ECONOMETRICS - FINAL EXAM, 3rd YEAR (GECO)
June, 4th, 2021 – 9.00

First family name:	**Second family name:**
Name:	**ID:**
Mobile:	**Email:**

Question 1	A	B	C	Blank
Question 2	A	B	C	Blank
Question 3	A	B	C	Blank
Question 4	A	B	C	Blank
Question 5	A	B	C	Blank
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Question 9	A	B	C	Blank
Question 10	A	B	C	Blank
Question 11	A	B	C	Blank
Question 12	A	B	C	Blank
Question 13	A	B	C	Blank
Question 14	A	B	C	Blank
Question 15	A	B	C	Blank
Question 16	A	B	C	Blank
Question 17	A	B	C	Blank
Question 18	A	B	C	Blank
Question 19	A	B	C	Blank
Question 20	A	B	C	Blank

Correct		Incorrect		Blank		Final Grade	

INSTRUCTIONS

This exam includes 20 multiple choice questions.

Your answers must be marked on the answer sheet that you will find in the first page. If you want to leave any question unanswered, choose the "Blank" option. This answer sheet is the only part of this exam that will be graded.

A correct answer adds 2 points to the final grade while an incorrect one subtracts 1 point. A blank answer does not add or subtract. The final grade is the number of points divided by 4.

Make sure that you checked your options, including “Blank”. Do not unclip the sheets. Use the blank space in the following pages to write notes or to do arithmetic calculations.

YOU HAVE ONE HOUR TO ANSWER THIS TEST

REMINDER

YOU ARE NOT ALLOWED TO USE DEVICES WITH CONNECTIVITY TO THE INTERNET, INCLUDING MOBILE PHONES, TABLETS, SMARTWATCHES OR MP3/4 PLAYERS

Questions 1 to 5 refer to the following statement. Using annual data about chicken meat demand in the United States from 1991 to 2013, the following model has been estimated using OLS:

$$Y_t = \beta_1 + \beta_2 X_{t2} + \beta_3 X_{t3} + \beta_4 X_{t4} + u_t \qquad t = 1,\ldots,23$$

where Y is per capita chicken meat consumption (in pounds), X_2 is per capita income (in dollars); X_3 is chicken meat price per pound (in cents) and X_4 is pork meat price per pound (in cents). Table 1 summarizes the main estimation results and Table 2 displays the variance-covariance matrix for the OLS parameter estimates.

Table 1

Model 1: OLS, using observations 1960-1982 (T = 23)
Dependent variable: Y

	Coefficient	*Std. Error*	*t-ratio*	*p-value*
const	38.6472	--------	-----	<0.0001
X2	0.0108762	--------	-----	0.0002
X3	−0.541084	--------	-----	0.0028
X4	0.174055	--------	-----	0.0118

Mean dependent var	39.66957	S.D. dependent var	7.372950
Sum squared resid	75.75855	S.E. of regression	---------
R-squared	0.936653	Adjusted R-squared	0.926651
F	-----------	P-value(F)	1.45e-11
Log-likelihood	−46.34424	Akaike criterion	100.6885
Schwarz criterion	105.2305	Hannan-Quinn	101.8308
rho	0.562093	Durbin-Watson	0.882813

Variance-covariance matrix for the estimated parameters

	const	X2	X3	X4
const	133.196	0.00307994	-0.515143	0.0928149
X2	0.00307994	0.567	-1.69	-9.00
X3	-0.515143	-1,69	0.0249544	-0.00735701
X4	0.0928149	-9.00	-0.00735701	0.00391008

Question 1. According to the information in Table 1, if real per capita income increases by one thousand dollars, *ceteris paribus* (use in your calculations all the decimals shown in the tables):

A) Per capita consumption of chicken meat would increase by approximately 10.87%

B) Per capita consumption of chicken meat would increase by approximately, 0.01087 pounds.

C) Per capita consumption of chicken meat would increase by approximately 10.87 pounds.

Question 2. The estimated variance of the model errors is equal to (use in your calculations all the decimals shown in the tables):

A) 75.7585

B) 3.9873

C) 0.9267

Question 3. The result from testing $H_0: \beta_4 = 0$ against $H_1: \beta_4 \neq 0$ would be:

A) Not rejecting H_0 at any conventional level of significance (1%, 5% y 10%)

B) Rejecting H_0 at the 5% level of significance, but not at the 10%

C) Rejecting H_0 at the 5% level of significance, but not at the 1%

Question 4. Knowing that $Prob[t(19) \leq 2.09] = 0.975$ and that $Prob[t(19) \leq 2.86] = 0.995$, if we test $H_0: \beta_3 = -\beta_4$ against $H_1: \beta_3 \neq -\beta_4$:

A) H_0 should be rejected at the 5% level of significance but not at the 1%

B) H_0 should be rejected at the 1% and the 5% levels of significance.

