McPeak
Lecture 10
PPA 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?

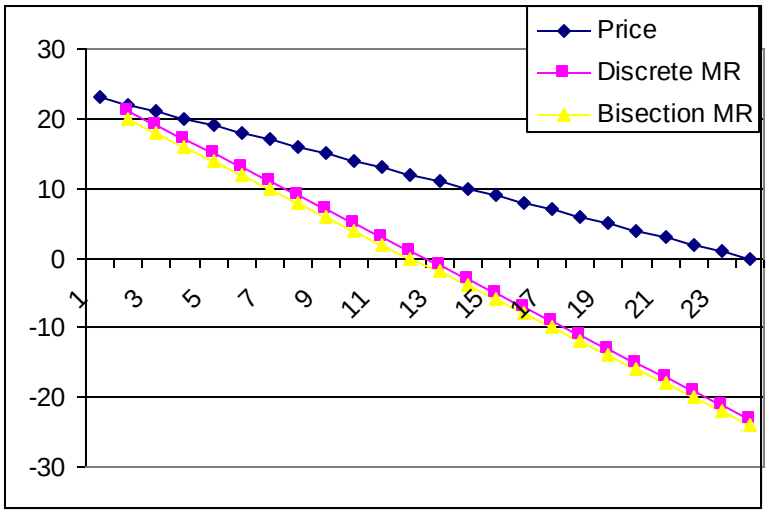
1) Technical reasons.
    a. Economies of scale. A natural monopoly exists when one firm can produce at a lower cost than several firms producing the same good and total output level (AC is downward sloping over the feasible range of output).
    b. Large Sunk costs.

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

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 firm 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^*
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.

If we assume perfect competition and the conditions for a horizontal supply curve discussed last class, we can define a cost curve as 2*q, so the MC is a constant 2.

24-2q=2 when q=11, which is where p=13.
In perfect competition by contrast, 24-q=2 when q=22, so that p=2.

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

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 $(p^{when\ q=0}-p^{competition})*(q^{competition})*(1/2)=(24-2)*22*(1/2)=242$

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

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.

[show graph]

[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).