Negative externality: consumer side

Definition – when the market activity of one person negatively affects other people outside of the market, this leads to an incorrect market equilibrium and thus a market failure.

Source: Gruber, J. (2018). *Public finance & Public Policy*

Intuition – When making choices, people usually only consider how much an action would cost themselves. Humans are inherently self-focused, our default is a lack of consideration for how our actions might negatively impact others. When there is a negative externality on the consumer side, the action of an individual reduces the well-being of others in society. The person is paying a smaller cost because they don't account for the additional cost being paid for by the other people that they are negatively effecting.

Mathematical / Technical

- When a market has a negative externality, too much is consumed. While the origin of the externality here is the consumers, ***both*** they and producers (the market) are to blame.
- The market equilibrium occurs where the marginal costs (MC) equal the marginal benefits (MB). To solve, find market outcome, Q^M , such that

$$MC(Q) = MB(Q)$$

  Then plug Q^M into either equation to determine the market price, P^M .
- To find the socially optimal equilibrium, P^*, Q^*, the marginal external cost (MEC) needs to be subtracted from the consumers' marginal benefits to obtain the social marginal benefits (SMB):

$$MB(Q) - MEC(Q) = SMB(Q)$$

- Solve for Q^* such that

$$SMB(Q^*) = MC(Q^*)$$

- In the socially-optimal outcome, we consume fewer quantities of the good, $Q^* < Q^M$ which can be induced with a higher price. Note, the market price is determined by consumer's demand:

$$MB(Q^*) = P^*, \quad P^* > P^M$$

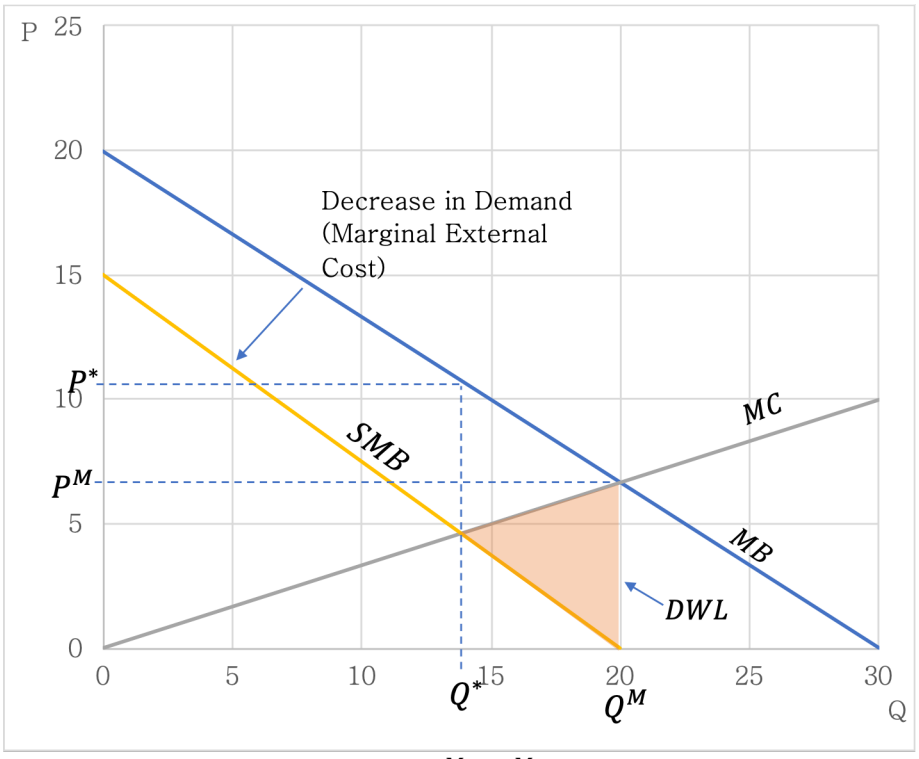
- Deadweight loss DWL is the total value of producing too many, where cost exceeds the benefits. For linear curves, this is a triangle and the value is calculated as the area:

