

Microeconomic Theory — ECON 323 503  
Chapter 17: Property Rights, Externalities,  
Rivalry, and Exclusion

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# Outline

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6. Rivalry and exclusion: Markets without these fail.

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- ▶ Negative externalities: pollution
- ▶ Positive externalities: immunization

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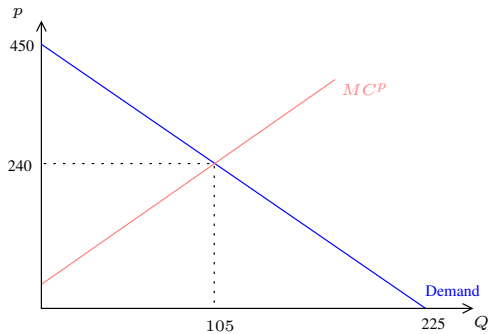
$$p = 450 - 2Q.$$

Equilibrium:

$$30 + 2Q = 450 - 2Q.$$

So  $Q_c = 105$  and  $p_c = 240$

# Graphically



## Social costs

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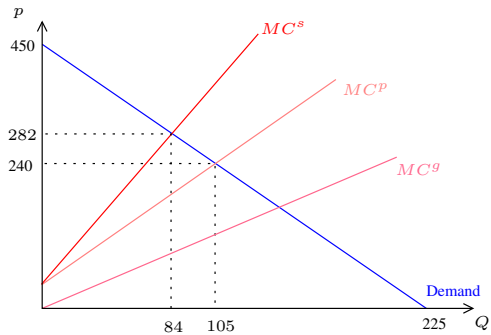
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So  $Q_s = 84$  and  $p_s = 282$ .

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Now we also consider the harm from pollution.



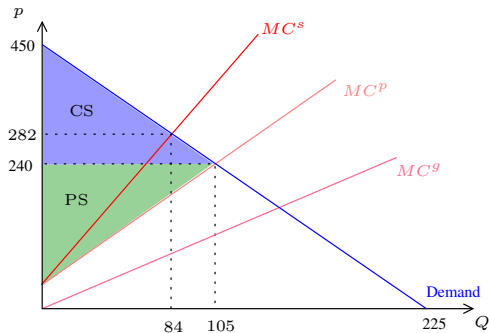
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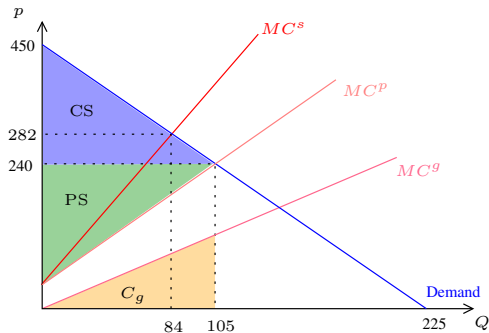
$$W = CS + PS - \underset{\text{cost of pollution}}{C_g}$$

# Social welfare



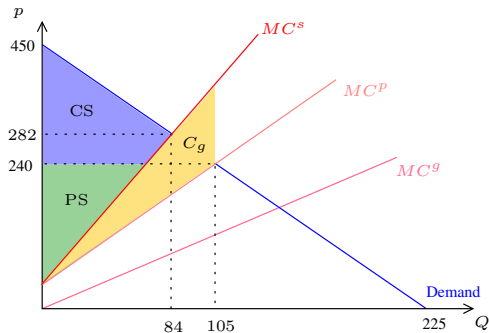
If we ignore the social cost of pollution, welfare is  $CS+PS$ .

# Social welfare



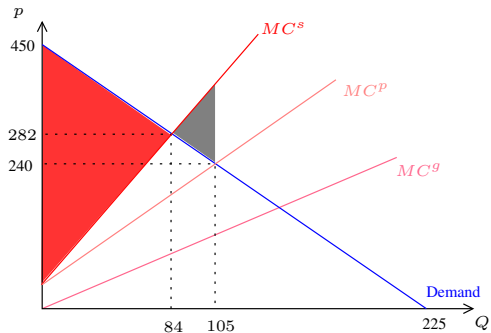
The yellow area is the social cost of 105 units of pollution.

