# PROBLEM SET 4 – Tutorial Week 6 (September 12–16)

*Deadline:* 11:59 p.m. two days before your tutorial. Please submit a PDF in groups of 2–3 within your tutorial group. On the first page, write your full names (as on the roster) in alphabetical order. Start each question on a new page. Name your PDF "PSet # – LastName LastName LastName," e.g., "PSet 4 – Banerjee Duflo Kremer." Points will be deducted for not adhering to the instructions. You only need to submit your answers to Section B.

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**Section A**

1. Hotel rooms in Damascus go for $400, and 1,200 rooms are rented on a typical day.
   (a) To raise revenue, the mayor decides to charge hotels a tax of $120 per rented room. After the tax is imposed, the going rate for hotel rooms rises to $500, and the number of rooms rented falls to 1,000. Draw a graph showing tax revenue and deadweight loss. Calculate the amount of revenue this tax raises for Damascus and the deadweight loss of the tax.
   (b) The mayor now doubles the tax to $240. The price rises to $600, and the number of rooms rented falls to 800. Draw a graph showing tax revenue and deadweight loss. Calculate tax revenue and deadweight loss with this larger tax. Does tax revenue double, more than double, or less than double? Does deadweight loss double, more than double, or less than double?

2. Read the following article:
   *The Economist.* May 23, 2020. "The world urgently needs to expand its use of carbon prices."
   https://www.economist.com/briefing/2020/05/23/the-world-urgently-needs-to-expand-its-use-of-carbon-prices
   (a) To keep the rise in global temperature well below 2°C compared with pre-industrial levels, what should the price of greenhouse-gas emissions be? What are the current prices of greenhouse-gas emissions?
   (b) When do prices change behavior? When do prices not change behavior? Cite examples of each case.
   (c) What are the different options for using the carbon-tax revenue? What are the pros and cons of each option?
   (d) The first-best option is a single carbon market. Why?
   (e) In the absence of a single carbon market, "border carbon adjustment" (BCA) mechanisms have been proposed. How do BCA's work in theory?
   (f) What challenges do BCA's face in practice?

3. Both public goods and common resources involve externalities.
   (a) Are the externalities associated with public goods generally positive or negative? Use examples in your answer. Is the free-market quantity of public goods generally greater or less than the efficient quantity?
   (b) Are the externalities associated with common resources generally positive or negative? Use examples in your answer. Is the free-market quantity of common resources generally greater or less than the efficient quantity?

4. Categorize the following into private good, public good, natural monopoly, and common resource. Explain.
   (a) Police protection
   (b) Street cleaning
   (c) Rural roads
   (d) City streets

5. Read the following article:
   *The New York Times*. August 27, 2000. "A Tale of Two Fisheries."
   http://www.nytimes.com/2000/08/27/magazine/a-tale-of-two-fisheries.html
   (a) Use the concept of "tragedy of the commons" to explain why the fish and lobster populations in New England have declined so drastically since the early 1970's.
   (b) In what scenarios are harbor gangs effective? Where do harbor gangs fail?
   (c) How have the Canadian and American governments been helping (or hurting) fishermen?
   (d) Why is lobstering in Australia more lucrative than lobstering in New England?
   (e) How did Australia end up with the world's premier tuna ranches?

6. Evaluate the following statements. Do you agree? Why or why not?
   (a) A tax that has no deadweight loss cannot raise any revenue for the government.
   (b) A tax that raises no revenue for the government cannot have any deadweight loss.
   (c) The benefits of corrective taxes as a way to reduce pollution have to be weighed against the deadweight losses that these taxes cause.
   (d) When deciding whether to levy a corrective tax on consumers or producers, the government should be careful to levy the tax on the side of the market generating the externality.

