These are solutions to the first home assignment for the course of Public Finance. Once we grade your solution, you will see your points in the section Study group roster in the SIS. You could have obtained up to 10 points, 2.5 for each exercise. In case you have questions about your grade or these solutions, do not hesitate to contact Miroslav Palansky at miroslav.palansky@fsv.cuni.cz or approach him after a lecture.

Problem 1

For the following areas, give at least one example in which the government is involved as (i) a producer and (ii) a regulator. (There are five areas and two roles, therefore you should list at least 10 examples. You might want to construct a table for the solution to this problem.)

a) education

b) transportation

c) insurance markets

d) financial markets

e) energy

Solution

Some examples of potential answers are given in Table 1.

Table 1: Solution to Problem 1

Area	Producer	Regulator
Education	Elementary schools	Textbook standards, accreditations
Transportation	Building roads	Air traffic control
Insurance markets	Unemployment insurance	Anti-discrimination laws
Financial markets	Government bonds	Banking
Energy	Nuclear power plants	Caps on electricity prices

Problem 2

We saw in a lecture that sometimes, voters' preferences might not be single-peaked, and we illustrated this on the problem of education. Describe another, different real-life situation where preferences of (at least some) people are likely to be multi-peaked and explain why you think so.

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Solution

A nice example of double-peaked preferences is provided in this blogpost: "My car's warranty expires next month, so I took it down for a routine checkup last week. With regards to the viability of what parts were under warranty, I either want them to be functioning very well or very poorly—either way, I end up with a car running well (on its own or immediately fixed) at no additional cost to me. What I want least is my car to be running just well enough that they choose not to fix anything. So I want it in great shape or poor shape most, but least favorable to me is a moderately well running car."

Problem 3

Imagine a hypothetical world in which asteroids are a real everyday threat[1]. They could be relatively small, but could cause fatal damage, even destroy a whole building. They would fall from the sky irregularly and unexpectedly and there would be only very limited ways to fight this phenomenon, because the technology is not advanced enough.

a) What would be the problems when deciding how to finance anti-asteroid policy? State the reasons for your arguments. Focus on the nature of the good represented by anti-asteroid defense mechanisms.

b) Explain why NASA spends so much money[2] on research into ways to deflect or neutralize asteroids that risk collision with Earth. (Hint: take a look at Chapter 6 of the course textbook.)

Solution

a) Pure public goods are characterized by non-excludability and non-rivalry. Both of these properties are fulfilled for anti-asteroid defense. Therefore, anti-asteroid defense can be seen as a good example of a pure public good. Moreover, it is a global public good. If we were to finance anti-asteroid defense globally, clearly, issues known from taxation at household level would arise at country level. We can easily compare the situation to the financing of national defense where the agents are countries, and we may think of GDP as income of countries. The ability-to-pay principle and the benefits principle would again guide the equity component, while the minimization of costs and distortions would guide the efficiency component.

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[1]By the way, this is not as far-fetched as one might think - see this Wiki page
[2]And it is a lot: see this news article.

b) The situation with anti-asteroid defense resembles the free rider problem faced by a large consumer of the public good (i.e. in this case, the US). The direct benefits from the public good are so large for the US that it pays for them to provide it for themselves even if they know that there are free riders benefiting from such actions.

Problem 4

In the elections to the Chamber of Deputies in the Czech Republic, we use the d'Hondt method to calculate mandates that each party will obtain; a system that disproportionately benefits parties that obtain a lot of votes.

a) What is the main argument for giving such preferential treatment to more successful parties?

b) The Czech Pirate Party has announced last week[3] that they will be pursuing a change in the mandate calculation system towards a more equitable approach, in which all parties would need the same amount of votes to obtain one mandate. Take the results[4] of the latest election to the Chamber of Deputies which took place in October 2017 and model what this would mean for the distribution of mandates among parties. Which party would lose the most mandates, and how many? Which party would gain the most mandates, and how many?

Solution

a) Using this system, it is more likely that a coalition will form and have a majority in the Chamber of Deputies.

b) Let us assume that the 5% threshold holds (note: however, assuming that it does not is also a correct solution). A system in which for each mandate, parties would need the exact same number of votes can be derived as follows. The parties that received at least 5% of all votes were nine. Together, they received 4,744,100 votes. There are 200 mandates to be distributed, so we divide the number of total votes by 200 to get 23,720.5—the amount of votes needed to get one mandate. Table 2 shows a model of the result of the election had this system been implemented. We divide the number of votes received by each party by 200 (see the third column) and give each party as many mandates as they have full integers in this result. Then, 3 mandates remain to be allocated. We can choose for example the largest remainder method, which allocates

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[3]A news article available here in Czech and here translated by Google into English.
[4]The results are available for example here on Wikipedia.

the remaining mandates to the parties with the higher remainder. We find these to be SPD, KSCM and CSSD. The last two columns of Table 2 show the final outcome in mandates and the change over the current state (which uses the d'Hondt method to allocate mandates). We find that under the current system, ANO2011 has 15 more mandates that they would if our modeled system were used, and ODS has one more. The rest of the parties would gain from changing the current system to the one we modeled.

Table 2: Modeling results of the election if a proportional system of allocation of mandates were used

Party	No. of received votes	No. of received votes divided by 200	Additional mandates	Total mandates	Change over current
ANO2011	1,500,113	63.24		63	-15
ODS	572,962	24.15		24	-1
Pirates	546,393	23.03		23	+1
SPD	538,574	22.71	1	23	+1
KSCM	393,100	16.57	1	17	+2
CSSD	368,347	15.53	1	16	+1
KDUCSL	293,643	12.38		12	+2
TOP 09	268,811	11.33		11	+4
STAN	262,157	11.05		11	+5