Adv. PE I: Tutorial Questions for Chapter 2

Severin Weingarten*

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1 The Public Good Model (Section 2.1)

Answer question 1 from the winter 2012 exam.[1]

2 Tax Competition and Infrastructure Spending (Section 2.3)

Use the model-on-one-page to answer the following questions about the model discussed in section 2.3 of the course.

a) Which equations do you consider assumptions? Explain the intuition of each assumption in one or two sentences.

Intuitively, the model has two main results: Firstly, competitive governments will provide the efficient amount of infrastructure and secondly, the capital tax is not sufficient to finance all infrastructure spending if $\lambda < 0$. The immobile factor (e.g. labor) will be required to cover the remaining costs.

b) Which mathematical operations are necessary to arrive at these results?

c) Which equations do you have to interpret to come up with the intuition given above?

3 Extension: Tax Harmonization (Section 2.3)

The result that the immobile factor has to cover some of the infrastructure costs in the model in section 2.3 is undesirable for various reasons (see Sinn 2003, p. 45). In class you showed that a **self-financing constraint on capital** is an appropriate remedy for this situation. Here we look more closely at another policy measure, which was only mentioned briefly in class.

a) Modify the original model (ignore the part about the self-financing constraint) to incorporate **tax harmonization**:

$$\tau = \tau^i = \tau^j \quad \forall i, j$$
$$\tau > c_K K$$

How do the main results of the modified model compare to the results of the original model discussed in class?

Hints:

1. *Since the tax is now fixed, the government can no longer set K but has to take it as given. Maximize the government's R assuming that it can only set W but not K. The government takes into account that changes in K will cause changes in W (i.e. $\frac{\partial K}{\partial W}$).*

*Chair of Public Finance, severin.weingarten@uni-jena.de, http://sweingarten.de/

[1] Past exams can be downloaded from the website of the chair: http://www.fiwi.uni-jena.de/Teaching/Archive+_+Past+Exams+.html

This was not the case in the model considered in class, because the government could just set K to whatever value it considered optimal.

2. *Use the firms' first-order-condition to simplify the resulting condition. You should be able to say something about the sign of all variables in this equation except $\frac{\partial K}{\partial W}$.*
3. *Use a total derivative of the firms' first-order-condition to show that $\frac{\partial K}{\partial W}$ is always positive.*
4. *Look at the equation derived in step 2. Given that we know all the signs, does the result satisfy the Samuelson condition?*

b) How can this result be explained intuitively?