McPeak
Lecture 10
PAI 723

The competitive model.

Marginal willingness to pay (WTP). The maximum amount a consumer will spend for an extra unit of the good.

As we derived a demand curve for an individual's preferences, we can interpret the demand curve tracing out the consumer's marginal willingness to pay at different levels of consumption.

Consumer surplus (CS) – the monetary difference between what the consumer is willing to pay for a given quantity of good and what the good costs.

[show graph]

Relies on the fact that the demand curve is downward sloping and that the price for purchasing is the same for all units.

The area under the demand curve and above the price line.

The area below the price line is expenditure (p times q).

If price increases and demand is constant, consumer surplus falls.

The decrease in consumer surplus for a given price increase will be larger:

- The greater the initial expenditure on the good
- The less elastic is the demand curve.

Producer surplus. The difference between the minimum amount necessary for the seller to be willing to produce the good and the selling price.

[show graph]

Producer surplus is revenue minus variable cost. Since profit is revenue minus cost, the difference between profit and producer surplus is fixed cost in the short run, and there is no difference in the long run.

The maximum societal welfare comes from maximizing consumer surplus plus producer surplus.

Why are there gains to trade?

[show graph of when quantity is too low]

[show graph of when quantity is too high]

Monopoly.
There is only one supplier of a good for which there is no close substitute.

How can such a thing happen?

1) Technical reasons.
    a. Economies of scale. A natural monopoly exists when one firm can produce at a lower cost than several firms producing the same good and total output level (AC is downward sloping over the feasible range of output).

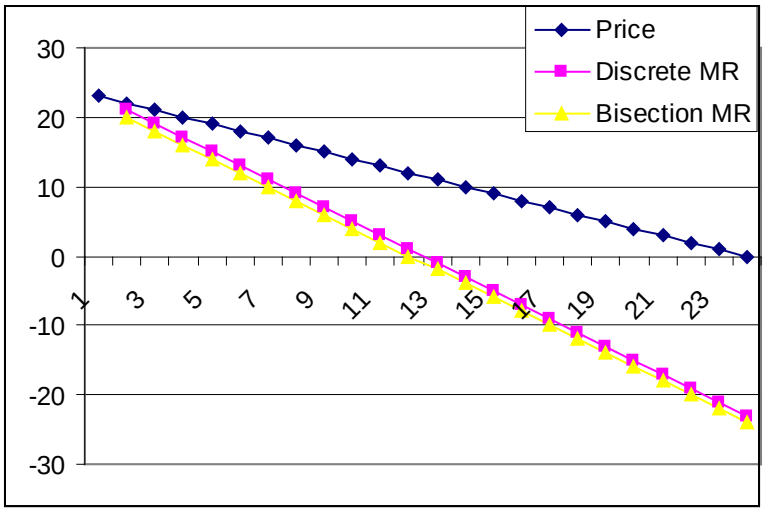
2) Legal reasons.
    a. Patents.
    b. Franchises
    c. Legal barriers.

3) Anti-competitive behavior

Marginal revenue as you recall is the change in revenue divided by the change in q. In the competitive model, the price taking firm faced a marginal revenue of p, since price did not change with the output level of the firm.

Now, the monopoly firm faces the entire demand curve. This is downward sloping, so by picking a level of q, there is also an associated p (the whole demand curve is defined by (p,q) pairs).

[show graph]



	Price	TR	Discrete MR	Bisection MR
1	23	23		
2	22	44	21	20
3	21	63	19	18
4	20	80	17	16
5	19	95	15	14
6	18	108	13	12
7	17	119	11	10
8	16	128	9	8
9	15	135	7	6
10	14	140	5	4
11	13	143	3	2
12	12	144	1	0
13	11	143	-1	-2
14	10	140	-3	-4
15	9	135	-5	-6
16	8	128	-7	-8
17	7	119	-9	-10
18	6	108	-11	-12
19	5	95	-13	-14
20	4	80	-15	-16
21	3	63	-17	-18
22	2	44	-19	-20
23	1	23	-21	-22
24	0	0	-23	-24

Note there is a difference between calculating the MR from one observation to the next compared to the MR at a given point.

Bisection rule. Marginal revenue for a linear demand curve defined by: p=a-b*q is MR=a-2*b*q.

For a linear demand curve, the marginal revenue curve bisects the demand curve.

Why?

Well demand is (24-q)=p in the example above, and we know p*q is revenue. So p*q is the same as (24-q)*q, or $24q-q^2$. The marginal of this is the derivative with respect to q, or 24-2q.

