

# Econometrics Test

2012 - 06 - 13

Name: \_\_\_\_\_ email: \_\_\_\_\_

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  $A$  and  $B$  are symmetric matrices,  $AB = BA$ .

TRUE ☐ FALSE ☐ CAN'T SAY ☐

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- (b) If  $X$  and  $Y$  are independent  $\chi^2$  variables with 1 degree of freedom, their correlation is 0.

TRUE ☐ FALSE ☐ CAN'T SAY ☐

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- (c) If  $\mathbf{x} \sim N(0, I)$ , then  $\mathbf{x}'\mathbf{x} \sim \chi^2$ .

TRUE ☐ FALSE ☐ CAN'T SAY ☐

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- (d) Consider a sequence of independent random variables distributed as

$$x_k = \begin{cases} 0 & \text{with prob. } 1 - 1/k \\ k & \text{with prob. } 1/k \end{cases}$$

for  $k = 1, 2, \dots$ ; the expected value of  $x_k$  is  $E(x_k) = 1$ .

TRUE ☐ FALSE ☐ CAN'T SAY ☐

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- (e) Consider a sequence of independent random variables distributed as

$$x_k = \begin{cases} 0 & \text{with prob. } 1 - 1/k \\ k & \text{with prob. } 1/k \end{cases}$$

for  $k = 1, 2, \dots$ ; the limit in probability of the sequence is 0 (in formulae,  $x_i \xrightarrow{P} 0$ ).

TRUE ☐ FALSE ☐ CAN'T SAY ☐

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2. Consider the following model, which was estimated on a sample of 6404 Italian households; data were collected in the year 2010 (source: Bank of Italy).

Dependent variable: *rat*;  $n = 6404$

	coefficient	std err	t-stat	p-value	Robust std err	Robust t-stat	Robust p-value
const	2.57627	0.08240	31.270	7.97E-200	0.09326	27.630	8.54E-159
gender	-0.00328	0.00802	-0.408	0.683	0.00807	-0.406	0.6846
age	-0.00592	0.00180	-3.294	0.001	0.00161	-3.686	0.0002
age2	0.00004	0.00002	2.431	0.0151	0.00001	2.666	0.0077
higheduc	-0.07746	0.00896	-8.643	6.86E-18	0.00945	-8.196	2.99E-16
y	-0.11164	0.00870	-12.830	3.02E-37	0.01054	-10.590	5.28E-26
w	-0.03297	0.00301	-10.940	1.3E-27	0.00260	-12.700	1.61E-36
Mean dependent var			0.789228	S.D. dependent var		0.337342	
Sum squared resid			621.3997	S.E. of regression		0.311672	
$R^2$			0.147199	Adjusted $R^2$		0.146399	
$F(6, 6397)$			184.0274	P-value( $F$ )		7.3e-217	

White's test for heteroskedasticity

Test statistic:  $n \cdot R^2 = 557.8959$ , with  $p\text{-value} = P(\chi_{24}^2 > 557.8959) = 0.000000$

The variables are:

Variable name	Description
<b>rat</b>	Ratio between bank deposits and total financial assets owned by the household
<b>gender</b>	Gender of the household head (1=male)
<b>age</b>	Age the household head at the time of the interview
<b>age2</b>	Age squared
<b>higheduc</b>	Dummy for higher education: 1 if the household head holds a high school diploma or higher
<b>y</b>	Natural logarithm of total household income
<b>w</b>	Natural logarithm of total household net wealth (real assets plus financial assets minus liabilities)

- Comment briefly on the order of magnitude of the mean of the dependent variable.<sup>1</sup>
- Comment briefly on the  $R^2$  index.
- Comment briefly on the  $F$  test and its  $p$ -value.
- Comment on the heteroskedasticity test: do you consider its outcome surprising or not? Why?
- Comment on the effect of the characteristics of the household head on the dependent variable.
- Comment on the sign and relative magnitude of the coefficients for  $y$  and  $w$  and give a behavioural interpretation. Is it correct to say that if income increases, bank deposits decrease?
- (Optional) Add any other consideration you consider appropriate to interpret the results.

<sup>1</sup>Of course, the dependent variable must take values between 0 and 1. Say why.