

# Exam

## *Adv. PSE I: Systems Competition*

Wirtschaftswissenschaftliche Fakultät der Friedrich-Schiller-Universität Jena  
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7 March 2014

First name:		Last name:	
Student ID:		Study programme:	

**Please note:**

- (a) The exam consists of 10 pages including this one. Please check whether your copy of the exam is complete.
- (b) The exam consists of 3 questions. The maximum number of points is 60. You have 60 minutes to complete the exam.
- (c) Please answer the questions by writing into the boxes provided after each question. **Do not use your own paper!** Fill your name and student ID number into the form at the top of each page.
- (d) If not defined otherwise, variables have the same meaning as in class. Please make sure that your answers are clearly legible and without any ambiguity. Your answers have to be tractable. If you use diagrams, make sure to label and explain them.
- (e) You may use a calculator, but it must not have a text storage function. You may use a dictionary, but it must not contain any notes.
- (f) It is your own responsibility to hand in your copy of the exam to the supervisory staff at the end of the exam.

Question	1	2	3	Sum	Grade
Max. no. of points	20	20	20	60	
No. of points received					

### Question 1: Tax Competition (20 Points)

In class, we went through two models of tax competition between  $n$  countries. Here, we will look at the one where the government provides a regular public good.

A representative firm uses capital  $k$  and labor  $l$  to produce a normal good. The firm maximizes its profits:

$$\max_{k,l} \pi = f(k,l) - (r + \tau)k - wl \quad (1)$$

Assuming that countries are symmetric and that no capital remains unused, we can calculate the following equation:

$$\frac{\partial r}{\partial \tau^i} = -\frac{1}{n} \quad (2)$$

We can also calculate the first-order condition of (1), totally differentiate it, and combine it with (2) to arrive at:

$$\frac{\partial k^i}{\partial \tau^i} = \frac{n-1}{n} \frac{1}{f_{kk}^i} \quad \frac{\partial k^j}{\partial \tau^i} = -\frac{1}{n} \frac{1}{f_{kk}^j} \quad (3a, 3b)$$

#### Question 1(a) (8 Points)

- (a1) Explain the economic intuition of equation (2). What does the term on the left-hand side stand for? Why is the right-hand side negative? Why does the number of countries  $n$  appear on the right-hand side?

- (a2) Explain the economic intuition of equations (3a, 3b)!

We will now look at the optimization problem of the government. It maximizes the utility of a representative household by setting the capital tax rate  $\tau$ . The representative household obtains utility from private consumption  $c$  and from the consumption of a tax-financed public good  $g$ .

$$\max_{\tau} u \left[ \underbrace{f(k) - f_k k + r\bar{k}}_c, \underbrace{\tau k}_g \right] \quad (4)$$

From this maximization calculus we can obtain the following first-order condition:

$$u_g = u_c \frac{1}{1 + \frac{\partial k}{\partial \tau} \frac{\tau}{k}} \quad (5)$$

**Question 1(b)** (8 Points)

(b1) Is (5) optimal from the point of view of a social planner and, intuitively, how can you tell? Why do we get this result?

(b2) How can one calculate the optimal result from the point of view of a social planner? Do the calculation or describe how you would do it.

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**Question 1(c)** (4 Points)

The heads of government of all countries in our model meet for talks about their tax policies. What sort of international agreement would they have to reach to solve the problem described by our model? Describe the contents of the agreement and explain why it would work. (There are a number of correct answers to this question. Please stick to a single one.)

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**Question 2: Competition of Competition Rules** (20 Points)

**Question 2(a)** (6 Points)

When we talked about the competition of competition rules in class, we used two oligopoly/duopoly concepts. Compare the two concepts. What do they have in common and how do they differ? (Think about assumptions, results, and the approaches used to obtain the results.)

