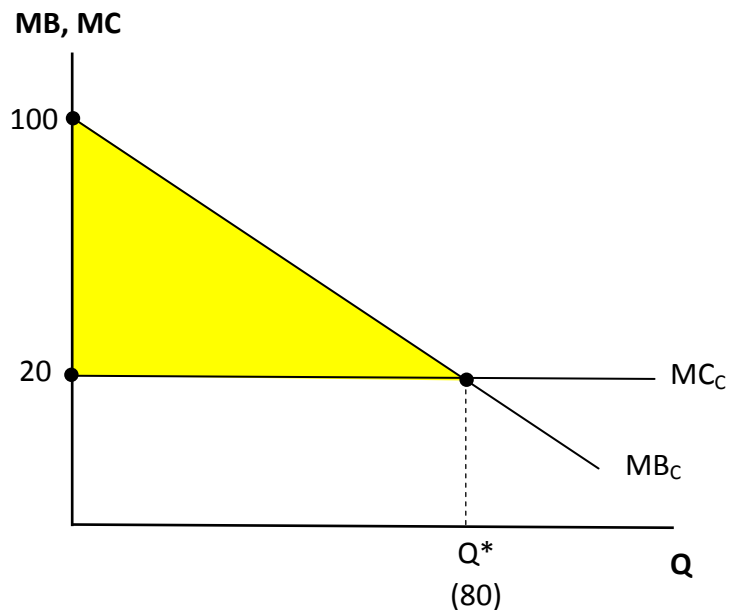


Negative externality example 1

Econ 201/Haworth

Assume that a consumer named Fred consumes a good called “stupid”, which allows Fred to have fun, but also do dumb stuff that unfortunately creates problems for other people. These problems are represented here very generally as an external cost.

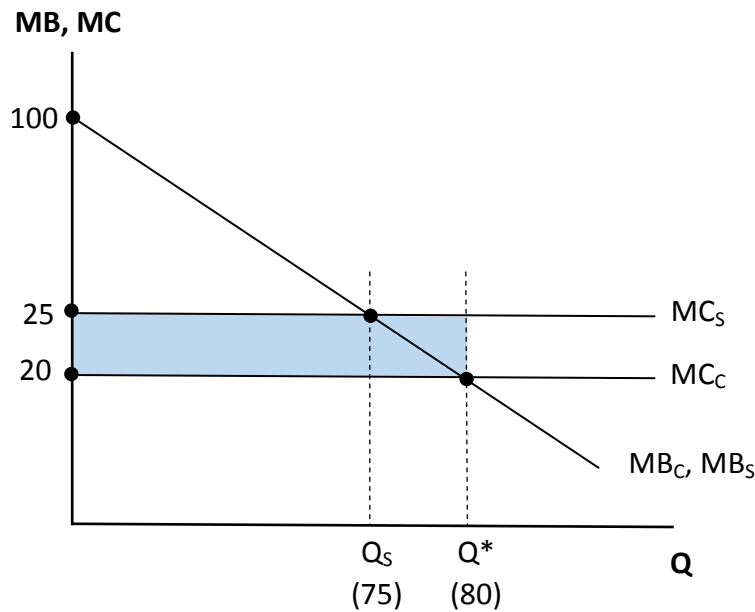
Suppose Fred considers his marginal benefit and marginal cost associated with consuming *stupid*. We can assume Fred experiences diminishing marginal returns on the benefit side of his consumption, but constant marginal cost (i.e. constant at \$20 per unit). If so, his consumption will be based on the graph below. He will consume where $MB_C = MC_C$, with the actual quantity being Q^* (or 80 units) and his net benefit being the yellow area. If the numbers in the graph are correct, then Fred would get a net benefit of \$3200 (which, of course, is the area of the yellow triangle below).



Unfortunately, when Fred consumes *stupid*, he ultimately imposes a cost on his friends. We could think of this cost as the cost of embarrassment from Fred doing really stupid stuff in public, or we could think of this cost as anything that Fred’s friends would consider a negative consequence from Fred consuming of *stupid*.

Let’s assume we can determine the extent of the pain inflicted upon Fred’s friends. Let’s say that as Fred consumes *stupid*, there is an external cost of \$5 per unit imposed on his friends. I.e., for every unit of *stupid* that Fred consumes, his friends suffer from \$5 in embarrassment. If Fred consumes 1 unit of stupid, then his friends receive \$5 in suffering. If Fred consumes 2 units of stupid, then it’s \$10 in suffering, and so forth.

