Introduction to Econometrics (Econ 107)
Drake University, Fall 2007
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MIDTERM EXAMINATION #2 ANSWER KEY
"Two Variable Regression"
October 9, 2007

VERSION A

I. MULTIPLE CHOICE
(1)e. (2)c. (3)b. (4)a. (5)a. (6)e. (7)c. (8)e. (9)d.

II. MULTIPLE ANSWER
(1) a. yes b. no c. no d. no e. yes.
(2) a. yes b. no c. no d. no e. no.
(3) a. yes b. no c. no d. no e. no.
(4) a. yes b. yes c. yes d. yes e. no.
(5) a. yes b. yes c. no d. no.

III. PROBLEMS
(1) a. \$935.
b. \$330.
c. elasticity at sample means = 1.95.
d. 95% confidence interval = -1045 ± 1.96(45) = -1045 ± 88.2 = (-1133.2, -956.8).
e. value of test statistic = 2.75, critical points = ± 1.96, reject null hypothesis.

(2) a. \$5500.
b. DOF = 15 – 2 = 13.
c. 95% confidence interval = 55 ± 2.160(25) = 55 ± 54 = (1, 109).
d. predicted cost = \$58,600.
e. standard error of prediction error = $\sqrt{\hat{\sigma}^2 + SE\left(\tilde{\beta}_1\right)^2} = \sqrt{900 + 40^2} = 50$.
f. prediction interval = 58,600 ± 2.160(5) = 58,600 ± 108 = (\$58,492, \$58,708).

IV. CRITICAL THINKING
a. One should suspect that the first assumption (that the conditional mean of the error term is zero: $E(\varepsilon_i|x_i) = 0$) is violated. The error term includes unobserved factors such as the frequency of storms in the county. But in counties where storms are more frequent, local authorities are more likely to adopt strict building codes. So ε_I and x_i are likely to be correlated. The other assumptions may be violated, too, but they would not cause the apparent bias in the estimates.
b. The least-squares estimator of β_2 is likely biased up. The least-squares estimator is capturing not only the *ceteris paribus* effect of building codes—which tend to decrease storm damage—but also the effect of more frequent storms—which tend to increase storm damage. Graph should show downward-sloping true population regression line and upward-sloping pattern of observations.

c. The researcher should find a way to control for the effects of more frequent storms. One way to do this would be to change the sample. Instead of a random sample of counties across the U.S., the researcher should collect a sample of counties with similar storm frequency (but different building codes). For example, include of including counties from both the Gulf Coast (where hurricanes occur frequently) and the Midwest (where hurricanes never occur), the researcher could include only counties from the Gulf Coast.

VERSION B

I. MULTIPLE CHOICE
(1)d. (2)d. (3)c. (4)b. (5)b. (6)c. (7)a. (8)d. (9)e.

II. MULTIPLE ANSWER
(1) a. no b. yes c. yes d. yes e. no.
(2) a. yes b. no c. no d. no e. no.
(3) a. yes b. yes c. yes d. yes e. no.
(4) a. yes b. yes c. yes d. yes e. no.
(5) a. no b. yes c. no d. no.

III. PROBLEMS
(1) a. \$960.
b. \$480.
c. elasticity at sample means = 2.6.
d. 95% confidence interval = -1920 ± 1.96(55) = -1920 ± 107.8 = (-2027.8, -1812.2).
e. value of test statistic = 4.0, critical points = ± 1.96, reject null hypothesis.
(2) a. \$2750.
b. DOF = 18 – 2 = 16.
c. 95% confidence interval = 55 ± 2.120(15) = 55 ± 31.8 = (23.2, 86.8).
d. predicted cost = \$58,500.
e. standard error of prediction error = $\sqrt{\hat{\sigma}^2 + SE\left(\tilde{\beta}_1\right)^2} = \sqrt{14400 + 50^2} = 130$.
f. prediction interval = 58,500 ± 2.120(130) = 58,500 ± 275.6
= (\$58,224.4, \$58,775.6).

IV. CRITICAL THINKING (same as Version A)

[end of answer key]