

Externalities In-class Example
ECNS 204 - Belasco

Railway engines create sparks, which sometimes set fire to crops planted near the tracks. A large number of farmers are affected, and transactions costs prevent the farmers and the railroad from negotiating bribes or side payments. The price of railway service is \$250 per train, and each train causes \$50 of crop damage. The accompanying diagram shows the relevant market for railway service. The Private marginal cost associated with is shown below:

$$MC_p = 50 + 6.25Q$$

where Q is the quantity of trains per month.

1. Determine the optimal number of trains per month for the railway service if they only consider private marginal costs.
2. Determine the total crop damage given your solution in part 1.
3. Plot the MR, MC_p , MC_s , and optimal quantities with and without the tax.

4. Determine the total welfare associated with production at this level. (*Hint: Total Welfare = Producer Surplus – Total Damage*)
5. Suppose a Pigovian tax of \$50 per train is imposed on the railroad. What is the new optimal number of trains per month for the railway service? What is the change in total welfare?
6. Suppose the farmers can move their crops away from the tracks at a cost of \$2,400 per month. If the goal is to achieve economic efficiency, who should be made liable for the crop damage? What is the resulting welfare change?
7. Suppose that the farmers can still move their crops (as in part 6). Also, suppose that the railroad can install safety equipment that will prevent the engine sparks for a cost of \$25 per train. If the goal is to achieve economic efficiency, who should be made liable for the crop damage? What will be the resulting welfare change?