$$DWL = \frac{[P^M - SMB(Q^M)](Q^M - Q^*)}{2}$$

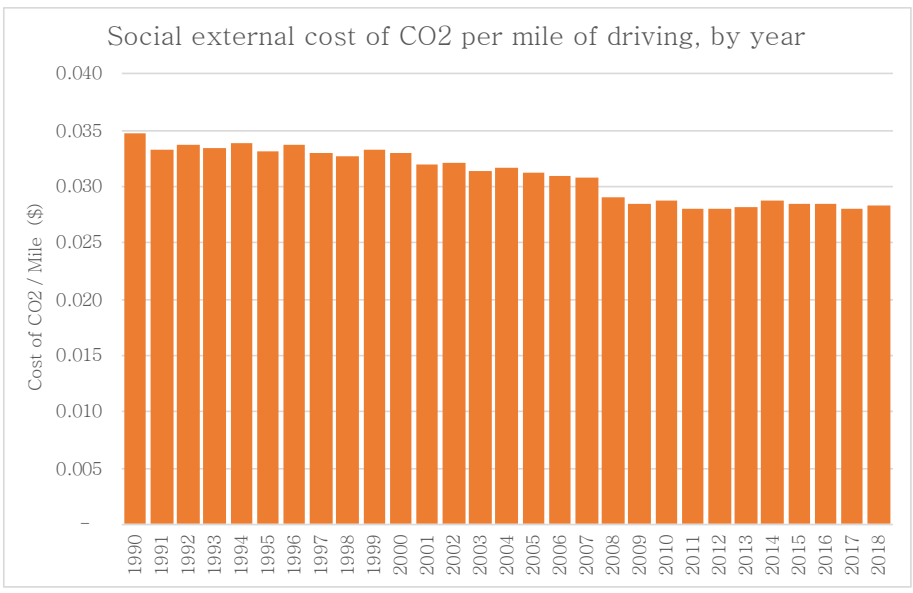
Real-world aspects – Examples of negative consumer externalities abound: driving, air travel, and noise pollution. One specific example is smoking, which has a negative impact on all that comes near someone who is smoking, through 2nd hand smoke and possibly lung disease. The estimated social cost of smoking is $40/pack, based on the additional health care costs that arise as a result.

Source: Sloan, F *et al.* (2004). *The Price of Smoking*

Graphical – Neg. consumer externality costs



The market outcome are Q^M, P^M. The shift in demand from MB to SMB, occurs due to the negative externality on the consumer side. The MEC is subtracted. The market is socially optimal at Q^*, P^*. DWL is the area between, MC & SMB, from the optimal equilibrium Q^* to Q^M.



Driving emits CO2, a harmful greenhouse gas. This negative externality of using cars is measured by the social cost of carbon and calculated using the value of $50 per ton emitted. This data is available, year by year and displays the additional dollar amount that each mile of driving poses to society in the form of marginal damages.

Sources of data: https://tinyurl.com/y7al4zem, https://afdc.energy.gov/data/10315

Practice questions

1. The bottom figure shows the social cost of driving from year to year. What is the average external cost and how can we factor this into an equilibrium analysis? Give a possible explanation for the decrease in total emissions per mile in recent years.

2. Rachel plays very loud music at night and prevents her neighbor from being able to sleep. Her MB is $P = 15 - Q$, but the SMB is $P = 10 - Q$ and the MC is $P = Q$. What is the market equilibrium (P^M , Q^M) and what is the optimal equilibrium (P^*, Q^*) in this scenario?

3. Smoking cigarettes causes a negative externality in the form of secondhand smoke to outside agents who are not involved. The cigarette smokers' MB is $P = 30 - 2Q$, but due to the negative externality, the SMB is $P = 15 - 2Q$. The MC is $P = Q$. What is the marginal external cost of smoking cigarettes?

Numerical solutions: **1.** About $0.30/mile. **2.** $P^m = 7.5, Q^m = 7.5$, $P^* = 5, Q^* = 5$; **3.** $MEC = \$10$.