# Social welfare



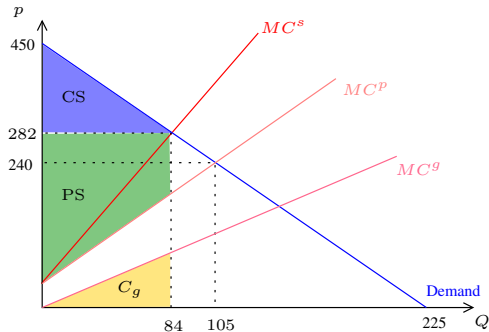
Since  $MC^s - MC^p = MC^g$ , this is the same area.

# Social welfare



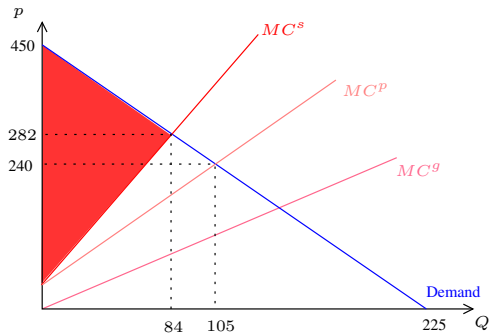
Total welfare is the red area minus the grey area.

# Social welfare



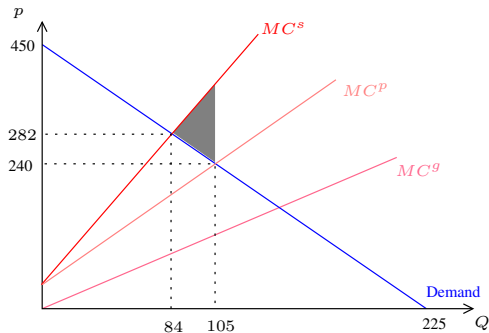
Social optimum: total welfare is calculated as  $CS + PS - C_g$ .

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So total welfare is the red area.

# Social welfare



Loss of welfare from competitive allocation is the grey area.



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The *marginal* benefit equals the *marginal* cost.

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Two kinds of regulation:

1. Standards: restrict the amount that the mills can pollute to 84 units.
2. Taxes: charge a tax to make the private cost more like the social cost.

# Standards

Difficulties with standards:

- ▶ Need to know enough to calculate the optimal quantity.
- ▶ Enforcement can be difficult.

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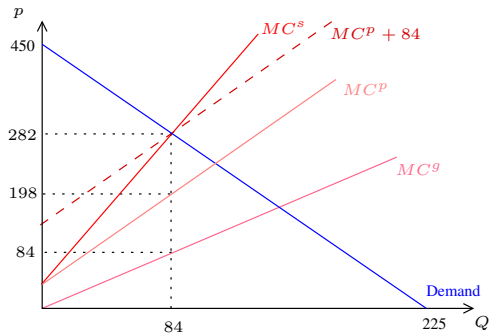
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This is particularly handy if firms can switch to technologies that pollute less.

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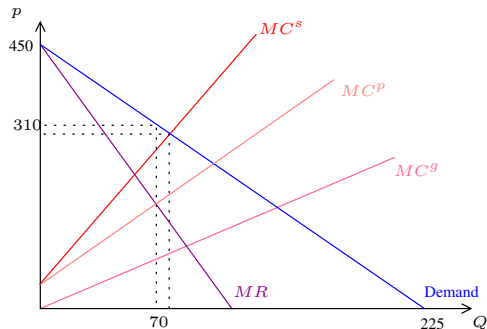
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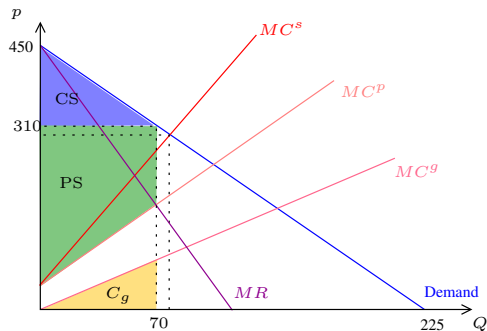
But this calculation doesn't account for  $MC^g(Q)$  so if social cost were much greater than private cost, the monopoly might produce too much.