The competitive firms choose q given p. Here, the monopoly chooses p and q based on information about the entire demand curve. It is making its choices in the awareness that increasing q decreases price, and that marginal revenue is a function of the quantity they pick.

Profit maximization steps for the monopolist.

1) Identify q^* that determines where $MR(q^*)= MC(q^*)$
2) Calculate what is the implied p^* for that q^* from the demand curve.
3) Calculate profit which is defined by p^* times q^* minus cost at q^* / look at p^* compared to $AC(q^*)$.
4) Shut down (produce q=0) if p^* is less than average variable cost (SR) or average cost (LR).

Simple example.

Demand is defined by p=24-q, and total cost is defined by $TC=q^2$, so that MC = 2*q (you will be given this, not be expected to derive it).

If we know that p=24-q, we can use the bisection rule to define MR=24-2*q, since R=p*q, $=24q- q^2$.

Where is MR=MC?

Where is 24-2*q=2*q, 24=4q, or q=6.

At a quantity of six, I plug back into the demand curve and find that p=24-6, or 18.

[note: a common mistake is to plug back into MR curve to solve for price]

Profit for me at this point is revenue minus cost, or 18*6-6*6, or 72.

To make life easier on us, I will tend to give you a constant marginal cost, but the procedure is the same.

How does this differ from a perfectly competitive market in terms of outcome?

If we use the given demand curve and recall that the MC curve traces out the supply curve in a perfectly competitive market, we find:

24-q=2q where supply and demand meet at a (p,q) pair, which solves for $q^*=8$, implying that $p^*=16$.

[show on graph]

There is a deadweight loss of monopoly. The market structure makes it so that transactions that would occur in a perfectly competitive market do no occur, thus reducing total societal welfare.

Note efficiency / equity distinction.

Now we can modify the example.

Change cost, so that TC=2*q, MC=AC=2. Keep demand at p=24-q.

This is the horizontal supply curve discussed last class.

For the monopolist, MR = MC, so 24-2q=2. This solves for q^m=11, which is where p^m=13.

In perfect competition by contrast, 24-q=2 when q^{pc}=22, so that p^{pc}=2.

CS with perfect competition is the area above the competition price line and below the demand curve, a triangle. When q=0, p=24 by the demand curve. So we have ($p^{\text{when q=0}}$-$p^{\text{competition}}$)*($q^{\text{competition}}$)*(1/2)=(24-2)*22*(1/2)=242

CS with monopoly is the area above the monopoly price line and below the demand curve, a triangle. ($p^{\text{when q=0}}$-p^{monopoly})*(q^{monopoly})*(1/2)=(24-13)*11*(1/2)=60 ½.

PS with perfect competition is the area below the price line and above the supply curve = 0.

PS with monopoly is the area defined by: (p^{monopoly}-mc)*(q^{monopoly}), or (13-2)*11 =121

Total welfare under competition is 0+242=242
Total welfare under monopoly is 121+60 ½, or 181.5

This illustrates a general result – total welfare is reduced under monopoly market structure compared to a perfectly competitive market.

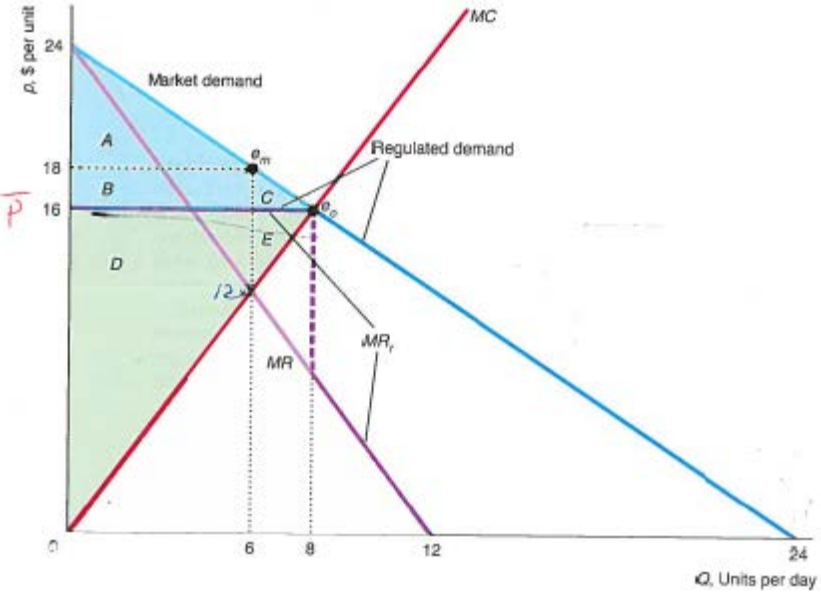
So what can we do about a monopoly?

