

Adv. PSE I: Tutorial 01

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1 Erosion of Source Taxes (Ch. 2.0)

In the lecture you graphically derived the main result of the model in chapter 2.0: The rent to the immobile factor (which can be interpreted as labour or land) falls if the government increases the capital tax rate.

Derive this result formally! Use the following production function:

$$f(K, L) = \sqrt{KL}.$$

Hints:

1. Maximize firm profits over K , to get the optimal K from the point of view of the firm.
2. Look at the graph derived in class. Use an integral to calculate the size of the area representing the rent to the immobile factor. Use the optimal K in this calculation.
3. Differentiate the result (the size of the area) with regard to τ . You should find that the rent to the immobile sector decreases as τ increases. Done.

2 The Interest Rate and the Number of Countries (Ch. 2.1)

Use the graph presented in class to illustrate how the number of countries n affects the results of the model!

Hint: The graph doesn't change a lot. Only the horizontal line representing taxes and interest rates is drawn differently depending on n .

3 Policy Measures to Stabilize Tax Policy (Ch. 2.1)

The main result of the model in chapter 2.1 is that public good provision will be inefficiently low. Two policy measures were mentioned in class: a) tax coordination and b) information exchange.

Show formally that both of these measures prevent underprovision!

Hints a):

1. Totally differentiate the first-order condition $f_k = r + \tau^i$ with regard to k^i , τ^i , and τ^j . (In class we did the same but we only differentiated for k^i and τ^i .)
2. Now assume that $d\tau^i = d\tau^j$ (i.e. countries coordinate tax adjustments) and solve for $\frac{dk^i}{d\tau^i}$. You should get zero.
3. What does this result imply regarding the rest of the model?

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Hints b):

1. Assume that the tax does no longer enter into the firm's maximization problem but rather decreases private consumption c by $\tau\bar{k}$.
2. Assume that the government can now spend $\tau\bar{k}$ rather than τk on the public good.
3. Calculate the results for this modified version of the model as you did in class with the original version. You should find that $u_g = u_c$. What does that imply?

4 Tax Base Equalization (Ch. 2.2)

Chapter 2.2 does not feature an own model but rather shows how the model in chapter 2.1 can be extended to include a tax equalization scheme. According to the results of this chapter a tax base equalization scheme leads to the efficient provision of public goods if it reimburses $\gamma = 100\%$ of the standardized tax revenue lost due to the deviation of a country's capital stock k^i from the average capital stock \bar{k} .

In class you calculated $\frac{dg}{d\tau^i}$ (equation 30). Now, show formally that $\gamma = 1$ implies allocative efficiency!

Hints:

Here you are required to calculate the model of chapter 2.1 again. The procedure is the same as in chapter 2.1 (starting at equation 21). The main difference is that the tax base equalization scheme has to be added to the second argument of $u(\dots)$ in the maximization problem of the government (equation 21).