ECO 610-401 Problem Set #2 KEY
FALL 2002

1. 6. a. Yes, the equation makes economic sense. Growth in tire sales are fueled by growth in miles driven and growth in new car sales.

b. The equation performs well in explaining the past data ($R^2 = .83$). The coefficients of the two explanatory variables are highly significant, and the Durbin-Watson statistic indicates no serial correlation.

c. The t-statistics for the respective coefficients are: $(1.41 - 1)/.19 = 2.15$ and $(1.12 - 1)/.41 = .29$. The first coefficient is significantly different than one; the second is not. If the second coefficient is taken to be one, this means that tire sales are proportional to new auto sales.

d. The forecast is: $.45 + (1.41)(-2) + (1.12)(-13) = -16.93$. An actual drop of 18% would not be surprising; it's well within the margin of forecast error.

2. S3. a. The estimated OLS equation is: $Q = 332.5 - 506.6P$. The equation is statistically significant ($R^2 = .941$). If price is cut by \$.10, quantity increases by 50.66 units.

b. A careful plot of the points shows a slight degree of curvature.

c. The Log-Log equation is:

$$\text{Log}(Q) = 2.975 - 2.02\text{Log}(P).$$

This provides a better fit of the data ($R^2 = .992$) than the linear equation. The Log-Log equation implies the demand equation:

$$Q = 19.6P^{-2.02}.$$

(The antilog of 2.975 is 19.6.) The price elasticity of demand is –2.02.

3. (a) The regression equation is: Cans = 3055 – 120.5 OwnPrice + 16.3 OtherPrice + 74.8 Temperature. OwnPrice and Temperature have t-statistics well above 2 in absolute value, and hence are statistically significant at the 95% level. OtherPrice has a t-statistic less than 1, and hence is not statistically significant at the 95% level. A 1 cent increase in the price of soft drinks will lead to a decline in sales of 120.5 cans. A 1 cent increase in the price of candy bars will lead to 16.3 additional cans of soft drinks being sold. A 1 degree increase in the temperature of classrooms on campus will generate 74.8 additional cans of soft drinks being sold.

(b) R^2=.55 means that 55% of the variation in the dependent variable, Cans, is explained by the independent variables in the regression equation above.

(c) Cans sold yesterday = 3055 – 120.5(50) + 16.3(60) + 74.8(72) = 3393.6 = 3394 cans.

(d) η= -[dQ/dP][P/Q] = -[-120.5][50/4000] = 1.5

(e) Profit-maximizing price: P = MC[1/(1-1/η) = 20[1/(1 – 2/3) = 20[3] = 60 cents, not 50 cents.