0.22 log INCOME – 3.12 log PRICE R2 = 0.67

(1.72) (4.23) (1.19) (– 4.92) SSE = 0.11

where the numbers in parentheses are t-statistics.

2. Both temperature and price are statistically significant with expected signs while income is insignificant in its effect on soft drink demand. For the linear model, the price elasticity of demand is $(\partial Q/\partial P) \times$ (Mean P/Mean Q)

–242.97 x ($2.2025/158.2083) = – 3.38

and for the log-linear model –3.12.

This point elasticity at the mean price and quantity across the states is in the elastic range, as expected. Note, however, that these are market-level price elasticities, so no firm behavior is directly implied by this estimate. Nevertheless, an elastic demand at the market level does imply elastic firm-level demand at comparable prices, comparable price sensitivity, and the smaller quantities facing each firm.

3. Omitting price from the regression, one obtains for the log-linear model

log QD= – 0.16 + 1.72 log TEMP – 0.152 log INCOME R2 = 0.49

(5.96) (– 0.73) SSE = 0.137

4. Omitting both price and temperature yields a linear model as follows:

QD = 254.6 – 5.37 INCOME R2 = 0.11

(– 2.11) SSE = 64.2

For the log-linear model, one obtains

QD = 4.47 – 0.552 INCOME R2 = 0.09

(– 2.13) SSE = 0.18

No, a marketing plan should not be designed specifically to introduce canned soft drink machines into low-income neighborhoods. And students should not offer the negative and significant income parameter estimate above as their reason. The above regression does NOT call for relocating canned soft drink machines away from low-income neighborhoods. The regression coefficient on income has been biased downward by the omission of price and temperature enough to make an insignificant factor appear negative and significant in its effect on demand. This illustrates the critical importance of using analytical reasoning and demand theory to correctly specify a regression model.