

**AUSTRALIAN NATIONAL UNIVERSITY**

*First Semester Examination 2008*

**PRINCIPLES OF PUBLIC ECONOMICS**

**(ECON8034)**

*Writing period: 3 Hours duration*

*Study period: 30 Minutes duration*

*Permitted materials: Non-programmable Calculators*

*You must attempt to answer all questions.*

*All questions to be completed in the script book provided.*

### **QUESTION 1**

The meaning of inequality comparisons depends critically upon the axiomatic basis that is specified for the inequality rule.

- (a) Provide the intuition for the transfer principle, the population principle and decomposability. (3 points)
- (b) Provide also the intuition for translation independence and scale independence, and show graphically that, for meaningful inequality comparisons, they cannot both be true at the same time. (3 points)
- (c) Explain the Lorenz curve approach to measure inequality. Which of the above principles lie behind this measure and why? (4 points)

### **QUESTION 2**

Consider the Cobb-Douglas utility function

$$U = (Y^i - T^i)^{1-\alpha} G^\alpha$$

with  $0 < \alpha < 1$ . Tax revenues are used to finance a public good  $G$ .

- (a) Suppose that a poll tax  $T^i = T$  for all  $i$  is levied on each of  $N$  members of society. Show that the majority voting outcome involves the amount of public good  $G = \alpha N Y^m$ , where  $Y^m$  denotes the before-tax income of the median voter. (4 points)
- (b) Now suppose that a proportional income tax  $T^i = tY^i$  is levied. Show that the majority voting outcome involves the amount of public good  $G = \alpha N \bar{Y}$ , where  $\bar{Y}$  is the mean income level. (4 points)
- (c) Which is the relationship between the outcomes found in parts (a) and (b) when income is uniformly distributed? (2 points)

### **QUESTION 3**

Suppose that two firms emit a certain pollutant. The marginal cost of reducing pollution for each firm is as follows:  $MC_1 = 300e_1$  and  $MC_2 = 100e_2$ , where  $e_1$  and  $e_2$  are the amounts (in tons) of emissions reduced by the first and second firms, respectively. Assume that in the absence of government intervention, firm 1 generates 100 units of emissions and firm 2 generates 80 units of emissions.

- (a) Suppose regulators decide to reduce total pollution by 40 units. In order to be cost effective, how much should each firm cut its pollution? (2.5 points)
- (b) What emissions fee should be imposed to achieve the cost-effective outcome? How much would each firm pay in taxes? (2.5 points)
- (c) Suppose that instead of an emissions fee, the regulatory agency introduces a tradable permit system and issues 140 permits, each of which allows the emission of one ton of pollution. Firm 1 uses its political influence to convince the regulatory agency to issue 100 permits to itself and only 40 permits to firm 2. How many, if any, permits are traded between the firms? By how many tons does each firm end up reducing its pollution? (2.5 points)
- (d) Provide a graphical representation. (2.5 points)

#### **QUESTION 4**

Voting and redistribution:

- (a) Assume that the distribution of personal income is skewed, with the average level of income,  $y^a$ , exceeding the median income,  $y^m$ . A majority therefore has below-average income. Show formally that, when individuals vote on the rate of income taxation, all tax revenue is to be equally redistributed, and there are no efficiency losses from taxation (there are no incentive effects of taxation and so no excess burden), the median voter will maximize utility by choosing appropriative taxation. How large will the majority in favor of appropriative taxation actually be? (4 points)
- (b) How do incentive effects of taxation change the self-interested outcome of majority voting on taxation and income redistribution found in part (a)? (2 points)
- (c) How does social mobility affect incentives to vote for income redistribution? (2 points)
- (d) How can majority coalitions on voting for income redistribution form without the inclusion of the voter who has the median income in the population? Which particular coalition is suggested by the presence of tax-financed entitlements for the poor? (2 points)

#### **QUESTION 5**

Political behaviour and public policy:

- (e) What are the sources of the principal-agent problem between voters and elected political representatives? (2.5 points)
- (f) What problems deter voters from solving the principal-agent problem with political representatives? What would a solution to the principal-agent problem require? (2.5 points)
- (g) Resolving the principal-agent problem between shareholders and management creates a principal-agent problem between shareholders and political decision makers. Why is this so? (2.5 points)
- (h) Why does political advertising introduce an anomaly into the principal-agent relationship between voters and politicians? What does evidence from the voting behaviour of lame-duck politicians indicate about principal-agent problems between voters and elected representatives? (2.5 points)

#### **QUESTION 6**

The trade-off between efficiency and equity is always at the heart of all tax debates.

- (a) Explain this tension with reference to the differences between proportional and progressive linear income tax schedules. Support your explanation with a graph. (5 points)
- (b) Explain also how nonlinear income tax structures may be able to increase the amount of redistribution without increasing the deadweight loss associated with the tax. Support your explanation with a graph. (5 points)