

# Positive externality: consumer side

**Definition** – When an individual's consumption in a market increases the well-being of others, but the individual is not compensated by those others.

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

**Intuition** – Sometimes one person's purchase of a good or a service has indirect benefits for others. If the person, the origin of the **positive effects**, were rewarded for these **spillovers**, then they would do more. Essentially, the market amount of the activity is too low. By accounting for the extra benefits, we can find the optimal amount, which occurs at a lower price for the consumer. A lower price makes the person want more of the good or service, a win-win.

## Mathematical / Technical

- The **free market equilibrium** is at  $(Q^M, P^M)$ , where the marginal cost ( $MC$ ) and marginal benefit ( $MB$ ) curves intersect.
- A positive consumption externality affects the inverse demand curve, shifting it out by the amount of the **marginal external benefit (MEB)** to society. The name of this new curve is **social marginal benefit (SMB)**.

$$SMB(Q) = MB(Q) + MEB(Q)$$

- The intersection of SMB with the MC curve reflects the **socially optimal price** for consumers,  $P^*$ , and **quantity**,  $Q^*$  of the good.
- Find  $Q^*$  such that

$$SMB(Q) = MC(Q)$$

- Then, solve for

$$P^* = MB(Q^*)$$

- With positive consumer externalities, the free market outcome is under-consumption.

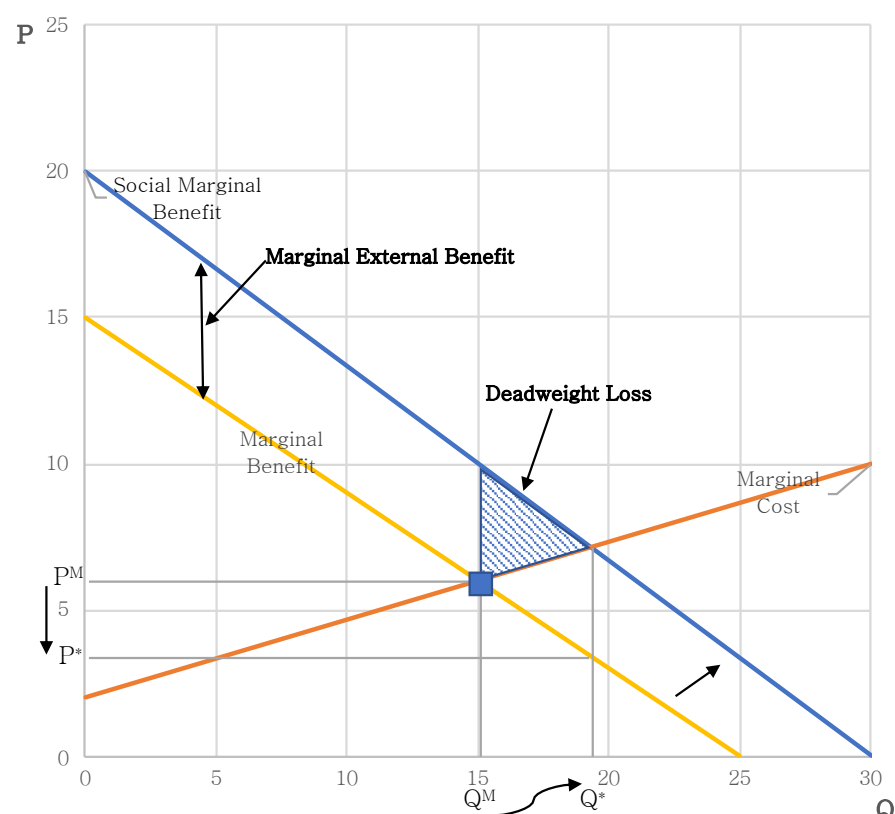
$$Q^* > Q^M \text{ and } P^* < P^M$$

- A **deadweight loss (DWL)** is a cost to society created by market failure when supply and demand are out of equilibrium. In this case, the reduction in social efficiency arises from a higher amount of social benefit as compared to private benefit.

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

- Example: Josh's neighbor Sarah is considering improving her landscaping, each additional unit which will cost \$1,000, but is worth only \$800 to her. Josh's bedroom faces her house, and he would like a nicer landscaping to look at, he values an additional unit at \$300. That is, the marginal benefit of improved landscaping is \$1,100, while the private marginal benefit to Sarah is \$800. Thus, additional landscaping is socially efficient. However, because Sarah's private costs exceed her private benefits, she will not do it; too little occurs.

## Graphical – Positive Consumer Externality



The free market equilibrium is denoted by a square,  $MB$  shifts out to  $SMB$  by the amount of benefit to society, the  $MEB$ .  $P^M$  decreases to  $P^*$ , and  $Q^M$  increases to  $Q^*$ . The deadweight loss is denoted by the shaded in triangle.

**Real-world aspects** – An example of a positive consumption externality is **vaccinations**. When many people are vaccinated against an infectious disease, they become immune to it, and stop it from spreading. This is referred to as herd immunity.<sup>a</sup> Another example is **electronic security/alarm monitoring** services outside homes, and offices. Neighbors whose homes are covered under the scope of these services benefit from this additional layer of security. **Flood protection** on large reserves of land is also known to have positive spillovers to neighbors who derive benefits from being better protected from floods.<sup>b</sup> For each of these examples, the consumption by individuals creates benefits for society as a whole.

Sources: <sup>a</sup> <https://tinyurl.com/yco8wwyg>, <sup>b</sup> <https://tinyurl.com/ybhersp3>

## Practice questions

- Let us look at the market for polio shots. Suppose the 1<sup>st</sup> unit provides marginal external benefits of \$60, but by the 300<sup>th</sup> unit the external benefits are \$0.
  - Find the market outcomes. Is the quantity too much or too little?
  - Draw the line that accounts for the MEBs. What is the term for this line?
  - Find the socially optimal outcome, and shade in the deadweight loss.
- If the quantity of small pox vaccines is determined by the market forces of demand and supply, will it be at an efficient level? Explain.
- Let us consider the market for landscaping.  $MC = 10 + Q$  and  $MB = 100 - Q$ . Each additional unit provides an external benefit to society of \$10.
  - What is the market quantity?
  - Is this the socially optimal quantity? Explain.
  - What is the value of the external benefits of the current level of production (quantity)?

Numerical solutions: **1A.**  $P^M = \$55$ ,  $Q^M = 165$ , **1C.**  $P^* \sim \$40$ ,  $Q^* \sim 200$ , **3A.** 45 units, **3C.**  $(\$10)(45 \text{ units}) = \$450$ .