Econometrics Test

2011 - 09 - 21

Name: _____ Matricola: _____

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. Answers with no motivations will not be considered.

   (a) A negative definite matrix is invertible.

   TRUE ◯ FALSE ◯ CAN'T SAY ◯

   (b) If the support of a continuous random variable X is the closed interval $[a, b]$, where a and b are finite, then $E(X)$ exists.

   TRUE ◯ FALSE ◯ CAN'T SAY ◯

   (c) If $E(X) = 0$ and $E(X^3)$ exists, then $E(X^3) = 0$.

   TRUE ◯ FALSE ◯ CAN'T SAY ◯

   (d) If $X_n \xrightarrow{\text{d}} N(0, 1)$, then $\lim_{n\to\infty} P(X_n < 0) = 1/2$.

   TRUE ◯ FALSE ◯ CAN'T SAY ◯

   (e) Suppose you estimate via OLS the following model

   $$y_i = \beta_0 + \beta_1 x_i + \beta_2 z_i + \varepsilon_i$$

   and that the t-statistics for β_1 and β_2 are -0.5 and 1.5, respectively. Then, the hypothesis $\beta_1 + \beta_2 = 0$ must be true.

   TRUE ◯ FALSE ◯ CAN'T SAY ◯

2. Suppose you have data on 2 variables y and x from 200 firms, 100 of which are based in Europe and the other 100 are in the US. These are the data for the two sub-samples:

	Europe	**USA**
$\sum_i x_i$	60	80
$\sum_i x_i^2$	100	100
$\sum_i y_i$	192	216
$\sum_i x_i y_i$	96	108

Given the model $y_i = \beta_1 + \beta_2 x_i + \varepsilon_i$, compute the estimates of β_1 and β_2

(a) for the European sample only

(b) for the US sample only

(c) by using the two sub-samples together

3. Table 1 contains the results on an OLS regression run on a dataset of Belgian households. The variables used are as follows: call E_{TOT} the total expenditure by the household and N the number of its members, then

Variable	**Description**
`s_alcohol`	Share of alcohol on total expenditure $\left(\frac{E_{ALCOHOL}}{E_{TOT}}\right)$
`s_tobacco`	Share of tobacco on total expenditure $\left(\frac{E_{TOBACCO}}{E_{TOT}}\right)$
`l_expend`	Natural logarithm of total expenditure ($\ln(E_{TOT})$)
`s_adults`	Share of adults in the household $\left(\frac{N_{ADULTS}}{N}\right)$

Comment on the estimates.

OLS, using observations 1–2724
Dependent variable: s_alcohol

	Coefficient	Std. Error	t-ratio	p-value
const	−0.0267	0.0132	−2.0267	0.0428
l_expend	0.0022	0.0009	2.4082	0.0161
s_tobacco	0.0423	0.0169	2.5106	0.0121
s_adults	0.0163	0.0019	8.5104	0.0000

Mean dependent var	0.017828	S.D. dependent var	0.021658
Sum squared resid	1.242581	S.E. of regression	0.021374
R^2	0.027118	Adjusted R^2	0.026045
$F(3, 2720)$	25.27197	P-value(F)	4.01e–16

Table 1: Alcohol consumption