1) Optimal price regulation, which sets a price ceiling.

What would the equilibrium market clearing price quantity pair be if the market was competitive? Set the price ceiling at this level, so that the demand curve facing the monopolist is modified to have a flat spot, then decrease after passing to the right of this p, q pair.

Figure 11.8 Optimal Price Regulation.

If the government sets a price ceiling at \$16, where the monopoly's marginal cost curve hits the demand curve, the new demand curve the monopoly faces has a kink at 8 units, and the corresponding marginal revenue curve, MR_r, "jumps" at that quantity. The regulated monopoly sets its output where $MR_r = MC$, selling the same quantity, 8 units, at the same price, \$16, as a competitive industry would. The regulation eliminates the monopoly deadweight loss, $C + E$. Consumer surplus, $A + B + C$, and producer surplus, $D + E$, are the same as under competition.



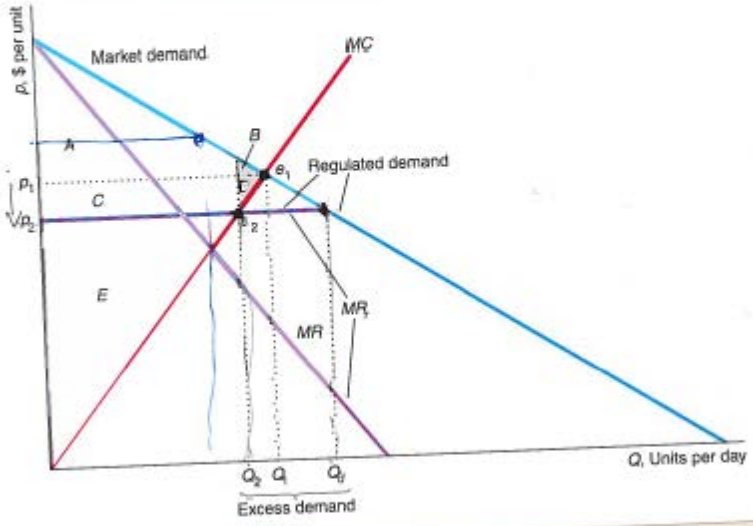
	Monopoly Without Regulation	Monopoly with Optimal Regulation	Change
Consumer Surplus, *CS*	*A*	*A* + *B* + *C*	*B* + *C* = Δ*CS*
Producer Surplus, *PS*	*B* + *D*	*D* + *E*	*E* − *B* = Δ*PS*
Welfare, *W* = *CS* + *PS*	*A* + *B* + *D*	*A* + *B* + *C* + *D* + *E*	*C* + *E* = Δ*W*
Deadweight Loss, *DWL*	−*C* − *E*	0	*C* + *E* = Δ*DWL*

Solved Problem 11.4

Suppose that the government sets a price, p_2, that is below the socially optimal level, p_1, but above the monopoly's minimum average cost. How do the price, the quantity sold, the quantity demanded, and welfare under this regulation compare to those under optimal regulation?

Answer

1. *Describe the optimally regulated outcome.* With optimal regulation, e_1, the price is set at p_1, where the market demand curve intersects the monopoly's marginal cost curve on the accompanying graph. The optimally regulated monopoly sells Q_1 units.



	Monopoly with Optimal Regulation	Monopoly with a Low Regulated Price	Change
Consumer Surplus, *CS*	$A + B$	$A + C$	$C - B = \Delta CS$
Producer Surplus, *PS*	$C + D + E$	E	$-C - D = \Delta PS$
Welfare, $W = CS + PS$	$A + B + C + D + E$	$A + C + E$	$-B - D = \Delta W = DWL$

[show graph when the price ceiling is set too low]