**Section B**

1. The supply of jeans is described by $Q^S = 650 + 20P$, and the demand for jeans is described by $Q^D = 1{,}400 - 10P$.
   (a) Graph the market for jeans. What is the equilibrium price and quantity?
   (b) Suppose that most of the buyers of jeans are teenagers. Government official X wants to protect buyers from paying high prices and suggests a price ceiling of $\$15$ per pair of jeans. Explain in detail what happens to the market for jeans and calculate the resulting shortage. If a black market surfaces, what is the black market price for a pair of jeans?
   (c) Government official Y points out that with a subsidy of $z$ dollars, buyers will also pay $\$15$ per pair of jeans. Find the subsidy, $z$. Indicate the deadweight loss on a graph.

2. Consider the market for fitness trackers. Suppose the weekly quantity demanded is given by $Q^D = 12{,}500 - 100P$, and the weekly quantity supplied is given by $Q^S = 25P$, where $P$ is the price per unit. *(Hint: Drawing graphs will be helpful.)*
   (a) What is the equilibrium price and quantity?
   (b) Calculate consumer surplus, producer surplus, and total surplus when the market is in equilibrium.
   (c) Find the value of the deadweight loss (dollars per week) if a price ceiling of $\$60$ is imposed on this market.
   (d) Find the value of the deadweight loss (dollars per week) if a price floor of $\$105$ is imposed on this market.
   (e) What does deadweight loss mean? Describe in words how to find the deadweight loss in a graph.

3. Suppose the government currently raises $10,000 through a $1 tax on widgets, and another $10,000 through a $100 tax on gadgets. If the government doubles the tax rate on widgets and eliminates the tax on gadgets, would it raise more money than today, less money, or the same amount of money? Explain. *(Hint: Consider the case when neither the supply curve nor the demand curve for widgets is perfectly price inelastic, and the case when either the supply curve or the demand curve for widgets is perfectly price inelastic.)*

4. Read the following article:
   *The New York Times.* March 28, 2013. "Thailand Set to Sell Off Huge Stockpile of Rice."
   http://www.nytimes.com/2013/03/29/business/global/thailand-set-to-sell-off-huge-stockpile-of-rice.html
   (a) Draw a supply-and-demand graph to illustrate the Thailand rice market. On your graph, indicate the amount of rice that the government has bought under the program.
   (b) Draw a supply-and-demand graph to illustrate the effects on the global rice market when the Thai government sells off its stockpile of rice.

5. (a) Is (the consumption of) potable water rival? Excludable? What sort of good is it? What about the provision of potable water? Are there justifications for the public provision of potable water?
   (b) Is (the consumption of) education a private good or a public good? What are the justifications for the public provision of education? You may consider different levels of education — kindergarten, primary, secondary, and tertiary.
   (c) How should the dissemination of news (*e.g.*, newspapers, magazines, internet, television, radio) be classified? What about the consumption of news? What are the policy implications of classifying the dissemination of news as a public good?

6. A local drama company proposes a new neighborhood theater in Clementi. Before approving the permit, the city planner completes a study of the theater's impact on the surrounding community.
   (a) One finding of the study is that theaters attract traffic, which adversely affects the community. The city planner estimates that the cost to the community from the extra traffic is $5 per ticket. What kind of an externality is this? Why?
   (b) Graph the market for theater tickets, labeling the demand curve, the social marginal benefit curve, the supply curve, the social marginal cost curve, the market equilibrium level of output, and the efficient level of output. Also show the per-unit amount of the externality.
   (c) Upon further review, the city planner uncovers a second externality. Rehearsals for the plays tend to run until late at night, with actors, stagehands, and other theater members coming and going at various hours. The planner has found that the increased foot traffic improves the safety of the surrounding streets, an estimated benefit to the community of $8 per ticket. What kind of an externality is this? Why?
   (d) On a new graph, graph the market for theater tickets taking into account both externalities. Label the demand curve, the social marginal benefit curve, the supply curve, the social marginal cost curve, the market equilibrium level of output, and the efficient level of output. Also show the per-unit amount of both externalities.
   (e) Propose a government policy that would result in an efficient outcome.
   (f) Identify the concepts highlighted in this question. Draw a graph for the case where the positive externality is less than the negative externality. Draw a graph for the case where the positive externality equals the negative externality.