

ENTRANCE EXAMINATION, 2018

Ph.D.

INTERNATIONAL TRADE AND DEVELOPMENT

[Field of Study Code : ITDH (831)]

Time Allowed : 3 hours

Maximum Marks : 100

Note : Both questions given in Part—A are compulsory. In addition, attempt any three questions out of the four questions given in Part—B, i.e., a total of five questions need to be attempted—two from Part—A and three from Part—B. All the questions carry equal marks. The figures in the margin indicate marks. All the parts of the chosen questions should be answered.

Part—A

1. Suppose X and Y are two independent random variables, each following the standard normal distribution :
 - (a) Derive the probability density function (p.d.f.) of the ratio $Z = X/Y$. 12
 - (b) Prove that the mean of Z is undefined. 4
 - (c) Derive the median and mode of Z . 4

2. Consider a linear equation with endogeneity and a just-identified linear reduced form

$$y_i = x_i\beta + e_i$$

$$x_i = \gamma z_i + u_i$$

Where both x_i and z_i are scalar. Assume that

$$E(z_i e_i) = 0$$

$$E(z_i u_i) = 0$$

- (a) Write down the standard 2SLS estimator $\hat{\beta}_{2SLS}$ for β using z_i as an instrument for x_i . 5
- (b) Find the asymptotic distribution for $\hat{\beta}_{2SLS}$. Write the asymptotic variance as a function of $\Omega = E(z_i^2 e_i^2)$, $Q = E(z_i^2)$ and γ . 10
- (c) Derive the reduced form equation

$$y_i = z_i\lambda + v_i$$

Also show that $\beta = \lambda / \gamma$ if $\gamma \neq 0$; and that $E(z_i, v_i) = 0$. 5

Part—B

3. (a) Two firms are competing for workers. The workers can be either high ability (with a productivity of θ_H) or low ability (with a productivity of θ_L , where $\theta_H > \theta_L > 0$), but the firms cannot observe the workers' abilities. The firms can announce one or more contracts offering a wage-task combination (w, t) where low-ability workers require more effort to complete a given task compared to high-ability ones : $e_L(t) > e_H(t) \forall t$. Suppose a worker's utility is his wage minus his effort

$$U = w - e$$

Will there always be an equilibrium? Why or why not?

10

- (b) Two ice cream sellers sell ice creams that are identical in terms of taste, quality, variety and price. These sellers have to decide where to locate, on a long stretch of beach, which we assume has length 1. Identify the Nash equilibrium/Nash equilibria of the game and justify your answer.

10

4. Consider the following two-period model of the representative household :

$$V = U(C_1) + \beta U(C_2)$$

$$A_1 = (1+r_0)A_0 + (1-t_1)Y_1 - C_1$$

$$A_2 = (1+r_1)A_1 + (1-t_2)Y_2 - C_2$$

Where V is life-time utility, $\beta = 1/(1+\rho)$ is the rate of felicity discounting due to time preference, C_τ is consumption in period τ ($\tau = 1, 2$) of agent's life, Y_τ is the (exogenous) income in period τ , and A_τ is financial assets possessed by the household in period τ , and t_τ is the proportional tax rate on income in period τ ($\tau = 1, 2$). Assume that the household saves in the first period of life in order to enjoy a pleasant retirement in the second period of life. Assume further that the periodic utility (or 'felicity') function, $U(\cdot)$, takes the following iso-elastic form :

$$U(C_\tau) \equiv \frac{C_\tau^{1-\frac{1}{\sigma}} - 1}{1 - \frac{1}{\sigma}}, \quad \sigma > 0, \sigma \neq 1$$

- (a) Interpret the model and derive the lifetime budget equation. Explain what you assume about A_2 . 6
- (b) Now, introduce the government, such that government buys goods for its own consumption (G_1 and G_2) in the two time periods, and finances its expenditure by taxes and/or debt. Government debt is denoted by B_τ ($\tau = 0, 1, 2$), where B_0 represents the initial level of debt. Demonstrate the Ricardian equivalence. 7
- (c) Compute the expressions for optimal consumption and savings plans (that is, C_1 , C_2 and S_1). 7

5. (a) Consider a $2 \times 2 \times 2$ framework. If there is monopoly in the domestic production of good X and perfect competition in the production of good Y in the home country, characterize the autarkic equilibrium condition algebraically and diagrammatically. If the home country is small and becomes open, how would you characterize the free trade equilibrium in case it is an exporter of good X ? What is the optimal policy to correct for the domestic distortion? 10

- (b) What is factor-intensity reversal? Examine how the presence of factor-intensity reversal impacts the Heckscher-Ohlin model and the associated theorems. Illustrate your answer with the help of a diagram. 10

6. (a) Consider a credit market where a risk neutral farmer's output Q depends on capital K according to the equation

$$Q = K^{\frac{1}{2}}$$

Capital is completely used up in production each period and the opportunity cost of each Rupee invested is $1+r$, where $r = 0.1$.

- (i) If the farmer has to self-finance the investment, what is the optimum level of investment and the farmer's income? 10
- (ii) Now suppose the farmer has no savings and must finance the investment in each period by borrowing from a risk neutral lender. The loan contract specifies that in return for the initial loan of K , the farmer should pay the lender R . The lender faces a marginal cost of $1+r$. Assume there is no uncertainty and if the farmer defaults, he cannot get credit in the future. The farmer has an outside option that pays w and discounts the future at a rate $\delta = 0.6$. What are the farmer's incentive constraint and the lender's participation constraint? 10
- (b) It is common to find that in a credit market a borrower cannot obtain a loan even though he is willing to pay the interest that lenders are asking. Why are lenders not willing to raise interest rates if the demand for loans exceeds their supply at the prevailing interest rates? Provide an analytical model that explains credit rationing as an equilibrium phenomenon. 10
