

Econometrics Test

2015 - 06 - 29

Name: _____

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1. Say if the following statements are unambiguously true (TRUE), unambiguously false (FALSE) or impossible to classify the way they are stated (CAN'T SAY). Write the motivations to your answers **only** in the space provided. A "CAN'T SAY" answer with no motivations will be considered wrong.

- (a) If A is a square and nonsingular matrix, then the projection matrix P_A is invertible.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (b) Let X be a discrete random variable whose support is the set of all positive integers between 1 and 73. Then, $E(X)$ must exist.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (c) Unbiased estimators may not possess a variance, but when they do, it goes to 0 as $n \rightarrow \infty$.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (d) Suppose that $\ln(y_i) = \beta_0 + \beta_1 \ln(x_i)$ with $-1 < \beta_1 < 0$. Then, if x_i increases, $x_i y_i$ must also increase.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (e) Heteroskedasticity makes OLS inconsistent.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

2. You have the following model: $y_i = \beta_0 + \beta_1 x_i + u_i$: suppose that the data you observe are

$$\mathbf{X}'\mathbf{X} = \begin{bmatrix} 100 & 80 \\ 80 & w \end{bmatrix} \quad \mathbf{X}'\mathbf{y} = \begin{bmatrix} z \\ 192 \end{bmatrix}$$

$$\hat{\boldsymbol{\beta}} = \begin{bmatrix} \hat{\beta}_0 \\ \hat{\beta}_1 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \end{bmatrix} \quad \hat{\sigma} = 1.2$$

Determine the following quantities:

$$w = \quad \quad \quad z = \quad \quad \quad$$

$$\mathbf{y}'\mathbf{y} = \quad \quad \quad \text{the standard error for } \hat{\beta}_1 = \quad \quad \quad$$

3. Table 1 contains a model for imports of goods and services in the Euro area (quarterly data from the AWM database, version 18up14).

Variable name	Description
m	log imports of goods and services (real)
y	log GDP (real)

Answer the following questions, making use of the numerical estimates that you find in table 1 (use a separate sheet for questions (b) and (e)):

- (a) Rewrite the model in ECM form:

$$\Delta m_t = \quad \quad \quad$$

- (b) Do we have an autocorrelation problem in this model? Motivate your answer.
(c) Calculate the first 3 impact multipliers:

$$\delta_0 = \quad \quad \quad \delta_1 = \quad \quad \quad \delta_2 = \quad \quad \quad$$

- (d) Calculate the long-run elasticity of imports with respect to GDP:

$$c = \sum_{j=0}^{\infty} \delta_j = \quad \quad \quad$$

- (e) Do the signs and magnitudes of the estimated multipliers conform to your economic intuition? Motivate your answer.

OLS, using observations 1984:1–2013:4 ($T = 120$)
Dependent variable: m_t

	Coefficient	Std. Error	t -ratio	p-value
const	−1.4259	0.8828	−1.615	0.1090
y_t	1.9754	0.1866	10.59	0.0000
y_{t-1}	−1.1827	0.3170	−3.73	0.0003
y_{t-2}	−0.6442	0.1828	−3.523	0.0006
m_{t-1}	0.9477	0.0338	28.03	0.0000
Mean dependent var	13.03216	S.D. dependent var	0.465405	
Sum squared resid	0.013163	S.E. of regression	0.010699	
R^2	0.999489	Adjusted R^2	0.999472	

Godfrey test up to order 4: LMF = 0.492491, with p-value = 0.741245

Table 1: ADL model for imports in the Euro Area