

Economics 500: Microeconomic Theory

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Problem Set #12 – Answers

1. The Coase Theorem says that efficiency in resource allocation will result from assigning property rights to resources. Give the intuition behind this theorem. Does it matter who receives the rights to the property? Explain.

The intuition behind the Coase Theorem is that when parties affected by externalities can negotiate costlessly with one another, an efficient outcome results no matter who receives the rights to the property. That means with costless negotiation, the resources allocation can get pareto efficiency.

No. It does not matter who receives the property rights.

2. Bryan can smoke his Newport Cigarettes with or without a filter. Smoking without a filter results in greater second-hand smoke damage to his mom. The relevant gains and losses for the two individuals are listed in the table below.

	With Filter	Without Filter
Gains to Bryan	\$200/week	\$245/week
Damage to his mom	\$35/week	\$85/week

- a. If Bryan is not liable for smoke damage and there are no negotiation costs, will the smoke with a filter? Explain carefully.

If Bryan is not liable for damage and there are no negotiation costs, he will smoke with filter, because after negotiation his mother will pay him $\$45 \leq P \leq \50 for his smoking with filter.

Here, the gain difference of Bryan smoking with filter and without filter for Bryan is $\$245 - \$200 = \$45$

The damage difference of Bryan smoking with filter and without filter for his mom is $\$85 - \$35 = \$50$, greater than the gain difference.

So his mom will pay him $\$45 \leq P \leq \55 , to make him smoke with filter.

- b. How, if at all, would the outcome be different if Bryan were liable for all second hand smoke damage and the cost of filtered cigarettes were \$10/week higher than indicated in the table? Explain carefully.

	With Filter	Without Filter	Difference
Gains to Bryan	\$190/week	\$245/week	55
Damage to his mom	\$35/week	\$85/week	50

Bryan is liable, he will compensate his mom's damage with $50 \leq P \leq 55$, and he will smoke without a filter.

3. Recently, Ted Turner of Turner Broadcasting, argued before a congressional committee that they should make a law rating TV shows for violence content. He said that children are damaged and violence must be curbed. He indicated that his own network shows too much violence. Explain why someone who shows violence on his TV channels is arguing for government regulation of himself.

If he is not liable, if he initiates this change, then he will be seen in a positive light. Thus, he may gain more viewers and thus he will gain profit.

4. Televisions seem to fit the definition of a public good fairly well, yet most TV in the U.S. is provided by private companies. Can you explain why? How has HBO dealt with the problem of excludability?

Although most TVs is provided by private company, but it seems to fit the definition of public goods very well, because the consumption of additional units of the TVs involves zero social marginal costs of production, so TVs combine with the non-rival characteristic;

Secondly, although the private companies can cost some money to exclude individuals from benefiting from the TVs, but in fact this kind of companies benefit a lot from advertising. Under this situation, the private companies do not care that there are a lot of free-riders, so they are reluctant to exclude them.

So TVs seems fit the definition of a public good.

HBO uses some technology to exclude the individuals who do not pay for the program; the registers must install some devices to receive the signals.

5. A firm in a perfectly competitive industry has patented a new process for making widgets. The new process lowers the firm's average cost curve, meaning this firm alone (although still a price taker) can earn real economic profits in the long run.
- a. If the market price is \$20 per widget and the firm's marginal cost curve is given by $MC = 0.4Q$, where Q is the daily widget production for the firm, how many widgets will the firm produce?

Perfectly competition market: $\max \pi, P=MC \rightarrow 20=0.4Q \rightarrow Q=50$

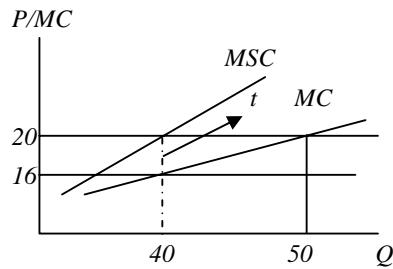
- b. Suppose a government study has found that the firm's new process is polluting the air and estimates the social marginal cost of widget production by this firm to be $MSC = 0.5Q$. If the market price is still \$20, what is the socially optimal level of production for the firm? What should the rate of government-imposed excise tax be to bring about this optimal level of production?

Set $MSC=0.5Q=P=20 \rightarrow Q=40$

*At the social optimal level of $Q=40$, $MC=0.4Q=0.4*40=16$.*

So the excise tax $t=20-16=\$4$

c. Graph your results.



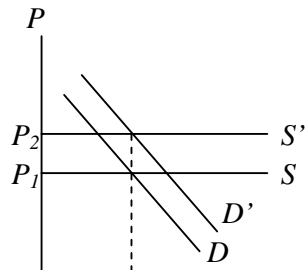
6. There is considerable legal controversy about product safety. Two extreme positions might be termed let the buyer beware and let the seller beware. Under the former scheme producers would have no responsibility for the safety of their products: buyers would absorb all losses. Under the latter scheme this liability assignment would be reversed: firms would be completely responsible under law for losses incurred from unsafe products. Using simple supply and demand analysis, discuss how the assignment of such liability might affect the allocation of resources. Would safer products be produced if firms were strictly liable under law? How do possible information asymmetries affect your results?

When let the buyer beware, the buyers would assume all losses. The demand curve under such a situation might be given by D . Firms (which assume no liability) might have a horizontal long-run supply curve of S .