# Monopoly ad externalities



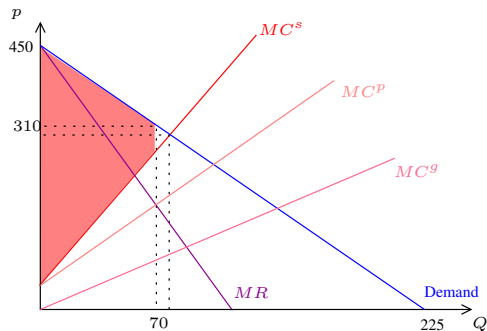
In this case, the monopoly produces too little of good (despite the pollution).

# Monopoly ad externalities



To evaluate the impact of the monopoly, calculate social welfare.

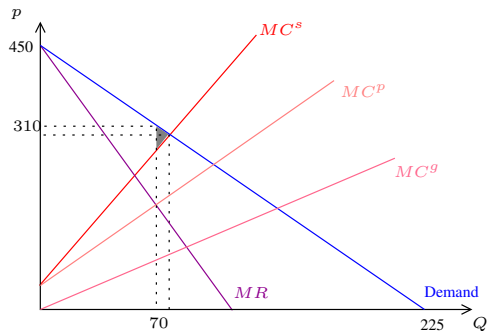
# Monopoly ad externalities



Social welfare is the red area.

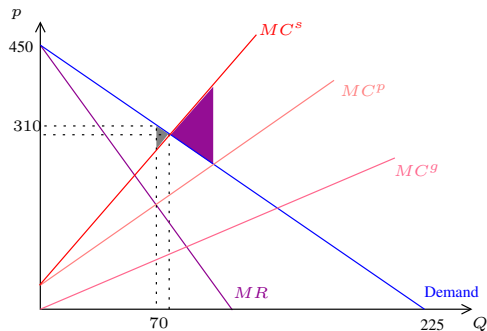


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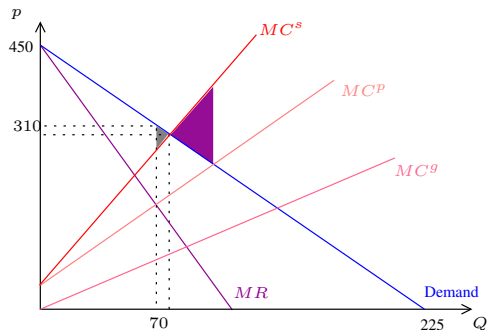
Deadweight loss from monopoly is the grey area.

# Monopoly ad externalities



DWL from monopoly (grey) is less than competition (purple).

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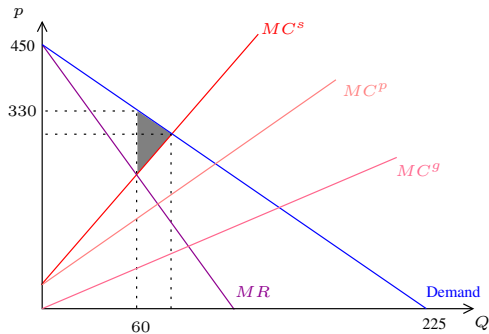
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If there was underprovision without a tax the situation will be worsened by the tax.

But if there was overprovision without tax, the tax *may* help.



# Tax, monopoly, and externalities



DWL is higher with tax than without.

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Not a practical solution, but highlights the problem of not having property rights defined.

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Social optimum: 1 car per hour and total profit of 500.

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If no property rights: mechanic maximizes profits by choosing to work on 2 cars per hour.

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Right to quiet: tea house maximizes profit by selling the right to one car per hour for 200. The mechanic makes 300 minus the 200 paid for the right to work on a car. The tea shop makes 200 plus the 200 it gets from the mechanic.

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Right to be noisy: mechanic sells its right to work on one car and makes 300. The loss of 100 is made up for by the price it charges the tea shop between 100 and 200.

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Caveat: This kind of bargaining only works in very special circumstances where there is no asymmetric information, no transaction cost, and so on.

