

MIDTERM EXAMINATION #4 ANSWER KEY
“Multiple Regression With Time-Series Data”
December 4, 2007

VERSION A

I. MULTIPLE CHOICE

- (1)b. (2)e. (3)b. (4)b. (5)e. (6)d. (7)c. (8)e. (9)b. (10)c.
 (11)d. (12)b.

II. MULTIPLE ANSWER

- (1) a. yes b. no c. no d. yes.
 (2) a. yes b. yes c. no d. yes e. no.
 (3) a. yes b. no c. yes d. yes e. no.

III. PROBLEMS

- (1) a. dynamic. b. 1.6. c. 3.6.
 (2) Degrees of freedom = 4. Value of test statistic = 9.6.
 Critical point = 9.49. Reject null hypothesis (just barely).
 (3) Transformed data, $\rho = 0.2$:

t	y_t	Replacement for intercept	x_t
2	17	0.8	14
3	18	0.8	15

- (4) a. 4.7t. b. 4t. c. nonstationary. d. 4.7. e. 4.
 (5) a. H_0 : Inflation *has* a unit root. b. -3.1. c. Reject null.
 (6) a. Perfect multicollinearity. b. 59.43. c. 59.66.
 (7) a. 37.4. b. 37.84. c. 39.

IV. CRITICAL THINKING

a. The first forecast (30.8) is better because it is the conditional mean of p_t given *all* the data in the sample, including the last observation p_{50} . For the first forecast, the variance of the forecast error is only 4. By contrast, the second forecast (28.7) is the unconditional mean given only the first observation. For the second forecast, the variance of the forecast error is $50 \times 4 = 200$.

b. Variables are cointegrated if they are individually integrated processes (that is, they do not revert to any mean or trend) but they do not stray far from each other. More precisely, x_t and y_t are cointegrated if for some constant β , the expression $(y_t - \beta x_t)$ is stationary and weakly dependent. Prices in the real world are likely to be cointegrated if arbitrage or consumer substitution or producer substitution keep the prices together.

Examples might include

- prices of gold in New York and London,
- the prices of different varieties of apples,

- the prices of quarts of milk and gallons of milk.

VERSION B

I. MULTIPLE CHOICE

- (1)c. (2)b. (3)d. (4)a. (5)f. (6)c. (7)b. (8)b. (9)a. (10)d.
 (11)d. (12)a.

II. MULTIPLE ANSWER

- (1) a. no b. yes c. yes d. no.
 (2) a. no b. yes c. no d. yes e. yes.
 (3) a. yes b. yes c. no d. yes e. no.

III. PROBLEMS

- (1) a. dynamic. b. 1.4. c. 2.4.
 (2) Degrees of freedom = 2. Value of test statistic = 4.2.
 Critical point = 5.99. Cannot reject null hypothesis.
 (3) Transformed data, $\rho = 0.4$:

t	y_t	Replacement for intercept	X_t
2	14	0.6	13
3	14	0.6	12

- (4) a. 0.24 t. b. 2t. c. nonstationary. d. 0.24. e. 2.
 (5) a. H_0 : Inflation *has* a unit root. b. -2.7. c. Cannot reject.
 (6) a. Perfect multicollinearity. b. 48.32. c. 48.54.
 (7) a. 33. b. 32.5. c. 35.

IV. CRITICAL THINKING (same as Version A)

[end of answer key]