

Econometrics Test

2014 - 01 - 15

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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 $A \cdot B'$ is a symmetric matrix, then the number of rows of A and B must be the same.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (b) Suppose that $\sqrt{n}(X_n - 3) \xrightarrow{d} N(0, 1)$; then $X_n \xrightarrow{p} 3$.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (c) Suppose that

$$E[y_t|x_t] = \beta_0 + \beta_1 \frac{1}{x_t + 1};$$

then, the parameters β_0 and β_1 can be estimated via OLS.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (d) Suppose the relationship between two positive variables is correctly described by the model

$$y_t = 10 - 0.5 \frac{1}{x_t + 1} + \varepsilon_t;$$

then, the elasticity of y with respect to x is negative.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

- (e) Godfrey's test statistic is larger than the Durbin-Watson statistic.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

2. A linear model was estimated on 200 observations with 8 explanatory variables and its R^2 was 0.75; after omitting four of them, the R^2 index went down to 0.7. Calculate the corresponding W test and indicate whether the model reduction is supported by the data.

W : _____ Distribution: _____

degrees of freedom: _____ p -value: _____

Decision: ☐ Accept reduction ☐ Reject reduction

3. In the following model the dependent variable is the number of total medals (gold + silver + bronze) won at the Atlanta Olympics in 1996 for the 196 participant countries. Explanatory variables are

- y : 1996 GDP per capita (in logarithm)
- p : total population in 1996 (in logarithm)
- USA: host country dummy variable

	Coefficient	Std. Error	t -ratio	p-value
const	-49.3584	6.0114	-8.2108	0.0000
y	2.3617	0.3912	6.0368	0.0000
p	2.2955	0.2907	7.8968	0.0000
USA	81.6975	8.4824	9.6314	0.0000

Mean dependent var	4.385417	S.D. dependent var	12.04387
Sum squared resid	12888.31	S.E. of regression	8.279785
R^2	0.534810	Adjusted R^2	0.527387
$F(3, 188)$	72.04533	P-value(F)	4.61e-31

White's test: $nR^2 = 45.746$, p -value = $P(\chi_6^2 > 45.746) = 0.000000$

- Comment on the signs and magnitudes of $\hat{\beta}$
- Comment on any other displayed statistics you deem appropriate
- Italy had, in 1996, about 57 million inhabitants and its per capita GDP was about 22000 \$; compute the model's prediction of medals won by Italy. (Nota Bene: the actual figure is 35)
- Belgium had, in 1996, about 10 million inhabitants and its per capita GDP was about 27000 \$; compute the model's prediction of medals won by Belgium. (Nota Bene: the actual figure is 6)

Medals predicted for Italy: _____

Medals predicted for Belgium: _____