When we consider how society is affected by Fred consumption of *stupid*, we first ask who would be included in this group. In this case, society would include Fred and his friends. Society would prefer that Fred make a consumption choice that maximizes the total surplus associated with his consumption. I.e., society would prefer that Fred consume where $MB_S = MC_S$. That choice would result in his consuming Q_S units of *stupid* (rather than Q^*). Based on what we show in the graph below, we'll assume that Q_S amounts to 75 units.



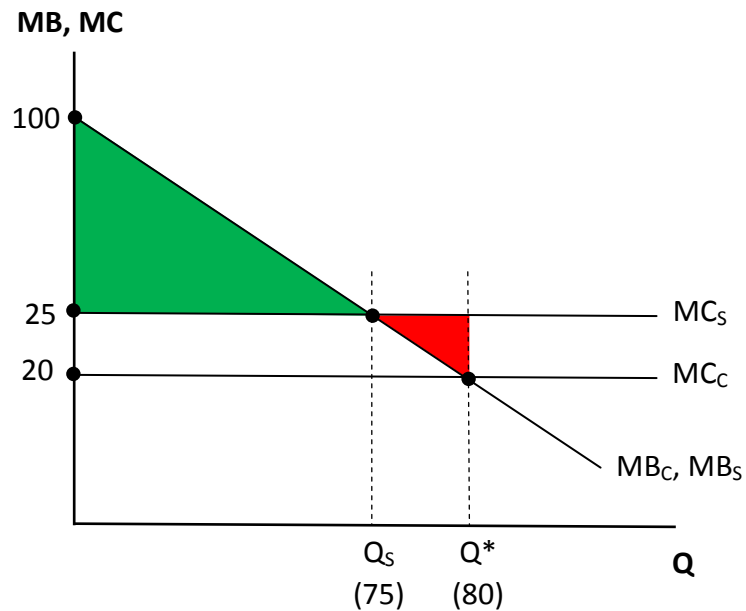
When Fred chooses his consumption, he prefers to maximize his own net benefit and so he consumes 80 units. In doing this, Fred imposes an overall cost upon his friends of $\$5 \times 80$ units, or $\$400$. That $\$400$ is represented as the blue area on the graph above. If we deduct this overall cost from our earlier result (i.e. the net benefit for Fred), then we find that the net benefit (or total surplus) for society is $\$2800$.

How do we represent that $\$2800$ on the graph?

Note in the graph below a green area. This green area represents the net benefit (or total surplus) earned from consuming at Q_S (i.e. only consuming 75 units of *stupid*). If we calculate the size of that area, we get $\$2812.50$. This is clearly greater than the net benefit or total surplus earned from Fred consuming 80 units of *stupid*. I.e., allowing Fred to consume 75 units of *stupid* makes society better off than allowing Fred to consume 80 units of *stupid*.

What is the difference between society's total surplus when Fred consumes 75 units vs society's total surplus when Fred consumes 80 units? Some simple math tells us it's $\$12.50$.

Note the red triangle on the graph below. This triangle is part of what used to be the cost on Fred's friends from Fred consuming 80 units of *stupid*. What is the area of this triangle? It turns out to be \$12.50. If we deduct that red triangle from the green area, then we have \$2800 – in other words, society's net benefit when Fred consumes 80 units of *stupid* (or, the total surplus associated with consuming 80 units of *stupid*).