C) H_0 should not be rejected at the 5% level of significance but it should be rejected at the 1% level of significance.

Question 5. The value of the F-statistic to test for the joint significance of the parameters β_2, β_3 and β_4 (use in your calculations all the decimals shown in the tables):

A) Is approximately equal to 45.291

B) Is approximately equal to 93.645

C) Is approximately equal to 73.9303

Question 6. Consider the model $Y_i = \beta_1 + \beta_2 X_i + U_i$. If the sample means of Y_i and X_i $(i = 1,2,...,N)$ are equal and positive, the OLS estimation for the intercept is:

A) Equal to zero if the OLS estimation for the slope parameter is different from one.

B) Positive if the OLS estimation for the slope parameter is positive and lower than one.

C) Negative if the OLS estimation for the slope parameter is negative.

Question 7. Consider the model $Y_t = \beta_1 + \beta_2 X_t + U_t$, with $U_t = A_t + A_{t-1}$ and $A_t \sim \text{NIID}\left(0, \sigma_A^2\right)$. The error terms from the model (U_t): (**Hint:** compute the covariance between U_t and U_{t-1})

A) Are heteroscedastic.

B) Are autocorrelated.

C) Show expected value different from zero.

Question 8. Which of the following statements is TRUE?

A) OLS regression models using non-stationary time series can result in spurious relationships.

B) OLS regression models using strongly autocorrelated time series do not suffer from any relevant practical problem.

C) The analysis of the residuals from an OLS regression model using non-stationary time series is not a useful tool to detect potential practical problems.

Question 9. Consider the model $Y = X\beta + U$, the hypothesis that U follows a multivariate normal distribution:

A) Allows us to obtain the distribution of the OLS estimator for β

B) Is required to proof the Gauss-Markov theorem

C) None of the above

Question 10. Consider the model: $Y = X\beta + U$. Which of the following error terms satisfy EVERY classical hypothesis?

A) $U \sim N(\mu, \sigma^2 I)$ with $\mu \neq 0$

B) $U \sim N(0, \sigma^2 I)$

C) $U \sim N(\mu, \sigma^2 \Omega)$ with $\mu \neq 0$ and Ω non-diagonal

Question 11. The model: $Y_t = \beta_1 + \beta_2 X_{t2} + \beta_3 X_{t3} + U_t$ satisfies every classical hypothesis. You observe a sample of 75 observations and $\bar{F}$ is the calculated value for the usual F statistic to test for the joint significance of the slope parameters from the above model. The p-value from this test is:

A) $\Pr ob\left[F(3,72) \leq \bar{F} \right]$

B) $\Pr ob\left[F(3,72) \geq \bar{F} \right]$

C) $\Pr ob\left[F(2,72) \geq \bar{F} \right]$

Question 12. Using quarterly data from US families, the following model has been estimated using OLS:

$$\log(Durables_i) = -9.7 + 1.91 \log(Consumption_i) + \hat{u}_i$$

where log(*Durables)* is the (log) investment in durable goods in billions of 1992 dollars and log(*Consumption*) is the (log) total consumption expenditure in billions of 1992 dollars. According to the estimation results:

A) A 1% increase in total consumption expenditure is related to an increase of, approximately, 1.91% in the investment in durable goods.

B) A 1 dollar increase in total consumption expenditure is related to an increase of, approximately, 1.91 billion in the investment in durable goods.

C) A 1% increase in total consumption expenditure is related to an increase of, approximately, 0.0191% in the investment in durable goods.

Question 13. Using data about teachers in public US schools, the following model has been estimated using OLS:

$$S_i = 26465 - 1786.07 D1_i - 4383.08 D2_i + \hat{u}_i$$

Where S_i is the salary (in dollars), $D1_i$ is a dummy that takes the value of 1 for the Northern States and zero otherwise and $D2_i$ is a dummy variable that takes the value of 1 for the Southern States and zero otherwise. Accordingly, the estimated average salary is:

A) 20296 dollars in the Northern States

B) 24679 dollars in the Northern States

C) 4383 dollars in the Southern States

Question 14. If a linear model suffers from approximate collinearity, choose the right answer:

A) OLS estimator is inefficient because the variance-covariance matrix is not equal to $\sigma^2 (X^T X)^{-1}$

B) The t-ratios are inflated (larger than usual)

C) The OLS estimation of parameters β is quite unprecise.

