Econometrics 2022-2023. Second Semester Final Exam, June 21, 2023

Part 1. (30 minutes). In each of 12 multiple choice tests indicate the correct answer.

1. For the Model $Y_i = \beta_2 X_i + u$ (Model A assumptions satisfied, $i=1,,,n$) the estimator $b_2 = \dfrac{((Y_1 + Y_n)/2) - \bar{Y}}{((X_1 + X_n)/2) - \bar{X}}$ is:

1) the OLS estimator of β_2; 2) unbiased estimator of β_2; 3) efficient estimator of β_2;
4) biased estimator of β_2; 5) not an estimator of β_2.

2. In a simple regression with an intercept $\hat{Y} = b_1 + b_2 X$, the estimated slope coefficient b_2 is equal to zero. Then the determination coefficient R^2 if calculated as $R^2 = 1 - RSS/TSS$, is

1) Always strictly positive;
2) Generally speaking, is positive, but can be equal to zero;
3) In some situations can be negative
4) Is equal to zero
5) Can not be calculated for that model.

3. If a new observation and a new explanatory variable are added in the Linear Regression Model, then for OLS-estimation, the following is true:

1) The Residual Sum of Squares (*RSS*) decreases; the Determination Coefficient R^2 may increase, decrease or stay the same;
2) The Residual Sum of Squares (*RSS*) increases; the Determination Coefficient R^2 may increase, decrease or stay the same;
3) Both the Determination Coefficient R^2 and the Residual Sum of Squares (*RSS*) may increase, decrease or stay the same;
4) The Determination Coefficient R^2 increases; the Residual Sum of Squares (*RSS*) may increase, decrease or stay the same;
5) The Determination Coefficient R^2 decreases; the Residual Sum of Squares (*RSS*) may increase, decrease or stay the same;

4. If you have estimated the parameters of the following model using the OLS directly (Gauss-Markov conditions satisfied),

$y = \alpha + \beta_1 x_1 + \beta_2 x_2 + (\beta_2 - \beta_3) x_3 + u,$ then:

1) you can get an unbiased estimate of β_3;
2) you can not get an unbiased estimate of β_3, but can get a consistent estimate of it;
3) you can not get an unbiased, or biased but consistent estimate of β_3;
4) you can not get any estimate of β_3;
5) all the above statements are incorrect.

5. Which of the following correctly defines *F* statistic for testing linear restrictions if R_r^2 represents the coefficient of determination from the restricted model, R_{ur}^2 represents the

coefficient of determination from the unrestricted model, and q is the number of restrictions placed?

1) $F = \dfrac{(R_{ur}^2 - R_r^2)/q}{(1-R_{ur}^2)/(n-k)}$ 2) $F = \dfrac{(R_r^2 - R_{ur}^2)/q}{(1-R_{ur}^2)/(n-k)}$ 3) $F = \dfrac{(R_{ur}^2 - R_r^2)/q}{(1-R_r^2)/(n-k)}$

4) $F = \dfrac{(R_r^2 - R_{ur}^2)/q}{(1-R_r^2)/(n-k)}$ 5) None of the above

6. The following double-logarithmic model is estimated: $\log Y = \beta_1 + \beta_2 \log X_2 + u$. Interpretation of the coefficient β_2 is the following:

1) If X_2 increases by one unit then Y increases approximately by $100\beta_2$ per cent;
2) If X_2 increases by one unit then Y increases approximately by $\beta_2/100$ per cent;
3) If X_2 increases by one per cent then Y increases approximately by $100\beta_2$ per cent;
4) If X_2 increases by one per cent then Y increases approximately by β_2 per cent;
5) If X_2 increases by one per cent then Y increases approximately by β_2 units.

