

Name: _____

Matricola: _____ email: _____

ECONOMETRICS - 08-06-2018 - Time: 2 h 30'

1. Say if the following statements are unambiguously true (True), unambiguously false (False) or impossible to classify the way they are stated (Not necessarily). Write the motivations to your answers **only** in the space provided. A “Not necessarily” answer with no motivations will be considered wrong.

- (a) If a matrix of any size is full of ones, then its rank is 1.

True ☐

False ☐

Not necessarily ☐

- (b) if X is a random variable whose support is the interval $[-1, 1]$, then $E[\exp(X)] = \exp[E(X)]$.

True ☐

False ☐

Not necessarily ☐

- (c) Consistent estimators may not be asymptotically normal.

True ☐

False ☐

Not necessarily ☐

- (d) Asymptotically normal estimators may not be consistent.

True ☐

False ☐

Not necessarily ☐

- (e) Assuming you represent the restrictions to a parameter vector β as $R\beta = d$, then the matrices

$$R_1 = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix} \quad d_1 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$
$$R_2 = \begin{bmatrix} 0 & 0 & -1 & 0 \\ 0 & 1 & 1 & 0 \end{bmatrix} \quad d_2 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

express the same restrictions.

True ☐

False ☐

Not necessarily ☐

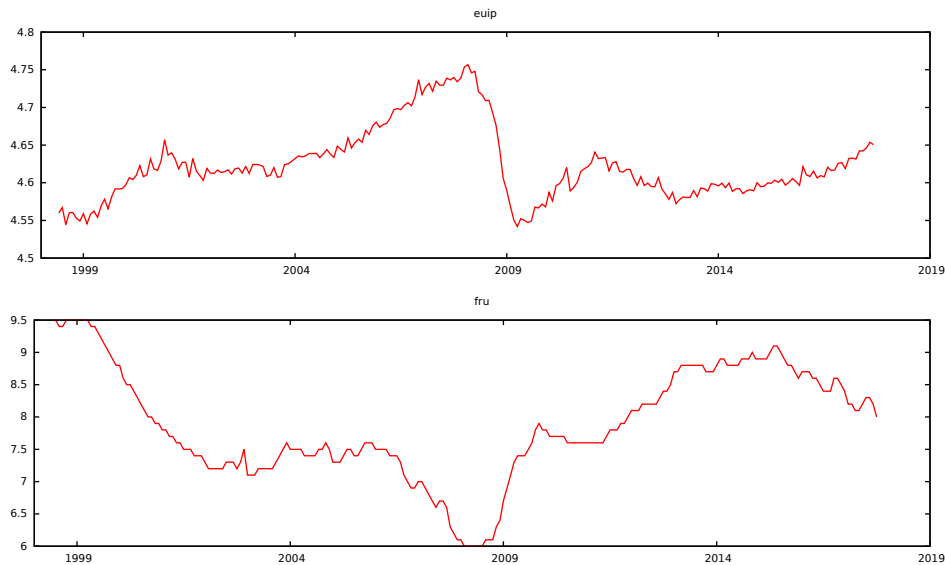


Figure 1: Data for exercise 2

2. The two variables **euiip** and **fru**, depicted in Figure 1 are defined as

Variable	Description
fru	Monthly unemployment in France (age 25 and over)
euiip	Euro area - log of Industrial Production Index, Total Industry (seasonally adjusted)

Table 1 contains a dynamic regression, where unemployment is the dependent variable and industrial production is the only explanatory variable (apart from the constant and a time trend).

- (a) Write the dynamic and cumulated multipliers δ_j and c_j in the space below:

Multiplier	δ_0	δ_1	δ_2	δ_3	δ_4
Numerical value					
Cum. multiplier	c_0	c_1	c_2	c_3	c_4
Numerical value					

- (b) Write the long-run multiplier: $c = \sum_{i=0}^{\infty} \delta_i =$ _____

- (c) Comment on sign and the magnitude of the long-run multiplier; does the sign agree with your economic intuition?

- (d) Suppose that industrial production raises permanently by 5%. Calculate the expected long-run effect on unemployment:

$$\Delta \text{fru} = \underline{\hspace{2cm}}$$

- (e) comment on the Godfrey test shown in the table; does the model suffer from residual autocorrelation?

Table 1: OLS, using observations 1998:08–2017:09 ($T = 230$), Dependent variable: **fru**

	Coefficient	Std. Error	<i>t</i> -ratio	p-value
const	4.6856	0.8144	5.7532	0.0000
time	0.0003	0.0001	3.3161	0.0011
fru_1	1.1239	0.0665	16.9119	0.0000
fru_2	−0.1753	0.0634	−2.7679	0.0061
euip	−0.9225	0.5079	−1.8164	0.0706
euip_1	−0.0110	0.5230	−0.0211	0.9832
Mean dependent var	7.866957	S.D. dependent var	0.847573	
Sum squared resid	1.332903	S.E. of regression	0.077139	
R^2	0.991898	Adjusted R^2	0.991717	
$F(5, 224)$	5484.484	P-value(F)	5.2e−232	
Log-likelihood	265.9770	Akaike criterion	−519.9539	
Schwarz criterion	−499.3255	Hannan–Quinn	−511.6328	
$\hat{\rho}$	0.004176	Durbin–Watson	1.984716	

Breusch–Godfrey test for autocorrelation up to order 12

Test statistic: LMF = 1.16152, p-value = 0.312734

3. Suppose some consistent and asymptotically normal estimation procedure gives you these estimates of the three parameters a , b and c :

$$\hat{a} = 1.1 \quad \hat{b} = 0.9 \quad \hat{c} = 2$$

and a consistent estimate of the asymptotic covariance matrix is given by:

$$\hat{V} = \begin{bmatrix} 0.01 & 0.02 & 0 \\ 0.02 & 0.05 & 0 \\ 0 & 0 & 0.25 \end{bmatrix}$$

- (a) Perform a significance test for a .

Test type: _____ Distribution: _____ Test statistic: _____
 Decision: ☐ Reject ☐ Don't reject

- (b) Perform a test for $H_0 : a = 1$

Test type: _____ Distribution: _____ Test statistic: _____
 Decision: ☐ Reject ☐ Don't reject

- (c) Perform a test for $H_0 : a = b$

Test type: _____ Distribution: _____ Test statistic: _____
 Decision: ☐ Reject ☐ Don't reject

- (d) Perform a test for $H_0 : a/b = 1$

Test type: _____ Distribution: _____ Test statistic: _____
 Decision: ☐ Reject ☐ Don't reject

- (e) Perform a test for $H_0 : a/b = c$ and comment on the method you used in the space below
 (Hint: use the delta method)

Test type: _____ Distribution: _____ Test statistic: _____
 Decision: ☐ Reject ☐ Don't reject
