

Exam: "Economics III" (Public Economics)

Examiner: Dr. Carsten Helm/Dr. Bertrand Koebel

Semester: Winter 2001

The following aids can be used: None

Examination questions:

Question 1 (40 %): Athens plans to substantially expand its subway system. It asks you to undertake a cost-benefit analysis of this public project.

1. (5%) In comparison to a private investment decision, what additional effects have to be taken into account in a cost-benefit analysis of this public project.
2. (15%) Denote the costs and benefits at time t for this project by c_t and b_t . Explain the decision rules based on the *absolute net present value*, the *relative net present value*, and the *internal rate of return*. Briefly elaborate on the advantages and disadvantages of these three decision rules.
3. (15%) Assume that the project requires large amounts of cement, so that it leads to a shift of the supply function for cement in the rest of the economy (we assume, however, that the project does not affect the demand for cement in the rest of the economy). Illustrate graphically the change in consumers' and producers' surplus associated with this shift of the supply function for cement in the rest of the economy.
4. (5%) The benefits of a project can be measured by its beneficiaries' aggregate *willingness to pay*. Given the above effect of the project on the supply of cement, is it appropriate to use the competitive market price for cement as a measure of the willingness to pay?

Question 2 (60%):

1. (5%) Define the notion of a public good and illustrate it with an example.
2. (5%) Give an example of a public good which is supplied by private firms. Give an example of a private good supplied by the State.
3. In a two consumer economy, let $u_i(c_i, g)$ characterize the utility level of consumer $i = 1, 2$, achieved for a level c_i of private good consumption and a level g of public good consumption. The prices of the private and the public good are respectively p_c and p_g . For producing g the State has to pay $p_g g$. Each consumer faces the budget constraint $p_c c_i + p_g g_i = b_i$, where b_i is an exogenously given budget and g_i is agent i 's contribution to the public good ($g_1 + g_2 = g$).

- (a) (10%) Give the expression for the conditions which have to hold for a Pareto-optimal allocation (c_1^*, c_2^*, g^*) . Interpret these conditions.
- (b) (5%) Give the first order conditions arising from individual utility maximization.
- (c) (5%) Which conclusions can you draw by comparing your solutions to Questions 2.3.a and 2.3.b ?
4. Now, assume that instead of p_g the State is able to ask differentiated prices p_{g_i} to both consumers for their consumption of g .
- (a) (10%) Show that there exist individual values $p_{g_i}^*$ that could be chosen by the State such that the allocation achieved by utility maximizing consumers is Pareto-optimal.
- (b) (5%) Interpret this tariffication policy and discuss the problems that the State would encounter when implementing it.
5. (15%) Now, the State decides to finance the production of the public good g by levying a value tax (at rate t) on the private good, so that individual i 's budget constraint becomes $p_c (1 + t) c_i = b_i$. The State's balanced budget condition is $p_g g = p_c t (c_1 + c_2)$. The utility functions are given by

$$u_1(c_1, g) = c_1^2 + g^2$$

$$u_2(c_2, g) = 10c_2^2 + 10g^2.$$

In addition it is known that $p_c = 1$, $p_g = 2$, $b_1 = 2$ and $b_2 = 4$. Show that there exists a tax rate t^* that could be chosen by the State such that (i) the State's budget is equilibrated and (ii) the allocation achieved by utility maximizing consumers is Pareto-optimal (that is, it fulfills the condition you obtained in question 2.3.a). Compute the corresponding values t^* , g^* , c_1^* and c_2^* .

Examination: Economic policy **Wintersemester: 2000/2001**
Examiner: Dr. G. Groh
The following aids can be used: None
Hint: Again, 80 of the 100 points attainable are regarded as the maximum number one can reach in the time available.

Examination questions:

1. (23 points: (a): 7, (b): 7, (c): 9)

What are the consequences of

- an increase in government expenditure
- a reduction of the money supply

in an IS-LM-framework, if

- (a) the investment function does not depend on the rate of interest
 (b) the money demand is independent of the rate of interest.

Illustrate the different effects for both cases graphically and give a short explanation for the results.

- (c) Assume now additionally, that private consumption also depends on the real money balances in a positive way. What will happen under the conditions of (a) and (b), if there is a decline in the general price level (and everything else remains unchanged)?

2. (24 points: (a): 11, (b): 10, (c): 3)

Consider the following concrete form of an IS-LM-model:

$$\begin{aligned}
 C &= 0.8(Y - \bar{T}), & \bar{T} &= 150; \\
 I &= 190 - 200(r - \pi^e), & \pi^e &= 0.05; \\
 \bar{G} &= 150; \\
 Y &= C + I + \bar{G} \\
 \frac{M^d}{p} &= 0.5Y + 700 - 4500r; \\
 \frac{\bar{M}}{p} &= 525
 \end{aligned}$$

- (a) Determine on this basis analytically the equilibrium values for the following variables:
- real income Y
 - nominal rate of interest r
 - real national savings S .
- (b) By which amount $\Delta \bar{G}$ would government expenditure have to rise in order to raise the equilibrium income by an amount of $\Delta Y = 270$?
- (c) By which amount is private investment reduced as a consequence of the measure in (b)?

3. (18 points: (a): 10, (b): 8)

Consider the IS-LM-model with endogenous money supply.

- (a) Derive in a straightforward way the deposit multiplier and the money multiplier, making directly use of the definitions of H and M . On which magnitudes does the money multiplier depend and in which way?
- (b) Derive the LM-curve under the conditions of endogenous money supply in a graphical way. In which regard does it differ from the “usual” LM-curve?

4. (15 points: (a): 12, (b): 3)

- (a) Explain graphically and verbally the problem of time-inconsistency of discretionary monetary policy.
- (b) Imagine a “hard-nosed” central banker, who is only concerned about inflation but not at all about unemployment. How would his indifference curves look like and what would be the consequences for the sustainable rate of inflation?

5. (20 points: (a): 10, (b): 10)

- (a) Suppose, a country wants to improve its current account by a devaluation of its currency. Assume furthermore, that the domestic as well as the foreign price level are both equal to one and that the current account is initially in equilibrium. Derive the condition, that must be met to achieve this goal, making use of the above assumptions. How is this condition called in economic literature?
- (b) Consider now the Mundell-Fleming model of an open economy. Show graphically the consequences of a decline in government expenditure under flexible exchange rates and high (but not perfect) international mobility of capital and give a short (verbal) description of the adjustment process.