

Econometrics Test

2016 - 01 - 20

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) An invertible matrix must be square.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (b) A consistent estimator may be unbiased.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (c) In the linear model $\log y_i = \beta_0 + \beta_1 \log x_i + u_i$, the coefficient β_1 may be interpreted as the elasticity of x with respect to y .

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (d) In a linear model, the number of dummy explanatory variables cannot exceed the number of non-dummy ones.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (e) The Godfrey test cannot be computed on a model with a lagged dependent variable.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

2. We have estimated via OLS a model of the form $y_i \simeq \beta_0 + \beta_1 x_{1,i} + \beta_2 x_{2,i}$, on 250 observations. Let the data matrices be as follows:

$$(X'X)^{-1} = 0.0001 \begin{bmatrix} 40 & 0 & 0 \\ 0 & 60 & 16 \\ 0 & 16 & 60 \end{bmatrix} \quad X'y = \begin{bmatrix} 80 \\ -400 \\ 1000 \end{bmatrix} \quad y'y = 6705.6$$

Now

- (a) Calculate the OLS statistic; $\hat{\beta}' = [\quad , \quad , \quad]$
 (b) Calculate the sum of squared residuals; $SSR =$
 (c) Calculate the OLS variance estimator $\hat{\sigma}^2 =$
 (d) Is the parameter β_1 “statistically significant”? YES ☐ NO ☐
 (e) Is the parameter β_2 “statistically significant”? YES ☐ NO ☐
 (f) Test the hypothesis $\beta_1 = -1$

$H_0 : \beta_1 = -1$ $W =$ _____
 Decision: ACCEPT ☐ REJECT ☐

3. Consider the model shown in table 1 and provide, on a separate sheet, a comment of the results; the variables used are

Var. name	Description
AvgInfantMR	Infant mortality rate (average 2011-2015)
AvgHospitalBeds	Hospital beds per 1000 inhabitants (average 2011-2015)
AvgPhysicians	Number of doctors per 1000 inhabitants (average 2011-2015)
AvglGNI	log of Gross National Income per capita (average 2011-2015)

Table 1: Infant Mortality in 88 world countries (Source: World Development Indicators)
 OLS estimates; Dependent variable: AvgInfantMR

	(ordinary s.e.)	(robust s.e.)
const	93.98** (6.829)	93.98** (9.827)
AvgHospitalBeds	-1.262** (0.5059)	-1.262** (0.4308)
AvgPhysicians	-1.212 (1.174)	-1.212 (1.124)
AvglGNI	-7.805** (0.8570)	-7.805** (1.069)
n	88	88
R^2	0.7513	0.7513
ℓ	-295.8	-295.8

White’s test for heteroskedasticity –

Test statistic: LM = 38.020345, p-value = 0.000017