

This is Problem Set 2 (PS2), the second of two Problem Sets that we ask you to solve during this semester. You have until April 21, 2020, 23:59 to submit your solutions to PS2. Submit your solutions (**in the .pdf format**, typed digitally<sup>1</sup> or written *legibly* and scanned) in the appropriate field of the section ‘Study group roster’ in the SIS<sup>2</sup>. Please name the file as follows: **Surname\_Name\_PF\_PS2.pdf**. You can obtain up to 10 points for this assignment (points for each problem are indicated in parentheses). Problem Sets are **individual work**. Base your answers on what we have covered in class and the course textbook. In case you have any questions, contact Tereza Palanská at [tereza.palanska@fsv.cuni.cz](mailto:tereza.palanska@fsv.cuni.cz).

## Problem 1 (6 points)

In this exercise, you will work with empirical data on public procurement. Download data on public procurement from OpenTender: [here](#) is the link to the download page. On the website, scroll down and choose one European country of your interest (and state clearly which country you chose). Use the link in the right column of the table to download data in JSON (upper table) or .csv format (bottom table). Only work with data for the year 2019. Use your favorite software.

- a) How many tenders did your chosen country administer in 2019?
- b) Create a three-column table that has different types of public procurement procedures in the first column and reports (i) percentage shares for each procedure type in terms of the number of tenders; and (ii) percentage shares for each procedure type in terms of the value of tenders. (Hint: Variables that you will need for these statistics are called `tender_proceduretype` and `tender_finalprice_eur`.)
- c) Create a horizontal bar graph showing the percentage share of tenders (in terms of their count) administered by different types of buyers. Based on this graph, can you tell how much your chosen country is decentralized in terms of procurement expenditures? (Hint: The relevant variable is called `buyer_buyertype`.)
- d) One simple way to find out which public procurement procedures are most efficient in finding the right (i.e., the cheapest) supplier is by looking at the difference between the estimated price of the tender and the final price of the tender. Calculate the average difference (in EUR) between these two measures for each procedure. Which procedure achieves the best outcomes on this metric? (Hint: The relevant variables are called `tender_estimatedprice_eur` and `tender_finalprice_eur`.)

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<sup>1</sup>If you're using L<sup>A</sup>T<sub>E</sub>X, you might find it useful to have [this document in the T<sub>E</sub>Xformat](#).

<sup>2</sup>Only students from the Faculty of Mathematics and Physics will submit by e-mail to [tereza.palanska@fsv.cuni.cz](mailto:tereza.palanska@fsv.cuni.cz).

## Problem 2 (4 points)

Externalities are all around us. Think of an externality associated with the **consumption** of a good whose name starts with the same letter as your last name.<sup>3</sup>

- a) Write the name of the good and explain which externalities can arise when it is consumed. Classify whether the externality is positive or negative and specify on whom the externality falls.
- b) Suppose that the demand for this good in the market is given by the equation  $P_D = 5 - \frac{M}{2} * Q$ , where  $P_D$  is the price per demanded unit of the good,  $M$  is the number of the month in which you were born, and  $Q$  is the total quantity of the good consumed in the market. Also suppose that the supply of this good is given by the equation  $P_S = N * Q$ , where  $P_S$  is the price per supplied unit of the good and  $N$  is the number of characters in your first name.<sup>4</sup> The marginal effect of the externality, i.e. the externality associated with the consumption of an additional unit of the good, is given by  $MEE = 1.5Q$ .

Illustrate the market for this good with a supply/demand graph. In this graph, draw and label curves for demand, supply, marginal effect of externality, private marginal cost, social marginal cost, private marginal benefit, and social marginal benefit. Indicate the area that represents deadweight loss of this externality. Make sure to label both axes.

- c) How large is the difference between the socially optimal consumed quantity and the equilibrium consumed quantity in case of no correction for the externality? (i.e., how many units of the good are over- (or under-) consumed?)
- d) How large is the deadweight loss of this externality (in terms of money)?

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<sup>3</sup>If you can't think of one, use the first letter of your first name or your hometown.

<sup>4</sup>As an example, if you were born in May and your name is Martin, set  $M = 5$  and  $N = 6$ .