

UNIVERSITY OF OSLO
DEPARTMENT OF ECONOMICS

Postponed exam: **ECON4620 – Public Economics, spring 2012**

Date of exam: Thursday, June 14, 2012

Time for exam: 09:00 a.m. – 12:00 noon

The problem set covers 2 pages

Resources allowed:

- No resources allowed

The grades given: A-F, with A as the best and E as the weakest passing grade. F is fail.

Problem 1 (weight 50%)

Consider the provision of a public good.

- a) What is the condition for a first best socially efficient amount of a public good?
- b) Is the amount uniquely determined by this condition?

In guidelines for cost-benefit analysis, it is often stated that when assessing the cost of a public good that is tax-financed one should augment the resource cost by a factor greater than one, to allow for the marginal cost of public funds.

- c) Discuss this recommendation and give a critical assessment.

You may make use of formulas from the appendix below to the extent that you find it helpful.

Appendix

The following formulas appear in articles on the reading list:

$$\frac{HU_G}{\alpha} = \frac{\lambda}{\alpha} \left(p_G - tH \frac{\partial X}{\partial G} \right)$$

$$\sum MRS_{GX}^i = p + \frac{\lambda \hat{V}_X^2}{\gamma} \left[\widehat{MRS}_{GX}^2 - MRS_{GX}^1 \right]$$

$$\sum_{h=1}^2 n_h MRS_{GB}^h = r + \lambda * \{ \widehat{MRS}_{GB}^2 - MRS_{GB}^1 \} - \sum_{h=1}^2 n_h \sum_i t_i \frac{\partial x_i^h}{\partial G}$$

X is the amount of a private good

x_i^h is agent h 's consumption of private good i

G is the amount of a public good

B is disposable income

n_h is the number of agents of type h

H is the total number of agents

p , p_G , or r is the production cost per unit of the public good

t and t_i are tax rates on consumption goods

U and V denote utility functions

MRS denotes a marginal rate of substitution

Superscripts, \wedge , and $\hat{}$ denote various types of agents

λ^* is a positive parameter, and the other Greek letters are positive Lagrange multipliers as defined in the respective articles

Problem 2 (weight 20%)

In the absence of taxes the user cost of capital of a profit maximising firm in a competitive economy can be expressed as $iq_{t-1} + \delta q_t - (q_t - q_{t-1})$ where q_t is the price of capital in period t , i is the interest rate, and δ is the depreciation rate. Suppose a profit tax is levied on firms.

- What is the meaning of a profit tax being neutral?
- What is the appropriate depreciation allowance? Explain your answer.
- What is the case for interest deductibility?

Problem 3 (weight 30%)

Consider an open economy producing a homogeneous good by means of labour, L , and capital, K , where the macro production function $F(K, L)$ exhibits constant returns to scale and has standard properties. There is a fixed amount of labour, which is immobile. Capital is mobile across borders. Let $k = K / L$, and per capita production is $y = f(k)$. The country levies a source-based tax on capital with tax rate t .

- Suppose the country maximises $y = f(k) - f'(k)k + tk$. Explain this objective function.

Now suppose there are two identical countries of the type described above, labelled 1 and 2, respectively. The aggregate amount of capital in the two countries is fixed.

- Explain the equilibrium condition: $f'(k_1) - t_1 = f'(k_2) - t_2$.
- Interpret the following effects: $\frac{dy_1}{dt_1} = k_1 + t_1 \frac{dk_1}{dt_1} - k_1 f''(k_1) \frac{dk_1}{dt_1}$.
- Suppose the countries play a tax-setting game and discuss the properties of the Nash equilibrium. (Formal analysis is not required.)