Econometrics 2022-2023. Second Semester Mid-Term Exam, April 11, 2023

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

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

$$(1) \quad D^*_t = \gamma P_t + u_t$$
$$(2) \quad \Delta D_t = \lambda (D^*_t - D_{t-1}),$$

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; $\Delta D_t = (D_t - D_{t-1})$; $\Delta P_t = (P_t - P_{t-1})$;

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 adaptive expectations model and can be consistently estimated in the form of ADL(1,0) model
3) the partial adjustment model and can be consistently estimated in the form of the ADL(1,0) model
4) the partial adjustment model and should be estimated in the form of the Koyck distribution model
5) not the partial adjustment model or the adaptive expectations model

2. The Durbin-Watson *d*-statistic is close to 2. It means that:
   1) the correlation coefficient between e_i and e_{i+k} is close to zero for any $k \geq 1$;
   2) the correlation coefficient between e_i and e_{i+k} is close to one for any $k \geq 1$;
   3) the correlation coefficient between e_i and e_{i+1} is close to one;
   4) the correlation coefficient between e_i and e_{i+1} is close to zero;
   5) the correlation coefficient between e_i and e_{i+1} is close to minus one.

3. Having 96 observations, a student had estimated the production function $ln(Y)=\beta_1+\beta_2 ln(K)+\beta_3 ln(L)+\beta_4 Time$; Y is the output, K – capital, L - labour:

$$ln(Y)=-6.4 + 0.38ln(K) + 0.69ln(L) + 0.0057Time; \; R^2 = 0.94;$$
$$\quad (1.3) \quad (0.14) \quad (0.12) \quad (0.0011)$$

(standard errors of coefficients are in the parentheses).

$ln(Y)$, $ln(K)$, $ln(Y)$ are $I(1)$. The following statement is true:

1) The regression model might be spurious if $ln(Y)$ is trend-stationary
2) The regression model might be spurious if $ln(Y)$ is difference-stationary
3) The regression model is always spurious
4) If the differencing will be done with this model, then a constant will be eliminated;
5) Detrending should be done with each variable separately instead of including the variable *Time*.

4. Refer to the following model.

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

β_0 represents:

1) the short-run change in Y given a temporary increase in S.
2) the short-run change in Y given a permanent increase in S.
3) the long-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.

5. A time series X_t is said to be (weakly) stationary if (the following is true), at least asymptotically:

I. The expected value of X_t is constant;
II. The population variance of X_t does not depend on t;
III. The sample variance of X_t does not depend on t;
IV. The expected value of X_t is a random variable;
V. The population covariance between X_t and X_{t+s} does not depend on t;
VI. The population covariance between X_t and X_{t+s} does not depend on s;
VII. The population covariance between X_t and X_{t+s} equals 0 for any t, s;

1) All I-VI; 2) I, III, IV only; 3)I, II, V only; 4) I, III, V only; 5) II-V only.

6.Indicate **incorrect** statement among the following:

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 only if $\alpha_2 < 1$
4) The AR(1) process $X_t = \beta_2 X_{t-1} + \varepsilon_t$, with $-1 < \beta_2 < 1$, is asymptotically stationary;
5) The AR(1) process $X_t = \beta_2 X_{t-1} + \varepsilon_t$, with $-1 < \beta_2 < 1$, is stationary for finite samples if X_0 is generated as a random variable with appropriate mean and variance.

7. Which of the following statements is true?

I. A random walk process is only asymptotically stationary.
II. The variance of a random walk process decreases as a linear function of time.
III. Random walk is a difference-stationary series
IV. Random walk is a difference-nonstationary series
V. Random walk without drift process has a constant mean
VI. Random walk with drift process has a constant mean
VII. Variance increases for the random walk with drift, but not for the random walk without drift process

1) IV, V only; 2) III, V only; 3) III, VI only; 4) III, V, VII only; 5) III, V, VII only.

8. After Koyck transformation the model of geometrically distributed lag takes the form:
1) ADL(1,0) model with iid disturbances
2) ADL(1,1) model with autocorrelated disturbances
3) ADL(1,0) model with autocorrelated disturbances
4) ADL(0,1) model with iid disturbances
5) no one from the listed

9. Which of the following statements is true?
1) ADL(1,1) model is a restricted version of an error correction model
2) An ADL(1,1) model can be used to study the long-run, but not the short-run dynamics in the relationship between the dependent variable and the explanatory variables in a time series model.
3) An error correction model is a restricted version of the ADL(1,1) model
4) An error correction model can be used to study the long-run, but not the short-run dynamics in the relationship between the dependent variable and the explanatory variables in a time series model.
5) The Durbin Watson test can be used to test for autocorrelation in the error terms in the ADL(1,1) model.

10. Which of the following statements correctly identifies the difference between an autoregressive model and a vector autoregressive model?
1) In an autoregressive model, the dependent variable is expressed as a function of its own lag, whereas in a vector autoregressive model, the dependent variable is expressed as a function of the lag of an explanatory variable.
2) In an autoregressive model, the dependent variable is expressed as a function of the lag of an explanatory variable, whereas in a vector autoregressive model, the dependent variable is expressed as a function of its own lag.
3) In an autoregressive model one series is modelled in terms of its own past, whereas in a vector autoregressive model several series are modelled in terms of their past.
4) In an autoregressive model several series are modelled in terms of their own past, whereas in a vector autoregressive model only one series is modelled in terms of its own past.
5) None of the above.

11. An economist wants to study the effect of income on savings. He collected data on 120 identical twins. Income is uncorrelated with the unobserved family effect. Choose correct statement
1) Random Effects estimation will provide consistent, but inefficient estimates
2) Fixed Effects estimation will provide consistent, but inefficient estimates
3) Fixed Effects estimation will provide consistent and efficient estimates
4) Fixed Effects estimation will provide inconsistent estimates
5) None of the above.

12. In the model based on panel data $Y_{it} = \beta_1 + \sum_{j=2}^{k} \beta_j X_{jit} + \sum_{p=1}^{s} \gamma_p Z_{pi} + \delta t + \varepsilon_{it}$ the random effect estimation is based on the following assumptions:

I. There are no X variables that are fixed for each individual.
II. All X variables are fixed for each individual.
III. Each of the unobserved Z_p variables is treated as being drawn randomly from a given distribution.
IV. The Z_p variables are correlated with some of the X_j variables.
V. The Z_p variables are distributed independently of all of the X_j variables.

1). I, III and IV only. 2). II, III and V only. 3). III and V only.
4) I, III and V only. 5). III and IV only.