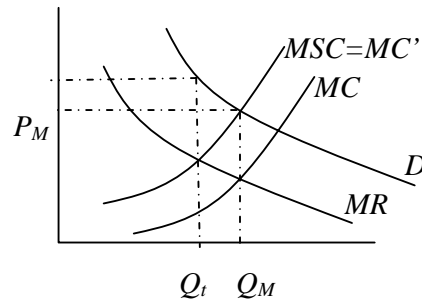
A change in liability assignment would shift both supply and demand curves.

When let the seller beware, losses (of amount L) would now be incurred by firms, thereby shifting the long-run supply curve to S' .

Individuals now no longer have to pay the losses and their demand curve will shift upward by L to D' . In this example, then, market price rises from P_1 to P_2 (although the real cost of owning the good has no changed), and the level of production stays constant at Q^ . Only if there were major information costs associated with these two kinds of choices might be the two give different allocations. It is also possible that L may be a function of liability assignment (the moral hazard problem), and this would also cause the equilibrium to differ.*



7. Suppose a monopoly produces a harmful externality. Use the concept of consumer surplus to analyze whether an optimal tax on the polluter would necessarily be a welfare improvement.



Untaxed monopoly produces Q_M at P_M , since $MR=MC$, if the MSC intersects the demand curve.

At (Q_M, P_M) , this is the optimal production level. A per-unit tax of t would shift the MC of monopoly to MSC , monopoly would produce Q_t , which is below the optimal level.

So the tax may improve matters only if the optimal level is less than Q_M and even then in many cases it will not.

8. A monopolist can produce at constant average and marginal costs of $AC = MC = 5$. The firm faces a market demand curve given by $Q = 53 - P$.

- a. Calculate the profit-maximizing price-quantity combination for the monopolist. Also calculate the monopolist's profits.

When $MR=MC$, $\max \pi$

$$TR=PQ=(53-Q)Q=53Q-Q^2 \rightarrow MR=53-2Q$$

$$MR=MC=5 \rightarrow Q=24 \rightarrow \text{demand curve } 24=53-P \rightarrow P=29$$

$$\rightarrow \pi = TR - TC = 24 * 29 - 5 * 24 = 576$$

- b. What output level would be produced by this industry under perfect competition (where $P = MC$)?

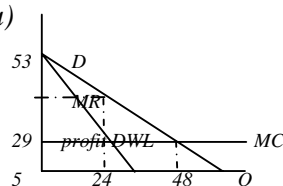
$$\text{Perfect competitive: } P=MC=5$$

$$Q=53-P \rightarrow Q=53-5=48$$

- c. Calculate the consumer surplus obtain by consumers in case (b). Show that this exceeds the sum of the monopolist's profits and the consumer surplus received in case (a). What is the value of the "deadweight loss" from monopolization?

$$\text{Competitive consumers surplus} = 1/2(53-5) * 48 = 1152$$

Case a)



$$CS = (53 - 29) * 24 * 1/2 = 288$$

$$Profit = (29 - 5) * 24 = 576$$

$$DWL = 1/2 * (48 - 24)(29 - 5) = 288$$

9. A monopolist faces a market demand curve given by

$$Q = 70 - P$$

- a. If the monopolist can produce at constant average and marginal costs of $AC = MC = 6$, what output level will the monopolist choose in order to maximize profits? What is the price at this output level? What are the monopolists' profits?

$$MC = MR = 6, Q = 70 - P \rightarrow P = 70 - Q$$

$$TR = PQ = (70 - Q)Q \rightarrow MR = 70 - 2Q = 6 \rightarrow Q = 32, P = 38$$

$$\pi = P * Q - AC * Q = (38 - 6) * 32 = 1024$$

- b. Assume that instead that the monopolist has a cost structure where the total costs are described by

$$TC = 0.25Q^2 - 5Q + 300$$

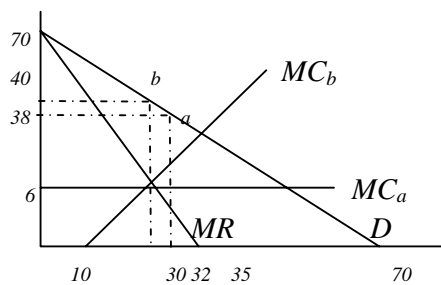
With the monopolist facing the same market demand and marginal revenue, what price-quantity combination will be chosen now to maximize profits? What will profits be?

$$TC = 0.25Q^2 - 5Q + 300, MC = 0.5Q - 5$$

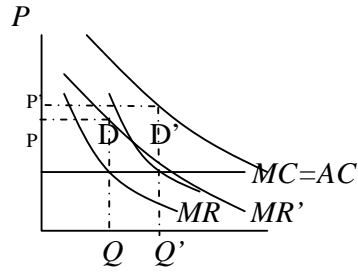
$$\text{Set } MC = MR \quad 0.5Q - 5 = 70 - 2Q \rightarrow Q = 30, P = 40$$

$$\pi = TR - TC = 30 * 40 - (0.25 * 30^2 - 5 * 30 + 300) = 825$$

- c. Graph the market demand curve, the MR curve, and the two marginal cost curves from parts (a) and (b). Notice that the profit-making ability is constrained by the market demand curve (along with its associated MR curve) and the cost structure underlying production.



10. Suppose the market for Hula Hoops is monopolized by a single firm
 a. Draw the initial equilibrium for such a market.



- b. Now suppose the demand for Hula Hoops shifts outward slightly. Show that, in general (contrary to the competitive case), it will not be possible to predict the effect of this shift in demand on the market price of Hula Hoops.

There is no supply curve for monopoly, when demand curve shifts. MR curve will shift, you can see because the $MR=MC$ intersection change, the price could be increase or decrease in response to an increase in demand.