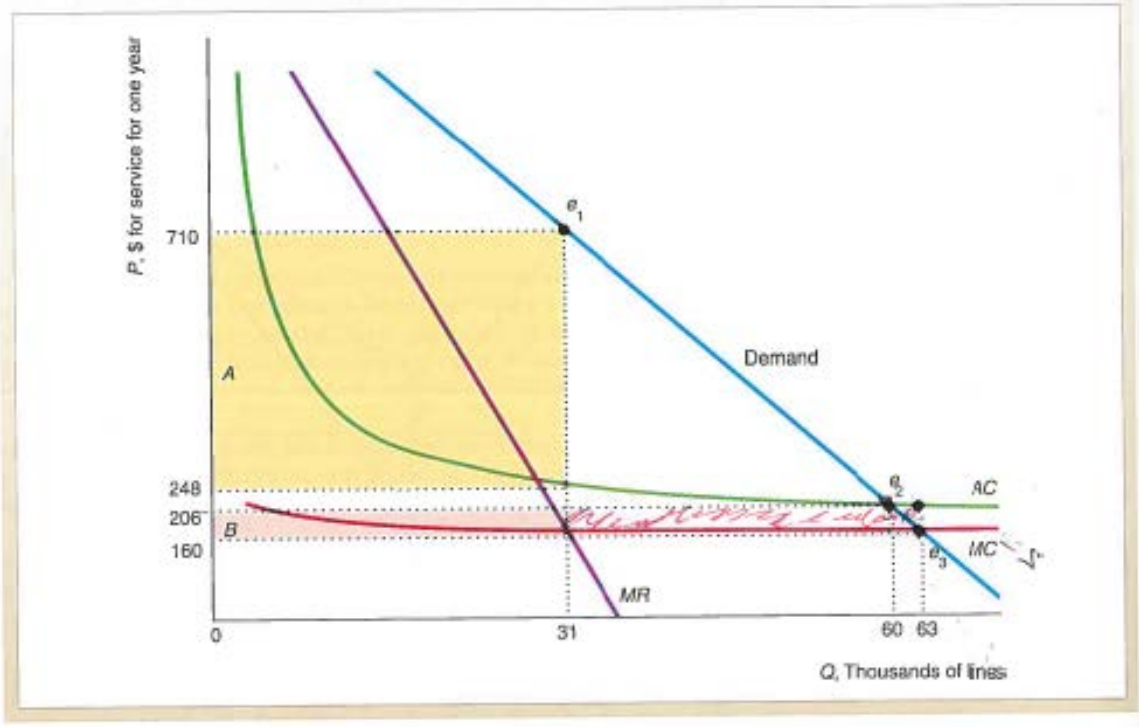
This is very difficult to get right if you don’t know the actual demand and cost curves.

Also may have a natural monopoly that is defined by decreasing average costs over the total range of feasible output levels. This means MC is below AC over this range as well, since if AC is downward sloping, that means MC is below it.

A policy that sets the price ceiling based on the marginal cost curve would make it better for the monopolist to shut down rather than produce (thus losing whatever consumer and producer surplus we are getting under the monopoly situation).

Figure 11.9 Regulating a Telephone Utility.

If the phone utility is an unregulated, profit-maximizing monopoly, e_1, it provides 31,000 telephone lines at \$710 each annually and makes a profit of \$14,322,000, equal to area *A*. The government may regulate the price so that the utility breaks even, e_2. Alternatively, the government may regulate the utility to behave like a price taker, e_3. If so, the government must subsidize the utility by area *B* = \$2,583,000 to keep it from shutting down.



Anti-Trust Laws

Beyond regulating prices, monopolies are prohibited by anti-trust laws and can be regulated through policy. There are anti-trust laws prohibiting actions that are likely to restrain competition.

- Sherman Act (1890)
    - Section one prohibits contracts, combinations, or conspiracies in restraint of trade.
        - Example: agreeing to restrict output or fix price.
        - Includes both *explicit* and *implicit* arrangements.

- For example, *parallel conduct*, in which firm B always follows firm A's pricing, is illegal, even if there is no formal agreement.

We will match any competitors lowest price?

- Section two makes it illegal to monopolize or attempt to monopolize a market.

- Clayton Act (1914)
  - The Sherman Act made it clear that monopolies were illegal, but was unclear about other practices. Thus in 1914, the Clayton Act was passed.
  - The Clayton Act helped to clarify the Sherman Act.
  - The Clayton Act prohibits actions that restrain competition.
    - For example, it prohibits mergers that "substantially lessen competition"
    - It also prohibits predatory pricing – setting prices below cost to drive competitors out of business.
- Enforcement:
  1. Federal Trade Commission
     - Created in 1914 to set standards dealing with anti-trust.
  2. Department of Justice's Anti-Trust Division
     - Interpretation of laws may vary as political power changes, as it is part of the executive branch.
  3. Private legal proceedings