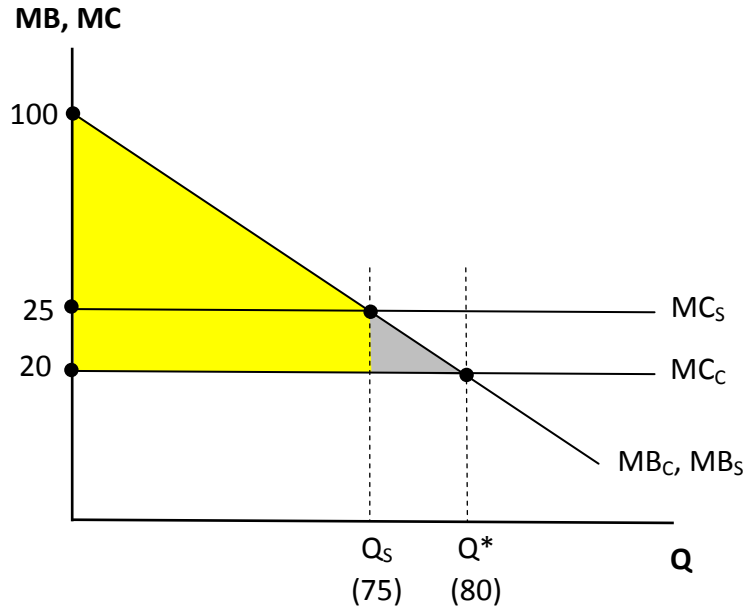


The red triangle would represent the reduction in total surplus from consuming something other than Q_s , which – by definition – means that area must be deadweight loss. Deadweight loss is the reduction of total surplus we get from not consuming or producing at the point where society's net benefit is maximized.

How do we get Fred to consume 75 units of *stupid*, rather than 80 units of *stupid*?

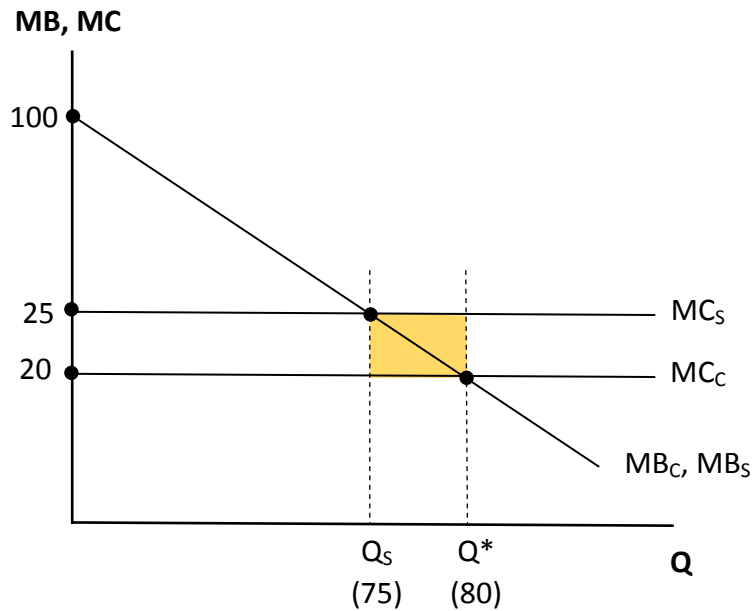
One approach would be to tax *stupid* by \$5 per unit. This would raise the marginal cost to Fred of consuming *stupid* from MC_c to MC_s , and would lead to his consuming 75 units. If he consumes 75 units, then there would be no red area, only green, and society would receive \$2812.50 in total surplus.

Another option would be to ask Fred to voluntarily cut back from 80 units to 75 units. The problem here is that Fred would lose the gray shaded area of net benefit in the graph below. As Fred reduces his consumption of *stupid*, he loses the gray area, while still retaining the remaining yellow area. If we calculate this size of this reduction using the numbers in the graph, then we find that Fred would lose \$12.50 in net benefit.



Fred clearly has no incentive to voluntarily reduce his consumption of *stupid*, since (as we already know) Fred is only interested in doing what's best for himself and not society.

However, what would society gain from Fred reducing his consumption of *stupid* from 80 units to 75 units? Fred would consume 5 less units, which means \$25 less embarrassment for Fred's friends. In other words, the cost associated with Fred's overconsumption is \$25. This is illustrated by the orange shaded rectangle in the graph below.



While reducing consumption from 80 units to 75 units may reduce the net benefit of Fred by \$12.50, this reduced consumption would increase the net benefit of society by \$25. What that amounts to is this. It would be worthwhile for society to consider paying Fred that \$12.50 to reduce his consumption by those 5 units so that they can gain \$25 in additional net benefit.

Will society follow through with this \$12.50 payment? That depends on whether Fred and his friends can negotiate this deal, and on whether there are well defined property rights associated with this situation. All we know for sure, is that there is at least room for negotiation, which gives us one more potential solution for this negative externality.

Note as well that even though Fred' consumption of *stupid* leads to his friends getting embarrassed, we aren't asking for a total elimination of Fred consumption of *stupid*. I.e., we're just asking Fred to reduce his consumption to what we might call a tolerable amount.