7. Econometric model is described by the following three equations:

$$(1) \quad y_1 = \alpha + \beta y_3 + \gamma x_1 + \sigma x_3 + \pi x_4 + u_1$$
$$(2) \quad y_2 = \delta + \varepsilon y_1 + \lambda x_2 + u_2$$
$$(3) \quad y_3 = \mu + \theta y_1 + \omega y_2 + \rho x_3 + \chi x_4 + u_3$$

where y_1, y_2 and y_3 are endogenous variables, x_1, x_2, x_3 and x_4 are exogenous variables; u_1, u_2 and u_3 are disturbance terms (independent and satisfying the Gauss-Markov conditions). Choose the correct statement:

1) equation (2) is exactly identified;
2) equation (1) is overidentified;
3) equation (3) is underidentified; .
4) equation (1) is exactly identified
5) equation (2) is underidentified.

8. The model with the dependent variable P_i (monthly pension), as a function of Experience E_i and the average earnings $EARN_i$ is being considered:

$$P_i = \beta_1 + \beta_2 E_i + \beta_3 EARN_i + u_i$$

The value of pension is restricted by the value P_U from the top, but there are no actual observations in the sample with $P=P_U$. The student decided to estimate Tobit model with the truncated sample (all the observations on the upper bounds excluded). Please indicate the **correct** statement among the following ones:

1) The estimated coefficients are biased but consistent;
2) The estimated coefficients are biased and inconsistent;
3) The estimated coefficients are unbiased;
4) For the truncated sample, the OLS estimation would provide unbiased estimates;
5) None of the above.

9.The following model of determination of the size of dividends is considered:

(1) $D^*_t = \gamma P_t + u_t$

(2) $\Delta D_t = \lambda (D^*_t - D_{t-1}) + \rho(P_t - P_{t-1})$

where D^*_t is the desirable size of the dividends; P_t is the current profits; D_t is the actual size of the dividends; $\Delta D_t = (D_t - D_{t-1})$.

The following statement is correct. The model is

1) the adaptive expectations model and can be consistently estimated in the form of the Koyck distribution model
2) the partial adjustment model and can be consistently estimated in the form of the ADL(1,0) model
3) the partial adjustment model and can be consistently estimated in the form of the ADL(0,1)
4) the error correction model and can be consistently estimated in the form of the ADL(1,1) model
5) the error correction model and can be consistently estimated in the form of the ADL(1,0) model

10. Refer to the following model.

$Y_t = \alpha_0 + \beta_0 St + \beta_1 St_{-1} + \beta_2 St_{-2} + \beta_3 S t_{-3} + u_t$

$(\beta_0 + \beta_1 + \beta_2 + \beta_3)$ represents:

1) the short-run change in *Y* given a temporary increase in *S*.
2) the long-run change in *Y* given a permanent increase in *S*.
3) the short-run change in *Y* given a permanent increase in *S*.
4) the long-run change in *Y* given a temporary increase in *S*.
5) none of the above.

11. Indicate **incorrect** statement among the following ones:

1) If X_t is a random walk with drift, the series of first differences $\Delta X_t = (X_t - X_{t-1}) = \beta_1 + \varepsilon_t$ (where ε_t is white noise) is stationary;

2) The time trend $X_t = \beta_1 + \beta_2 t + \varepsilon_t$ is non-stationary series;

3) The MA(1) process $X_t = \varepsilon_t + \alpha_2 \varepsilon_{t-1}$ is stationary

4) The AR(1) process $X_t = \beta_2 X_{t-1} + \varepsilon_t$, with $-1 < \beta_2 < 1$, is asymptotically stationary;

5) The random walk without drift becomes stationary after taking logarithms.

12. Which of the following is a reason for using the random effects approach instead of the fixed effects one?

1) It provides unbiased and consistent estimators when the disturbance terms are serially correlated.
2) It provides unbiased and consistent estimators when the disturbance terms are heteroskedastic.
3) It provides a more efficient estimates than the fixed effects approach.
4) It allows to take into account the unobserved heterogeneity, unlike the fixed effects.
5) It provides a way to include time-constant explanatory variables in a fixed effects analysis.