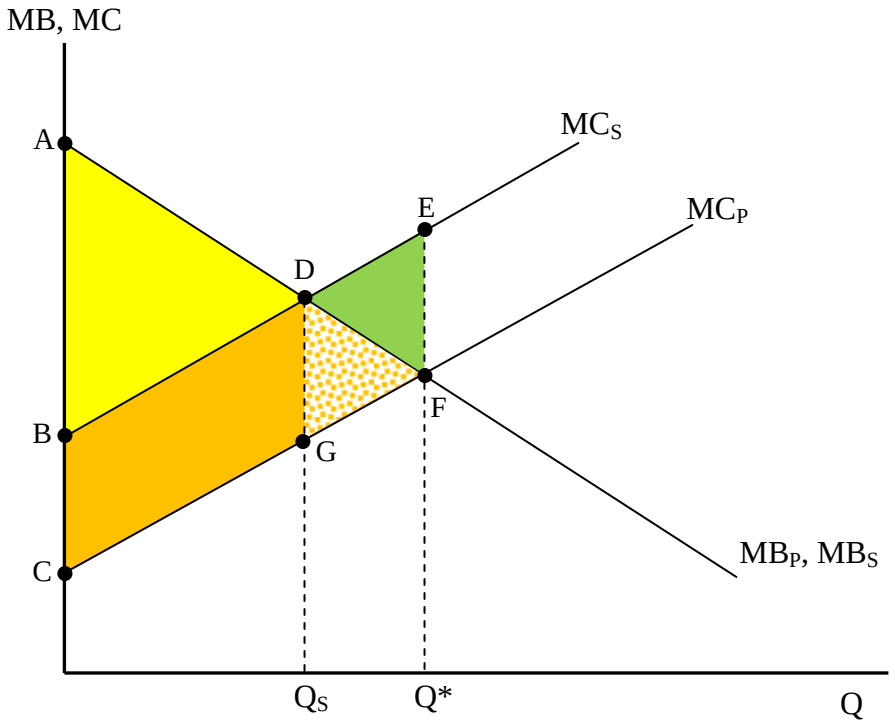
Negative Externality Example 2
Econ 201/Haworth

Assume there's a lawnmowing firm who mows lawns and cleans up leaves. Assume further that all of this is done with very loud equipment, and that this noise is considered a significant annoyance. Life is never easy, so as you'd expect, some of the lawnmowing firm's clients are next to a restaurant with a large outdoor patio. In the several hours it takes to service these clients, the restaurant loses paying customers – i.e., the lawnmowing firm's noise leads to people not eating at the restaurant, which means the firm is losing potential profit.

The graph below illustrates the output decision of the lawnmowing firm. The firm considers its private marginal benefit (MB_P) and private marginal cost (MC_P) in deciding how much of their service to provide. The firm will choose an output level of Q*, where $MB_P = MC_P$ at pt F.



As the lawnmowing firm makes this output choice, we know that the firm's noise leads to a loss of profit for the restaurant. This implies that the firm is imposing an external cost on someone within society, i.e. imposing a cost on someone who should not be affected by the firm's output decision (since the restaurant is not asking the firm to mow a lawn or pick up any leaves). On the graph, the loss of profit (cost) is seen as the vertical distance between pts B and C. Let's assume the vertical distance from B to C is $10. The graph tells us that every time the lawnmowing firm produces a unit of output, there's a cost of $10 imposed on society. If the firm produces Q* units, then that cost would be equal to the area BDEFGC (i.e. the solid orange, dotted orange & green areas combined).

If the lawnmowing firm is imposing a cost on society of BC ($10) for every unit they produce, then this implies the existence of a marginal cost curve for society of MCs. A negative externality exists whenever the marginal cost to society is greater than the private marginal cost of the firm (i.e. $MC_S > MC_P$).

Although the firm will want to produce where $MB_P = MC_P$, society would prefer that the firm produce where $MB_S = MC_S$ (if there is no extra benefit arising within this market, then the marginal benefit for society curve, MB_S, is the same as MB_P). If the firm produces where $MB_S = MC_S$, then they would produce Q_S units at pt D.

What can we say about this situation?

- If the firm does what is best for themselves (i.e. maximizes their own net benefit), then the firm will produce Q* units.
- If the firm does what is best for society (i.e. maximizes society's net benefit), then the firm will produce Q_S units.

Of course, the firm will prefer to produce Q*, which means they will overproduce – relative to what society would prefer the firm do.

How does this overproduction affect society?

Overproduction ultimately leads to the existence of an external cost. We can define that external cost as the extra cost imposed on society by the firm which is beyond what we'd get if the lawnmowing firm produced at Q_S. I.e., the external cost would be the area DGFE (the orange dotted & green areas combined). If the firm didn't overproduce, then this area would not exist.

Total surplus under the assumption of no externality would be the area between MB_P and MC_P. That would be the area ADFGC (i.e. the yellow, solid orange & dotted orange areas combined). Of course, an externality *does* exist, because $MC_S > MC_P$, so in order to find the total surplus under this externality, we must deduct the area of BDEFGC from area ADFGC. That gives us an area equal to the area of (ABD – DEF). I.e. area ABD less the area DEF.

- Area ABD is the total surplus that results from the firm producing what society prefers (i.e. from producing where $MB_S = MC_S$).
- Area DEF represents a loss in total surplus that arises from this externality. I.e. DEF is an amount we do not get (due to the externality), an amount that must be deducted from ABD to get the total surplus under this externality. Of course, lost surplus is referred to as deadweight loss. Area DEF is deadweight loss.

If the firm produced where $MB_S = MC_S$, we'd get area ABD, but as the firm is producing where $MB_P = MC_P$, we get an area smaller than ABD. I.e., this externality makes society worse off.