Introduction to Econometrics (4th Edition)

by

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Solutions to Odd-Numbered End-of-Chapter Exercises: Chapter 7

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7.1

(1) $t = 10.47/0.29 = 36.1$; p-value $= 2\Phi(-36.1) \approx 0$

(2) $t = 10.44/0.29 = 36.0$; p-value $= 2\Phi(-36.0) \approx 0$

(3) $t = 10.42/0.29 = 35.9$; p-value $= 2\Phi(-35.9) \approx 0$

7.3.

(a) Yes, age is an important determinant of earnings. The t-statistic is 0.61/0.04 = 15.3, with a p-value less than .01; this implies that the coefficient on age is statistically significant at the 1% level. The 95% confidence interval is $0.61 \pm (1.96 \times 0.04) = [0.53, 0.69]$.

(b) $\Delta Age \times$ [\$0.53, \$0.69] = 5× [\$0.53, \$0.69] = [\$2.65, \$3.45].

7.5. The *t*-statistic for the difference in the college coefficients is
$t = (\hat{\beta}_{college,2015} - \hat{\beta}_{college,1992})/SE(\hat{\beta}_{college,2015} - \hat{\beta}_{college,1992}).$

Because $\hat{\beta}_{college,2015}$ and $\hat{\beta}_{college,1992}$ are computed from independent samples, they are independent, which means that $\text{cov}(\hat{\beta}_{college,2015}, \hat{\beta}_{college,1992}) = 0$.

Thus, $\text{var}(\hat{\beta}_{college,2015} - \hat{\beta}_{college,1992}) = \text{var}(\hat{\beta}_{college,2015}) + \text{var}(\hat{\beta}_{college,1998}).$

This implies that $SE(\hat{\beta}_{college,2014} - \hat{\beta}_{college,1992}) = (0.29^2 + 0.34^2)^{\frac{1}{2}} = 0.45.$

Thus, the *t*-statistic is (10.44 − 8.94)/0.40 = 3.33. The estimated change is statistically significant at the 5% significance level (3.33 >1.96).

7.7. (a) The *t*-statistic is $\frac{0.485}{2.61} = 0.186 < 1.96$. Therefore, the coefficient on BDR is not statistically significantly different from zero.

(b) The coefficient on *BDR* measures the *partial effect* of the number of bedrooms holding house size (*Hsize*) constant. Yet, the typical 5-bedroom house is much larger than the typical 2-bedroom house. Thus, the results in (a) says little about the conventional wisdom.

(c) The 99% confidence interval for effect of lot size on price is 2000 × [.002 □ 2.58 × .00048] or 1.52 to 6.48 (in thousands of dollars).

(d) Choosing the scale of the variables should be done to make the regression results easy to read and to interpret. If the lot size were measured in thousands of square feet, the estimate coefficient would be 2 instead of 0.002.
This would make the results easier to read an interpret: on average, a one thousand increase in lot size is associated with a two thousand dollar increase in the price of a house.

(e) The 10% critical value from the $F_{2,\infty}$ distribution is 2.30. Because 0.08 < 2.30, the coefficients are not jointly significant at the 10% level.

7.9. (a) Estimate

$$Y_i = \beta_0 + \gamma X_{1i} + \beta_2(X_{1i} + X_{2i}) + u_i$$

and test whether $\gamma = 0$.

(b) Estimate

$$Y_i = \beta_0 + \gamma X_{1i} + \beta_2(X_{2i} - 2X_{1i}) + u_i$$

and test whether $\gamma = 0$.

(c) Estimate

$$Y_i - X_{1i} = \beta_0 + \gamma X_{1i} + \beta_2(X_{2i} - X_{1i}) + u_i$$

and test whether $\gamma = 0$.