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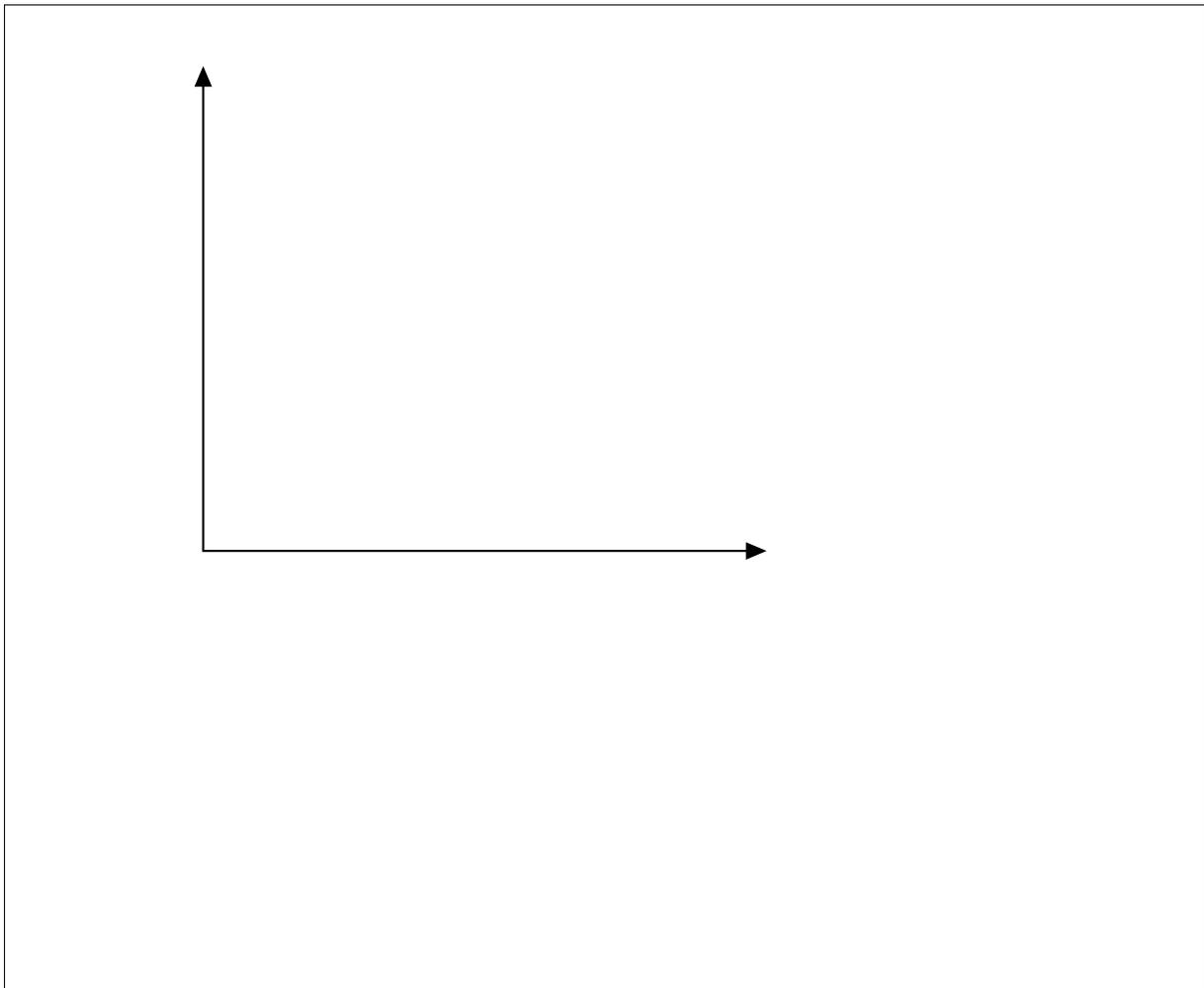
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**Question 2(b)** (6 Points)

When we compare welfare across different oligopoly situations, we often use aggregate output as an indicator of welfare.

Use a diagram to explain why this simplification is possible. Does aggregate output also tell us something about the division of welfare among consumers and producers? If yes, what exactly does it tell us?

Do not forget to label your diagram properly!



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**Question 2(c)** (8 Points)

In class, we talked about a model by Sinn (2003). The model contains a deregulation race where countries abandon their antitrust laws one after another.

- (c1) Which condition has to be fulfilled for a country to be able to start the race? Why would this country want to start the race? Base your answer on the oligopoly concepts discussed above.

