Introduction to Econometrics (Econ 107)
Drake University, Spring 2008
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Signature: _____

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MIDTERM EXAMINATION #3 ANSWER KEY
"Multiple Regression With Cross-Section Data"
April 3, 2008

VERSION A

I. MULTIPLE CHOICE: [2 pts each—18 pts total]
(1)b. (2)d. (3)b. (4)c. (5)b. (6)b. (7)d. (8)b. (9)c.

II. MULTIPLE ANSWER:

(1)	a. Yes.	b. Yes.	c. Yes.	d. No.	e. No.	f. No.
(2)	a. Yes.	b. No.	c. No.	d. Yes.		
(3)	a. Yes.	b. No.	c. No.	d. Yes.		

III. PROBLEMS:

(1) [Adding regressors: 5 pts]
a. Estimated coefficients can either increase or decrease.
b. Standard errors can either increase or decrease.
c. Sum of squared residuals must decrease.
d. R^2 value must increase.
e. Theil's adjusted R^2 value can either increase or decrease.

(2) [Analysis of variance table, R^2, F-test: 20 pts]
a. 23. b. 3. c. 13. d. 0.0409. e. 0.350.
f. DOF in numerator = 2, DOF in denominator = 20, value of F-statistic = 6.923, critical point = 3.49, easily reject null hypothesis.

(3) [Dummy variables and structural change: 20 pts]
a. 2.7. b. 3.1. c. -0.15. d. [1]. e. [2].
f. DOF in numerator = 1, DOF in denominator = 90, value of F-statistic = 7.5, critical point = 3.95, easily reject null hypothesis.

(4) [Heteroskedasticity: 12 pts]
a. Yes. b. No. c. Positively. d. 3.1. e. 3.84.
f. Cannot reject null hypothesis.

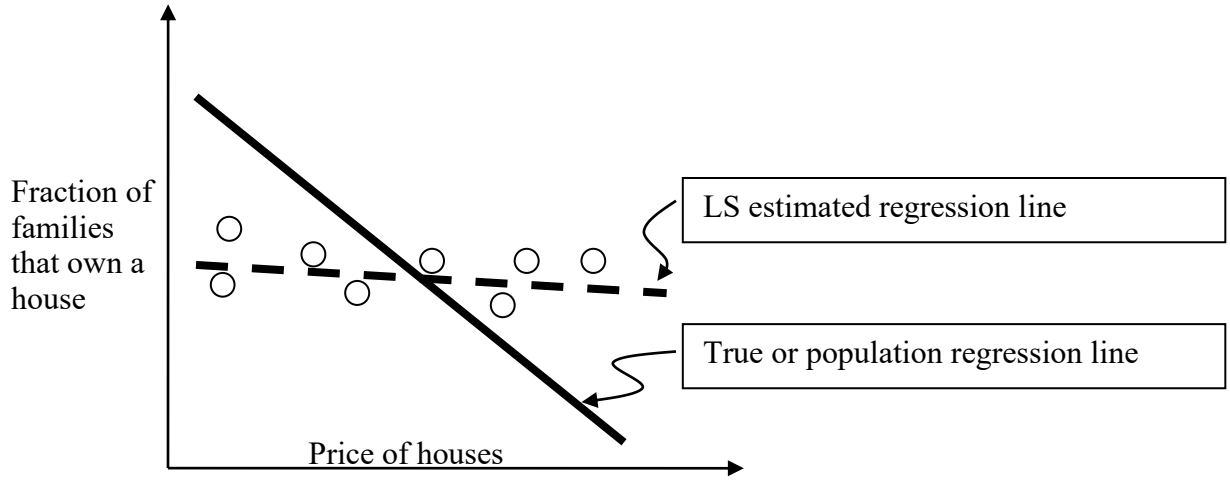
(5) [Weighted least squares: 6 pts]

	Transformed data		
i	y_i	Intercept	x_i
1	38	0.1	16.5
2	15	0.125	11

IV. CRITICAL THINKING:

The least-squares estimate of β_2 will be *biased up (toward zero).* For high values of *house price*, income will be above average, so the error term will tend to be positive. For low values of *house price*, income will tend to be below average, so the error term will tend to be negative. Hence the data will tend to be below the true regression line for low values of *house price* and above the true regression line for high values of *house price*. So least squares will tend to estimate a demand curve that is insufficiently steep, with slope biased up (toward zero).

