國立政治大學 九十九 學年度研究所 (博)碩 士班招生考試試題

考試科目	個體經濟學	所別	經濟系	考試時間	5 月 22 日(六) 第一節

1. **(20%)** Proof the following properties for an indirect utility function (i.e. $V(\boldsymbol{p},y)$: $\boldsymbol{p}$ is the price vector and y is the income):

   a. Homogeneous of degree zero in $\boldsymbol{p}$ and y.

   b. Strictly increasing in y and decreasing in p_n for $n = 1, 2, \ldots, N$.

   c. Quasi-convex in $\boldsymbol{p}$ and y.

2. **(20%)** Suppose a function $C(\boldsymbol{p},y)$ has all the properties for an cost function. $\boldsymbol{p}$ is the price vector and y is the output quantity. How do you recover the production function (i.e. $y = f(\boldsymbol{x})$) associating with it? Explain the process in details.

3. **(20%)** A per-unit tax, $t > 0$, is levied on the output of a monopoly. The monopolist faces demand, $q = p^{-a}$, where $a > 1$, and has constant average costs. Show that the monopolist will increase price by more than the amount of the per-unit tax.

4. **(20%)** Suppose that in a pure exchange economy (i.e. an economy without production), we have two consumers, **Alice** and **Bob**, and two goods, *Pie* and *Cake*. **Alice** and **Bob** have the utility functions:

$$U_a = min\{x_{pa}, x_{ca}\} \text{ and } U_b = min\{x_{pb}, (x_{cb})^{0.5}\}$$

(where x_{pa} is **Alice**'s consumption of *Pie*, and so on). **Alice** starts with an endowment of 30 units of *Pie* (and none of *Cake*); **Bob** starts with 20 units of *Cake* (none of *Pie*). Neither can consume negative amounts of a good.

   a. Define a Walrasian Equilibrium for the economy.

   b. Find a Walrasian Equilibrium for the economy.

5. **(20%)** Answer the following questions.

   a. Prove that every finite extensive form game with perfect information possesses at least one pure strategy subgame perfect equilibrium.

   b. Provide an example of a finite extensive form game having no pure subgame perfect equilibrium.

備註	試題隨卷繳交

國立政治大學 九十九 學年度研究所博/碩士班招生考試試題

考試科目	總體經濟學	所別	經濟所	考試時間	5 月 22 日(六) 第二節

25% for each question

1.

a. Consider a Ramsey economy. Suppose there is a permanent fall in government spending. What is its impact on consumption and capital at the steady state? What happens to consumption and capital at the time of the change?

b. Suppose that at time 0, the government switches to a policy of taxing investment income at rate τ. Thus the real interest rate that households face is now given by $r(t)=(1-\tau)f'(k(t))$. Assume that the government returns the revenue it collects from this tax through lump-sum transfers. How do the new steady-state values of consumption and capital compare with their values at the old steady state? How does the economy respond to the adoption of the tax at time 0? What are the dynamics after time 0?

2.

a. What are the implications of the Lucas imperfect-information model for monetary policy?

b. Suppose that aggregate supply is given by the Lucas supply curve, $y_t=\bar{y}+b(\pi_t-\pi_t^e)$, $b>0$, and suppose that monetary policy is determined by $m_t=m_{t-1}+a+\varepsilon_t$, where ε is a white-noise disturbance. Assume that private agents do not know the current values of ε_t; thus π_t^e is the expectation of m_t-m_{t-1} given m_{t-1}, ε_{t-1}, y_{t-1}, and p_{t-1}. Finally, assume that aggregate demand is given by $y_t=m_t-p_t$. Find y_t in terms of m_{t-1}, m_t, and any other variables or parameters that are relevant.

3.

a. Keynes postulates the consumption as a linear function of income:

$$C=a+bY.$$

What is its implication for the average propensity to consume (APC)? Is the prediction of this consumption function for the APC supported by empirical studies? If not, explain how the permanent income hypothesis helps explain the empirical findings.

b. In Hall's model, the permanent-income hypothesis implies that consumption follows a random walk. Explain.

4.

a. Explain the Lucas critique.

b. Explain the equity premium puzzle.

備註	試題隨卷繳交

國立政治大學 99 學年度研究所 博/碩 士班招生考試試題

考試科目	計量經濟學	所別	經濟學系	考試時間	5 月 22 日(六) 第三節

1. Let f denote the joint density function of the random vectors $Y_1, \ldots, Y_T$ with the parameter vector θ_o. Then given the observed values $y_1, \ldots, y_T$,the likelihood function of θ_o is

$$L(\theta_o) := f(y_1, \ldots, y_T; \theta_o).$$

Denote $s(y_1, \ldots, y_T; \theta) = \nabla_\theta \ln L(\theta)$ as the corresponding score vector, and $\mathbb{E}$ and Var are taken with respect to the true density function.

