Indian Institute of Technology Kharagpur
Department of Humanities and Social Sciences
Five-Year Integrated M.Sc. in Economics
Third Class Test (Autumn Semester: 2021-22)
Subject: Econometric Analysis II (HS40007)

Time: 1hr **Full Marks 20** **Date: 16 November 2021**

(Instructions: Answer all the Questions; Submit the handwritten and signed Answer Script in PDF in MS Teams only; No late submission of the Answer Script or its submission through email will be considered.)

Part-I: Select the most appropriate alternative for the following: **1 × 10 = 10**

1. In econometrics, simultaneity arises when:
   A) Strictly exogenous explanatory variables determine the dependent variable through a step-by-step process
   B) The random disturbance term is correlated with both the dependent variable and the explanatory variables
   C) One or more of the explanatory variables is jointly determined with the dependent variable
   D) Both autocorrelation and heteroscedasticity are present in the model

2. Which of the following is a disadvantage of the fixed effects approach to estimating a panel data model?
   A) The model is likely to be technical to estimate
   B) The number of parameters may be large leading to a loss of degrees of freedom
   C) The approach may not be valid if the composite error term is correlated with one or more of the explanatory variables
   D) The fixed effects approach can only capture cross-sectional heterogeneity and not temporal variation in the dependent variable

3. Which of the following are advantages panel data model over pure cross-sectional or pure time-series models?
   i) Use of panel data increases the number of degrees of freedom and the power of tests
   ii) Use of panel data allows the average value of the dependent variable to vary either across cross-sectional units or over time or both
   iii) Use of panel data enables the estimated relationship between the independent and dependent variables to vary either across cross-sectional units or over time or both
   A) (i) Only
   B) (i) and (ii) only
   C) (ii) only
   D) (i), (ii) and (iii)

4. Which of the following are true concerning a triangular or recursive or casual models?
   i) The parameters can be validly estimated applying OLS method to each equation

ii) The independent variables may be correlated with the error terms in other equations
iii) An application of 2SLS would lead to unbiased but inefficient parameter estimates
iv) The independent variables may be correlated with the error terms in the equations in which they appear as independent variables

A) (ii) and (iv) only
B) (i) and (ii) only
C) (i), (ii) and (iii) only
D) All the above

5. The fixed effects regression model:
   A) Has n different intercepts
   B) The slope coefficients are allowed to differ across entities, but the intercept is fixed
   C) Corrects the effects of heteroscedasticity
   D) A log-log model may include logs of binary variables and thus control for fixed effects

6. For an exactly identified equation, the order condition is that the equation must:
   A) Exclude one less than the total number of endogenous variable in the model
   B) Include one less than the total number of endogenous variable in the model
   C) Include only one of the endogenous variable in the model
   D) Exclude two or more endogenous variables

7. Which of the following assumptions is required for obtaining unbiased fixed effect estimators?
   A) The errors are heteroscedastic
   B) The errors are autocorrelated
   C) The explanatory variables are strictly exogenous
   D) The unobserved effect is correlated with the explanatory variables

8. In the fixed effects regression model, we should exclude one of the binary variables for the entities when an intercept is present in the equation
   A) Because one of the entities is always excluded
   B) Because there are already too many coefficients to estimate
   C) To allow for some changes between entities to take place
   D) To avoid perfect multicollinearity

9. If you included both time and entity fixed effects in the regression model with a constant:
   A) One of the explanatory variables needs to be excluded to avoid perfect multicollinearity
   B) You can use the "before and after" specification even for T > 2
   C) You must exclude one of the entity binary variables and one of the time binary variables for the OLS estimator to exist

D) The OLS estimator no longer exists

10. Which of the following highlights a limitation of estimating simultaneous equations model (SEM) with time-series data?
    A) Most time-series have variables with a unit root and 2SLS is complicated when applied to equations with such variables
    B) The 2SLS estimates are inefficient when applied to variables that are not in their levels but in first differences
    C) It is difficult to form simultaneous equations which satisfy the rank and order conditions using time series data
    D) The problem of serial correlation greatly limits the efficiency of SEM and leads to inefficient estimations

Part-II: Answer the following questions:

1. Consider the following system of equations:

$$Y_{1i} = \alpha_0 + \alpha_1 Y_{2i} + \alpha_2 Y_{3i} + \alpha_3 Y_{4i} + u_{1i};\ Y_{2i} = \beta_0 + \beta_1 Y_{1i} + \beta_2 Y_{5i} + \beta_3 X_{1i} + \beta_4 X_{2i} + u_{2i}$$

$$Y_{3i} = \gamma_0 + \gamma_1 Y_{2i} + \gamma_2 X_{3i} + u_{3i};\ Y_{4i} = \delta_0 + \delta_1 Y_{2i} + \delta_2 X_{4i} + u_{4i};\ Y_{5i} = \lambda_0 + \lambda_1 Y_{2i} + \lambda_2 Y_{3i} + \lambda_3 Y_{4i} + u_{5i}$$

Identify the exogenous and the endogenous variables in this system of equations. Can these equations be estimated by applying the method of OLS? Justify your answer.

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2. Consider the following model:

$$C_t = \alpha_0 + \alpha_1 Y_t + u_t;\ I_t = \beta_0 + \alpha_1 \beta_t + \beta_2 Y_{t-1} + v_t;\ Y_t = C_t + I_t$$

Express these structural form equations as reduced form equations. How will you interpret the coefficients of the reduced form equations?

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3. Assume that you want to estimate a model to explain why export intensity varies across firms in an industry. Specify and discuss the model that you would like to estimate for this purpose. How will estimate the specified model? Justify your answer.

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