Microeconomics for Public Policy I
Fall 2025

Problem Set 13

On what and how to submit

- For this and all future problem sets, questions are from the "Problems" section of the questions at the end of the chapter.

- Due before 8 pm December 9.

- Name the file "ps13_[lastname].pdf". For example, my file would be "ps13_brooks.pdf".

- Turn in via this google survey.

- Make sure your name is at the top of the submission.

- You do not need to type your submission. Any **legible** submission in pdf format is ok. For example, you can write the problem set with hand-drawn graphs, take a picture, make a pdf, and submit the pdf.

1. Externalities

Suppose that consumers demand plastic junk with a demand curve of $Q = 300 - 4P$. Suppose also that producers make plastic junk with a market supply curve of $Q = P - 15$. As seems like, we will assume that plastic junk has an external cost of \$10/unit.

A graph is not not required for these problems, but will likely help you think through the steps and equilibria.

(a) In a market without taxes or regulation, what is the equilibrium quantity and price of plastic junk?

Find the equilibrium price and quantity by setting supply equal to demand:

$$
\begin{aligned}
Q_D &= Q_S \\
300 - 4P &= P - 15 \\
5P &= 315 \\
P^* &= 63
\end{aligned}
$$

Find Q^*:

$$
\begin{aligned}
Q^* &= 300 - 4P \\
&= 300 - 4(63) \\
&= 48
\end{aligned}
$$

(b) Now suppose that the government recognizes the cost of plastic junk and charges producers a Pigouvian tax of \$10/unit. What is the new supply curve with this tax?

Importantly, note that $P_{S,\text{new}} = P_{S,\text{old}} + 10$.

So first we need to find the supply curve in terms of P:

$$
\begin{aligned}
Q &= P - 15 \\
P &= Q + 15
\end{aligned}
$$

Given this, we can find the supply curve with the Pigouvian tax:

$$
\begin{aligned}
P_{S,\text{new}} &= P_{S,\text{old}} + 10 \\
&= Q + 15 + 10 \\
&= 25 + Q
\end{aligned}
$$

(c) Find the new equilibrium price and quantity for plastic junk with the Pigouvian tax.

Find the new equilibrium price and quantity (which I'll denote **) by setting the new supply curve equal to the original demand curve. Before you get to any numbers, you should expect that the tax will decrease the equilibrium quantity and increase the equilibrium price. First, let's re-write the new supply in terms of Q:

$$
\begin{aligned}
P &= 25 + Q \\
Q &= P - 25
\end{aligned}
$$

Now set supply and demand equal:

$$
\begin{aligned}
300 - 4P &= P - 25 \\
325 &= 5P \\
P^{**} &= \frac{325}{5} \\
P^{**} &= 65
\end{aligned}
$$

Given this new equilibrium price, what is the new equilibrium quantity?

$$
\begin{aligned}
Q^{**} &= 300 - 4P \\
&= 300 - 4(65) \\
&= 40
\end{aligned}
$$

(d) Name two external costs of plastic junk (on the production or conumpstion side), explaining why they are external costs.

We accept any logically argued answer here. An external cost is a cost imposed on a non-party to the transaction by the consumption or production of plastic junk. For example, the production of plastic junk may harm water by getting plastic bits in the water supply. The consumption of plastic junk (and the disposal of the plastic junk) could harm the livelihood of fisherman if it ends up in the ocean. Neither the water supply consumers nor the fisherman are parties to the original transaction.

2. Chapter 17, Question 2

(a) profit maximizing quantity of bouquets

A profit maximizing producer sets $MR = MC$. Here $MR = 6$, and $MC = 0.25Q$. To maximize profits, Jill sets $6 = 0.25Q$, or $Q = 24$.

(b) social costs

Cost of the last bouquet to Jill: $MC = 0.25Q = 0.25(24) = 6$. Cost of the last bouquet to Cooper: $0.50 * Q = 0.50(24) = 12$. Total social cost $= 6 + 12 = 18$.

Is producing the last bouquet a good thing for society? No, because social costs ($18) are greater than social benefits ($6).

(c) Is Jill over- or under-producing? Jill is over-producing.

(d) Suppose that Jill marries Cooper and now (in economist words) internalizes the costs to Cooper. Her marginal cost function is now $P = 0.25Q + 0.50Q = 0.75Q$.

(e) How many bouquets should Jill produce if she marries Cooper and has this new function? Again, Jill should set $MR = MC$. MR is still 6, but $MC = 0.75Q$. So she sets $6 = 0.75Q$, which implies $Q = 8$. If Cooper is her husband, she takes his costs into account. If he is her neighbor, she does not.

3. Externality example

Find an news article that describes an externality – without using the word "externality"! Explain what the economic transaction is, who the parties to the transaction are, to whom the externality occurs, whether the market produces too much or too little, and whether the externality is positive or negative. Include the link to the article. A few short paragraphs should be sufficient to answer this question.

Any reasonably argued answer here is fine.