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| 考 試 科 目 | 個體經濟學 | 所 別 | 經濟學系 | 考試時間 | 3 月 6 日(六) 第二節 |
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1. (20 分) A decision maker has to allocate his initial wealth $w_0 > 0$ between two assets. One asset is risk free and pays a certain return of 1 for every dollar invested. The other is risky; its return per dollar invested is given by the random variable r which takes on two values, i.e. either values r^H or r^L . Let $a \in [0, 1]$ be the fraction of wealth invested in the risky asset. So future wealth is $w = (1 - a)w_0 + aw_0r$. Consider the decision maker is a von-Neumann Morgenstern expected utility maximizer with payoff function for future wealth $U(w)$. Assume that $u'(w) > 0$ and $u''(w) < 0$ for all w . What kind of condition(s) for the expected return of the risky asset do we need, i.e. $E(r)$, in order to obtain a positive value of the optimal choice of a ?
2. (30 分) An individual has the utility function $U(h, c) = hc$. (h : leisure, c : consumption; $P_c = \$1$). There are 24 hours in a day, and $w = \$1$ is the market wage rate per hour. Non-earned income is \$10. Please compute the compensating variation (CV) and equivalent variation (EV) to the individual for each of the following government policies.
- (1) The government decides to impose an income tax on both the wage income and the non-earned income. The income tax rate is 50%. (10 分)
 - (2) The government decides to impose a minimum hourly wage as \$2 per hour only for the first 3 hours worked. (10 分)
 - (3) The government decides to impose a minimum work-hour requirement as 8 hours per day, i.e. the individual has to work at least 8 hours a day. (10 分)
3. (25 分) 假設市場上有多家同質廠商，每一家廠商的成本函數如下：

$$TC(q) = 5q$$

其中 q 為代表性廠商的產量。令市場的需求函數如下：

$$P = 1005 - Q$$

其中 Q 為市場需求量。請回答以下問題：

- (1) 在完全競爭市場下，試問市場的長期均衡價格、數量，消費者剩餘各為何？並請畫圖來表示所求出的結果。(8 分)
- (2) 若所有的廠商聯合起來，形成一家獨佔廠商，試問該獨佔廠商的利潤為何？請求出獨佔市場的形成所造成的社會福利損失？並請畫圖來表示所求出的結果。(8 分)

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(3) 何謂 Lerner index? 根據以上的資料, 請在完全競爭市場以及獨佔市場下, 分別求出 Lerner index 的數值。(9分)

4. (25分) 若市場中有 n 家同質的廠商, 每一家廠商的成本函數如下:

$$TC(q) = F + cq + dq^2$$

其中 q 為代表性廠商的產量, F 為廠商的固定成本, 而 c 與 d 均為正值的係數。請回答以下問題:

- (1) 何謂 minimum efficient scale (MES)? 試問代表性廠商之 MES 的值為何? (8分)
- (2) 若廠商在市場中從事 Cournot 競爭, 在短期均衡下, 試問代表性廠商之產量為何? 市場的價格為何? (8分)
- (3) 若廠商可以進出市場, 在長期均衡下, 試問市場中的廠商家數為何? (9分)



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1. 底下是一簡單凱因斯 IS-LM 模型：(25%)

$$Y = C(Y - T) + I(i) + G,$$

$$L(Y, i) = M / P.$$

- (1) 試根據此模型及圖形分析 H1N1 病毒風暴是否會導致台灣經濟的蕭條？
- (2) 目前利率已低於 1%，試根據此模型及圖形分析政府採用寬鬆貨幣政策，是否會回復經濟的景氣？

2. 底下是有關減稅方案的經濟效果議題：(25%)

- (1) 何謂 Laffer Curve？試根據以上凱因斯 IS-LM 模型及數學來說明。
- (2) 美國歐巴馬總統上任後，提出減稅方案來解解救經濟的蕭條；試根據凱因斯學派及供給面經濟學派，以圖形來分析減稅方案的總體經濟效果。



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3. Consider an imaginary economy described by the Solow model of economic growth, with the production function given by $Y = K^\alpha L^{1-\alpha}$, where $\alpha = 0.3$. The labor force is growing at the rate of $n = 0.02$. Assume that the capital stock depreciates at a constant rate $\delta = 0.10$.

- (1) Calculate the steady state levels of output per worker (y), capital per worker (k) and consumption per worker (c) for the following savings rates: $s = 0.25, 0.29, 0.31, 0.33$. (8%)
- (2) What is the "Golden Rule" savings rate for this imaginary economy? Calculate steady state consumption at the Golden Rule savings rate and compare it to the 4 values you calculated above. (6%)
- (3) Explain in your own words which of the above savings rates may be categorized as "inefficient over saving." (6%)

4. (1) How does an increase in desired national saving in a large open economy affect the world real interest rate? (5%)
- (2) How does an increase in desired investment affect it? (5%)
- (3) Why do changes in desired saving or investment in large open economies affect the world real interest rate but changes in desired saving or investment in small open economies do not? (5%)

5. Suppose that the central bank does not always react systematically to changes in macro-economic conditions so that monetary policy may be described by the interest rate rule:

$$r_t = \bar{r} + h(\pi_{t,t-1}^e - \pi^*) + a_t, \quad h > 0,$$

where a_t is a 'white noise' stochastic variable reflecting the non-systematic part of monetary policy. The above equation states that the central bank bases its policy decisions on the expected inflation gap, since it does not have full information on the current inflation rate at the time when it sets the interest rate. For simplicity, assume that the central bank does not react to the expected output gap and expectations are rational.

