

MIDTERM EXAMINATION #2 ANSWER KEY
“Two-Variable Regression”
February 23, 2006

VERSION A

I. MULTIPLE CHOICE: [3 pts each—48 pts total]

(1)c. (2)e. (3)e. (4)a. (5)d. (6)d. (7)a. (8)c. (9)c. (10)c. (11)b. (12)c. (13)b. (14)e. (15)d. (16)e.

II. PROBLEMS

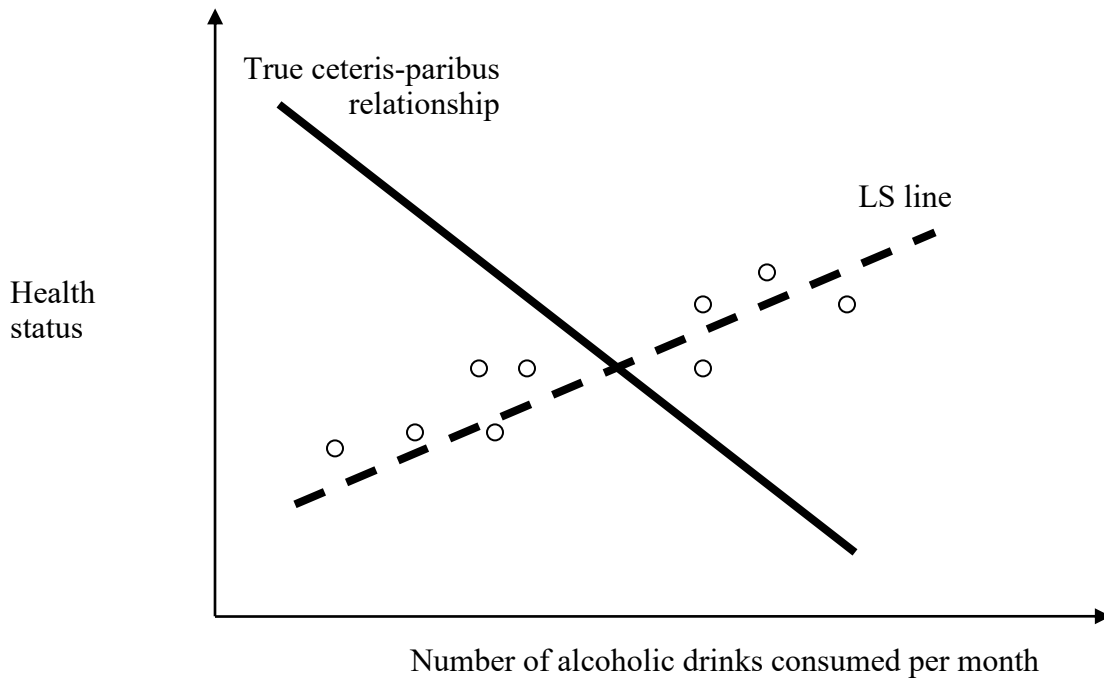
(1) [LS confidence intervals, tests, prediction: 24 pts] a. 0.072. b. 3.026. c. 18.
d. $3.05 \pm 0.12606 = (2.92394, 3.17606)$.
e. value of test statistic=-3.0, critical point = -1.734, reject null hypothesis=YES.

(2) [LS confidence intervals, tests, elasticity: 24 pts] a. 2880 kilowatt-hours,
b. 432 kilowatt-hours, c. elasticity=-0.6, d. $2880 \pm 911.4 = (1968.6, 3791.4)$,
e. value of test statistic =-3.2, critical point=-1.645, reject null hypothesis=YES.

III. CRITICAL THINKING [4 pts]

Least-squares gives the "wrong" answer in this case because other factors beside the number of the number of alcoholic drinks consumed per month (x) affect health status (y), and these other factors (ε) are correlated with the number of alcoholic drinks (x). The correlation arises here because persons with serious medical conditions such as diabetes, cirrhosis, etc. have been forbidden to drink by their doctors. Thus we should suspect that the assumption $(\varepsilon_i|x_i) = 0$ is violated. In fact, $\text{Cov}(\varepsilon_i|x_i)$ is likely positive, so the LS estimator of the slope is biased upward.

The problem can be depicted graphically as follows.



VERSION B

I. MULTIPLE CHOICE: [3 pts each—48 pts total]

(1)e. (2)d. (3)a. (4)e. (5)b. (6)a. (7)d. (8)b. (9)c. (10)c. (11)a. (12)a. (13)c. (14)c. (15)b. (16)b.

II. PROBLEMS

(1) [LS confidence intervals, tests, prediction: 24 pts] a. 0.075. b. 3.225. c. 13.
d. $3.25 \pm 0.1728 = (3.0772, 3.4228)$.
e. value of test statistic=-25, critical point = -1.771, reject null hypothesis=YES.

(2) [LS confidence intervals, tests, elasticity: 24 pts] a. 3400 kilowatt-hours,
b. 700 kilowatt-hours, c. elasticity=-0.7, d. $3400 \pm 1146.6 = (2253.4, 4546.6)$,
e. value of test statistic =-2.8, critical point=-1.645, reject null hypothesis=YES.

III. CRITICAL THINKING [4 pts]

Same as Version A.

[end of answer key]