# Rivalry and exclusion

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Markets for all but private goods fail.

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This is the *tragedy of the commons*.

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Cannot regulate to require price to be zero.



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So if 1 hires and 2 doesn't:

1 gets  $8 - 10 = -2$

2 gets  $8 - 0 = 8$ .

## Hiring game

	2 hires	2 doesn't hire
1 hires	$-2, -2$	$-2, 8$
1 doesn't hire	$8, -2$	$0, 0$

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	2 hires	2 doesn't hire
1 hires	$-2, -2$	$-2, 8$
1 doesn't hire	$8, -2$	$0, 0$

Nash equilibrium: Neither hires.



## Hiring game

	2 hires	2 doesn't hire
1 hires	$-2, -2$	$-2, 8$
1 doesn't hire	$8, -2$	$0, 0$

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If you have a roommate, this is what probably happens when it comes to cleaning up.

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The Nash equilibrium is still for neither to hire.

## A more general example

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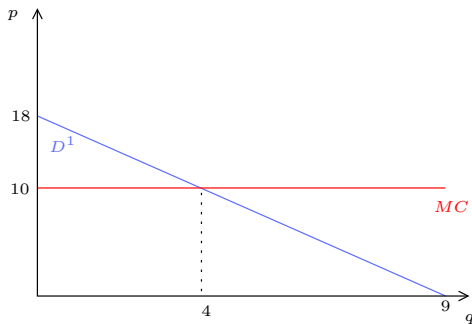
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Total value of  $q$  guards:  $D^1(q) + D^2(q)$  — vertical sum.

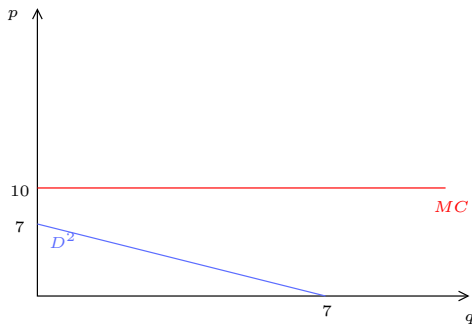


## Free riding



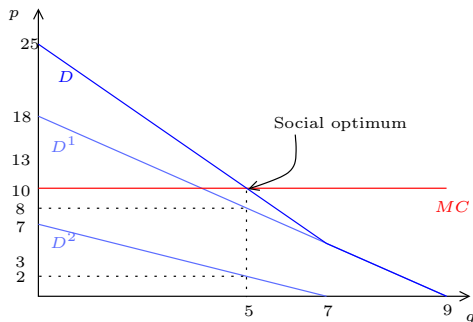
If 1 makes its decision alone, with no guards provided by 2, it decides on 4 guards.

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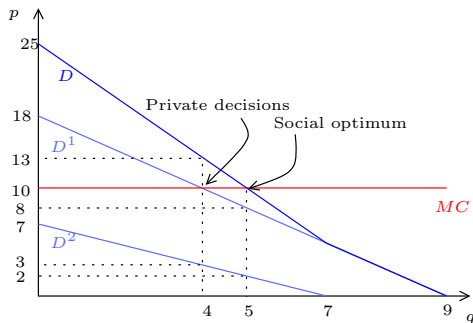
If 2 makes its decision alone, with no guards provided by 1, it decides on no guards.

# Social optimum



The social optimum is to hire 5 guards and split the cost between 1 and 2.

# Equilibrium



If they are choosing independently, the equilibrium is for 1 to hire 4 guards and 2 to hire none.

## Efficient level of a public good

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$G = G_1 + G_2$  — the total amount of public good provided.

Pareto-efficiency: Each provides  $G_i$  so that increasing one's utility decreases the other's.



## Pareto-efficiency

We can prove (won't do it here) that an allocation is Pareto-efficient when

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Free riding leads to the phenomenon where the provision of the public good is too little if we treat it like a private good.

# What to do about free riding

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3. Contracts: we can stop short of merging if the firms can agree to sign contracts to guarantee that they cooperate.
4. Coercion: the government can impose the socially efficient levels via taxes.