Question 15. Under heteroscedasticity, the OLS estimator for parameters β is:

A) Linear and efficient, but biased

B) Linear and unbiased, but NOT efficient

C) Unbiased and efficient, but NOT linear

Question 16: The auxiliary regression for the White test:

A) Estimates a linear relationship between the squared OLS residuals from the original model and the regressors from this model.

B) Estimates a NON linear relationship between the squared OLS residuals from the original model and the regressors from this model

C) The test statistic is the R-squared from the OLS estimation of the original model

Question 17. Consider a linear OLS regression model. You suspect that there are some outliers and some influential observations. Choose the right answer:

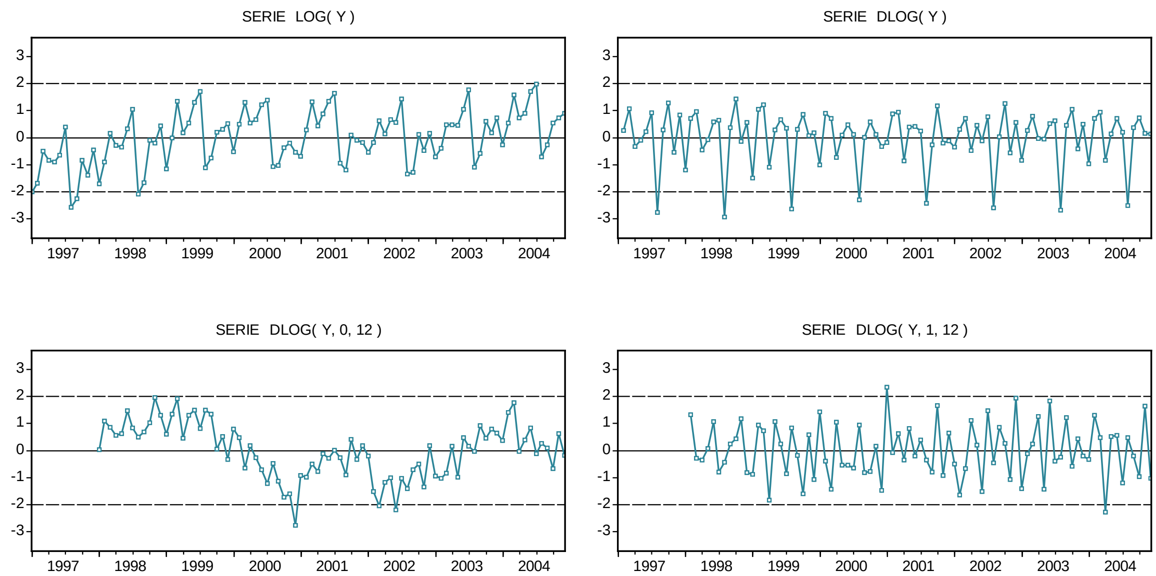
A) An outlier always shows a large and positive OLS residual

B) An outlier is always influential in the OLS estimation

C) The graph of OLS residuals is only an approximation to detect this problem, because an influential observation may show a small OLS residual

Questions 18 and 19 refer to the following statement. Figure M1 shows the series LOG (Y), DLOG(Y) (a regular difference of the log of Y), DLOG (Y,0,12) (a seasonal difference of the log of Y) and DLOG (Y,1,12) (a regular and a seasonal difference of the log of Y). [**Note**: DLOG (Y,1,12) is a regular difference of DLOG (Y,0,12) and a seasonal difference of DLOG(Y)]

Figura M1



Question 18. Choose the right answer:

A) DLOG (Y, 1, 12) is mean stationary

B) DLOG (Y, 0, 12) is mean stationary

C) DLOG (Y) is mean stationary

Question 19: The four time series plotted in Figure M1 are log-transformed so that:

A) The original series Y required the log-transformation to become variance-stationary

B) DLOG(Y) is the absolute change in Y between one month and the previous month

C) DLOG(Y) is the quarterly variation rate of Y

Question 20: If a time series grows linearly over time, but its dispersion (variance) is approximately constant as the mean grows:

A) The time series is mean-stationary and variance-stationary

B) The time series is variance-stationary but it is NOT mean-stationary

C) The time series is neither mean-stationary nor variance-stationary

CALCULATIONS

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