As usual, the economy's demand and supply sides are described by:

Goods market equilibrium: $y_t - \bar{y} = z_t - \alpha(r_t - \bar{r})$,

Short-run AS: $\pi_t = \pi_{t,t-1}^e + \gamma(y_t - \bar{y}) + s_t$,

where z_t and s_t are white noise reflecting demand and supply shocks.

- (1) Show that the variance of output is given by $\sigma_y^2 \equiv E[(y_t - \bar{y})^2] = \sigma_z^2 + \alpha^2 \sigma_a^2$, where σ_z^2 and σ_a^2 are the variances of z and a , respectively. (5%)
- (2) Is monetary policy 'effective' in this model? (5%)
- (3) What would be the effect of greater predictability of monetary policy? Discuss. (5%)

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1. A random sample of size n , Y_1, Y_2, \dots, Y_n , is taken from the pdf

$$f_Y(y; \theta_o) = cy\theta_o^2, \quad 0 \leq y \leq \frac{1}{\theta_o},$$

where c is a constant and 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 .

- Find $\hat{\theta}_{mm}$ and $\hat{\theta}_{ml}$. (5%)
 - Is $\hat{\theta}_{ml}$ unbiased? (5%)
 - Show the Cramér-Rao lower bound in this case. (5%)
 - Is it possible that the variance of an unbiased estimator is less than the derived Cramér-Rao lower bound in (c)? Why or Why not? (5%)
 - Is $\hat{\theta}_{mm}$ a sufficient estimator for θ_o ? Why or Why not? (5%)
 - Is $\hat{\theta}_{ml}$ a consistent estimator for θ_o ? Why or Why not? (5%)
2. Let X_1, X_2, \dots, X_n and Y_1, Y_2, \dots, Y_m be independent random samples from normal distributions with mean μ_X and μ_Y and standard derivations σ_X and σ_Y , respectively.
- If σ_X and σ_Y are known, derive a $100(1 - \alpha)\%$ confidence interval for $\mu_X - \mu_Y$. (5%)
 - For testing $H_0: \sigma_X^2 = \sigma_Y^2$ versus $H_1: \sigma_X^2 \neq \sigma_Y^2$,
 - Derive the likelihood ratio test statistic in detail. (5%)
 - Explain how to implement the likelihood ratio test given the significance level α . (5%)
3. Show the “memoryless property” of the geometric random variable X . (5%)

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4. In the model $y_t = \alpha + \beta x_t + e_t$, with x_t non-stochastic. Assume that $E(e_i) = 0$ and $E(e_i^2) = \sigma_0^2$. Giving the following sample moments:

$$\sum_{t=1}^{10} y_t = 8, \quad \sum_{t=1}^{10} x_t = 40, \quad \sum_{t=1}^{10} y_t^2 = 26, \quad \sum_{t=1}^{10} x_t^2 = 200, \quad \sum_{t=1}^{10} x_t y_t = 20.$$

Assume that this model holds for $x_{11} = 10$ and $x_{12} = 12$.

- Calculate the best linear unbiased predictor of y_{11} and y_{12} . (5%)
 - Estimate the standard error of your forecast in (a). (10%)
 - If the realized values for y_{11} and y_{12} are 0.5 and 0.6 respectively, test the null hypothesis that $H_0 : E(e_{11}) = 0$ and $H_0 : E(e_{12}) = 0$ at the 5% level. State additional assumption you need to carry the test. (15%)
5. Let e_0, e_1, \dots, e_T be a sequence of independent and identically distributed $N(0, \sigma_0^2)$ random variables for some σ_0^2 . Assume that
- $$y_t = \alpha_0 + \beta_0 e_{t-1} + e_t, \quad t = 1, \dots, T,$$
- for some α_0 and β_0 .
- Please derive the variance of y_t . (5%)
 - Please derive the autocovariances, $cov(y_T, y_{T-k}), k = 1, 2, \dots, T-1$. (5%)
6. Assume that $y_t = \beta_1 x_{t1} + \beta_2 x_{t2} + u_t$, $E(u_t) = 0$, $E(u_t^2) = \sigma^2$, $E(u_t u_s) = 0$. All variables have zero mean. If β_1 is estimated from the regression of y on x_1 with x_2 omitted, show that the resulting estimate is biased but has smaller variance than the estimate with x_2 included. (10%)