- (c2) How does overall welfare at the end of the deregulation race compare to overall welfare in a situation where all countries uphold their national antitrust policies? Explain!

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### Question 3: Multiple-choice Questions (20 Points)

You will be *awarded one point* for ticking a correct statement and for not ticking an incorrect statement. You will *neither receive nor lose points* for marking statements incorrectly.

#### Question 3(a) The Erosion of the Welfare State (5 Points)

In the model by Poutvaara (2008) the government of each country sets two tax rates and decides how many individuals will receive an education which will make them internationally mobile after graduation.

Are the following conditions necessary to ensure that a government will provide the socially optimal amount of internationally applicable education?

Correct?

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- The government must not care about the consumption of immigrants.

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  - The government must be able to levy a tax on the wages of all individuals who work domestically.

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  - The government must be able to levy a tax on the wages of all individuals who were educated domestically—regardless of where these individuals work.

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In the model by Thum and Übelmesser (2002) the old generation decides about (1) the extent of redistribution from the young to the old and (2) the extent to which the education of the young will be applicable abroad.

Correct?

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- The model builds on the idea that, in a closed economy, the young will underinvest in education: they fear that if they invested more, the old generation would capture the payoff from the investment by increasing taxes.

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  - If the government decides to provide a lot of internationally applicable education, it will have to choose a higher tax rate to obtain the same tax revenues as in a closed economy.

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**Question 3(b) Environmental Regulation (5 Points)**

The following five items refer to a group of models about emissions and spillovers that were discussed in class.

Correct?

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- In a closed economy without spillovers governments can achieve allocative efficiency by levying a Pigovian tax on emissions.

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  - If the damage of all emissions spreads evenly across the world, governments will set a tax rate that leads to an efficient result.

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  - The regulatory decision of country  $i$ 's government is affected by the extent of the damage that other countries' emissions cause in country  $i$ .

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Now assume that there are no spillovers but that polluting firms are jointly owned by natives and foreigners. Governments only care about the welfare of their own citizens. Assuming that you do not know the exact parameters of the model, is it likely that governments will regulate in a way that leads to allocative efficiency if they only use ...

Correct?

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- permanent tradeable emission permits?

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  - environmental standards?

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**Question 3(c) The Competition of Product Standards (5 Points)**

Consider the market for machines used in the construction industry. Manufacturers offer machines of different qualities. Safer machines are more expensive to manufacture. Buyers cannot assess the quality of a machine before they buy it.

Correct?

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- This is a case of ex-ante moral hazard.

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  - A selection process will set in. It will end when only machines of medium and lower quality are left on the market.

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  - A government that aims to maximize the total welfare of all market participants will enact safety standards that satisfy the following condition: the marginal cost of an increase in quality equals the marginal utility of an increase in quality.

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  - Assume that regulation is justified by the selection principle in a closed economy. Is it likely that buyers will be able to tell whether or not governments are overregulating if borders are open and governments engage in systems competition?

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  - Governments that are engaged in systems competition can no longer enact regulation that affects the profits of machine manufacturers in their own country.

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**Question 3(d) Lemon Banking** (5 Points)

Correct?

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- The bankruptcy externality discussed in class is caused by the fact that depositors are risk averse, while bank owners are risk neutral.

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  - Banks never invest more into safe assets than the regulatory minimum.

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  - Assume (1) that bank owners are liable for all losses of their banks, (2) that they have the necessary cash on hand, and (3) that the government is not currently regulating the banking industry. The government can increase overall welfare by introducing a small minimum requirement for investments into safe assets.
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Equation (6) is taken from the model on banking regulation that was discussed in class.  $\alpha$  is the share of natives among the depositors of national banks and  $\beta$  is the share of natives among the owners of national banks.

$$\frac{\partial W}{\partial \varepsilon} = (\alpha - \beta) (1 - p(q)) s + \alpha \frac{dq}{d\varepsilon} p'(q) (rF - s\varepsilon) \quad (6)$$

According to the equation ...

Correct?

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- If  $\alpha = \beta$ , the government will set a minimum requirement for investments into safe assets that leads to a social optimum.

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  - If  $\beta > \alpha$ , the redistributive effect and the risk reduction effect of an increase in the required amount of safe investments run in opposite directions.
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