(1) What is $\mathbb{E}[s(Y_1, \ldots, Y_T; \theta_o)]$? (10%)

(2) Show that $\mathbb{E}[\nabla_\theta^2 \ln L(\theta_o)] + \text{Var}(s(Y_1, \ldots, Y_T; \theta_o)) = 0$, where $\nabla_\theta^2 \ln L(\theta_o)$ is the Hessian matrix of $\ln L$ evaluated at θ_o. (10%)

2. Given the specification,

$$\boldsymbol{y} = \boldsymbol{X}_1\boldsymbol{\beta}_1 + \boldsymbol{X}_2\boldsymbol{\beta}_2 + \boldsymbol{e},$$

where $\boldsymbol{y}$ is $T \times 1$ vector of observations, each column of $\boldsymbol{X}_1$ and $\boldsymbol{X}_2$ contains T observations of an explanatory variable, $\boldsymbol{X}_1$ is of full column rank k_1 and $\boldsymbol{X}_2$ is of full column rank k_2, and $k_1 + k_2 = K$. Denote $(\hat{\boldsymbol{\beta}}_{1,T}', \hat{\boldsymbol{\beta}}_{2,T}')'$ as the corresponding OLS estimators.

(1) Show that

$$\hat{\boldsymbol{\beta}}_{1,T}' = \left[\boldsymbol{X}_1'(I - P_2)\boldsymbol{X}_1\right]^{-1} \boldsymbol{X}_1'(I - P_2)\boldsymbol{y},$$

where I is the identity matrix and $P_2 = \boldsymbol{X}_2(\boldsymbol{X}_2'\boldsymbol{X}_2)^{-1}\boldsymbol{X}_2'$. (10%)

(2) What is the coefficient of determination (R^2)? Show that $0 \le R^2 \le 1$. (10%)

(3) Let $\bar{R}^2$ denote the adjusted R^2, is it possible that $\bar{R}^2$ could be negative? (10%)

(4) Will the changes below affect the resulting OLS estimators, t ratios, and R^2?

a. $\boldsymbol{y}^*$ and $(\boldsymbol{X}_1, \boldsymbol{X}_2)$ are used as the dependent and explanatory variables, where $\boldsymbol{y}^* = 100\boldsymbol{y}$. (10%)

b. $\boldsymbol{y}$ and $(\boldsymbol{X}_1^*, \boldsymbol{X}_2)$ are used as the dependent and explanatory variables, where $\boldsymbol{X}_1^* = 10\boldsymbol{X}_1$. (10%)

備註	試題隨卷繳交

考試科目	計量經濟學	所別	經濟學系	考試時間	5 月 22 日(六) 第三節

3. Consider the model of a one-time structural change at a known change point:

$$\begin{bmatrix} \boldsymbol{y}_1 \\ \boldsymbol{y}_2 \end{bmatrix} = \begin{bmatrix} \boldsymbol{X}_1 & 0 \\ \boldsymbol{X}_2 & \boldsymbol{X}_2 \end{bmatrix} \begin{bmatrix} \boldsymbol{\beta}_o \\ \boldsymbol{\delta}_o \end{bmatrix} + \begin{bmatrix} \boldsymbol{e}_1 \\ \boldsymbol{e}_2 \end{bmatrix},$$

where $\boldsymbol{y}_1$ and $\boldsymbol{y}_2$ are $T_1 \times 1$ and $T_2 \times 1$, $\boldsymbol{X}_1$ and $\boldsymbol{X}_2$ are $T_1 \times k$ and $T_2 \times k$, respectively. The null hypothesis is $\boldsymbol{\delta}_o = 0$. How would you test this hypothesis based on the constrained and unconstrained models? (10%)

4. A random sample of size n, $X_1, X_2, \ldots, X_n$, is taken from the pdf

$$f_X(x;\theta_o) = 2x\theta_o^2, \; 0 \leq x \leq \frac{1}{\theta_o},$$

where θ_o is the unknown parameter of interest. Let $\hat{\theta}_{mm}$ denote the Method of Moments estimator for θ_o, and $\hat{\theta}_{ml}$ the Maximum Likelihood estimator for θ_o.

(a) Find $\hat{\theta}_{mm}$ and $\hat{\theta}_{ml}$. (10%)

(b) Is $\hat{\theta}_{ml}$ unbiased? (5%)

(c) Is $\hat{\theta}_{ml}$ a consistent estimator for θ_o? (5%)

備註	試題隨卷繳交