Full credit requires a graph like the following.



VERSION B

I. MULTIPLE CHOICE: [2 pts each—18 pts total]
(1)b. (2)b. (3)d. (4)a. (5)f. (6)e. (7)e. (8)e. (9)b.

II. MULTIPLE ANSWER:

(1)	a. No.	b. Yes.	c. Yes.	d. Yes.	e. No.	f. No.
(2)	a. No.	b. No.	c. Yes.	d. Yes.		
(3)	a. Yes.	b. Yes.	c. No.	d. No.		

III. PROBLEMS:

(1) [Adding regressors: 5 pts]
a. R^2 value must increase.
b. Theil's adjusted R^2 value can either increase or decrease.
c. Estimated coefficients can either increase or decrease.
d. Standard errors can either increase or decrease.
e. Sum of squared residuals must decrease.

(2) [Analysis of variance table, R^2, F-test: 20 pts]
a. 28. b. 4. c. 2. d. 0.556. e. 0.5.
f. DOF in numerator = 3, DOF in denominator = 24, value of F-statistic = 10, critical point = 3.01, easily reject null hypothesis.

(3) [Dummy variables and structural change: 20 pts]
a. 0.1. b. 2.7. c. 3.1. d. [2]. e. [4].
f. DOF in numerator = 1, DOF in denominator = 60, value of F-statistic = 30.0, critical point = 4.0, easily reject null hypothesis.

(4) [Heteroskedasticity: 12 pts]
a. No. b. Yes. c. Negatively. d. 4.3. e. 3.84.
f. Yes, reject null hypothesis.

(5) [Weighted least squares: 6 pts]

	Transformed data		
i	y_i	Intercept	x_i
1	47	0.125	20
2	17	0.143	13

IV. CRITICAL THINKING: (Same as Version A)

VERSION C

I. MULTIPLE CHOICE: [2 pts each—18 pts total]
(1)a. (2)e. (3)e. (4)e. (5)c. (6)d. (7)e. (8)a. (9)a.

II. MULTIPLE ANSWER:
(1) a. No. b. No. c. Yes. d. Yes. e. Yes. f. No.
(2) a. Yes. b. Yes. c. No. d. No.
(3) a. No. b. Yes. c. Yes. d. No.

III. PROBLEMS:

(1) [Adding regressors: 5 pts]
a. Sum of squared residuals must decrease.
b. R^2 value must increase.
c. Theil's adjusted R^2 value can either increase or decrease.
d. Estimated coefficients can either increase or decrease.
e. Standard errors can either increase or decrease.

(2) [Analysis of variance table, R^2, F-test: 20 pts]
a. 33. b. 5. c. 4. d. 0.3. e. 0.2.
f. DOF in numerator = 4, DOF in denominator = 28, value of F-statistic = 3.0, critical point = 2.71, reject null hypothesis.

(3) [Dummy variables and structural change: 20 pts]
a. -0.15. b. -0.1. c. 2.7. d. [1]. e. [4].
f. DOF in numerator = 2, DOF in denominator = 40, value of F-statistic = 12.5, critical point = 3.23, easily reject null hypothesis.

(4) [Heteroskedasticity: 12 pts]

a. No. b. Yes. c. Negatively. d. 4.6. e. 3.84.
f. Yes, reject null hypothesis.

(5) [Weighted least squares: 6 pts]

	Transformed data		
i	y_i	Intercept	x_i
1	25	0.111	14
2	16	0.143	14

IV. CRITICAL THINKING: (Same as Version A)

[end of answer key]