Introduction to Industrial Organization
Professor: Caixia Shen Fall 2014
Lecture Note 3

Part 1: Perfect Competition (Ch.6)-continue

The previous analysis:

- Derived perfectly competitive under the assumption that N fixed.
- Proved that conditional on N, the perfectly competitive allocation is efficient.

6. Entry and Exit in perfect competitive competition

What happens when firms can enter and exit the market?

First, derive the long run perfectly competitive equilibrium when there is costless exit and entry.

In the short run, if the equilibrium price is p*, profits can be positive depending on how many firms are in the market. Each firm produces $\frac{Q^D(p^*)}{N}$. If there is free entry, firms will enter the market until profits are driven to zero. The long-run perfectly competitive price must be such that profits are equal to zero (p=AC) and firms are behaving optimally (p=MC). Thus the long-run p* must occur at the minimum of the AC curve.

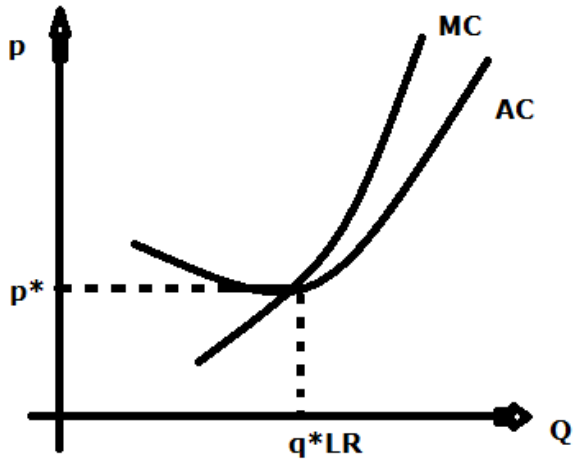

Figure 6.e11 Long-run perfect competitive equilibrium

In the long-run, price falls to p^*_{LR} and each firm produces q^*_{LR}. Which means that there are $N_{LR}=\frac{Q^D(p^*_{LR})}{q^*_{LR}}$ firms in the market. Note that if there is no sunk cost, $p^*_{LR}=\underline{p}$ from the previous slides.

Does total surplus increase as firms enter? Yes. Intuitively as firms enter and price is driven down. Two things happen. First consumers set to buy more stuff. Second, that

stuff is produce more efficiently. Figure 6.e12 illustrates the increase in surplus from long-run to short-run.

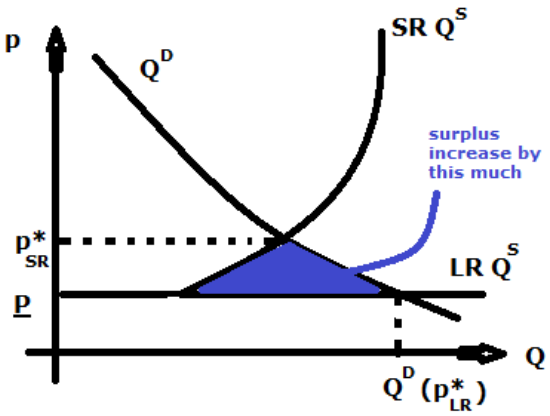

Figure 6.e12 An increase in surplus in long-run from short-run

7. The analysis we've done leads to the immediate results that when markets are perfectly competitive, regulation or government intervention is welfare decreasing.

7.1. Taxation. Suppose the government requires consumers pay a $t tax on each unit of output they produce. Now an equilibrium price is a p* such that $Q^D(p^*+t)=Q^S(p^*)$.

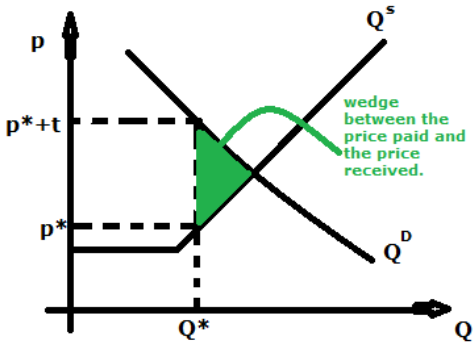

Figure 6.e13 Efficiency loss under taxation

7.2. The government explicitly limits entry at $N^F < N^{LR}$. Now the long-run supply curve effectively looks like a short-run supply curve with the number of firms fixed at N^F.

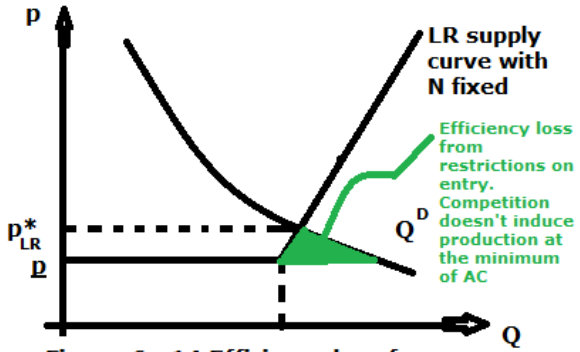

Figure 6.e14 Efficiency loss from regulation on entry

7.3. The government makes entry costly through regulation. Entry unit limited, but costs firms T dollars.

- Now average costs increase from $\frac{C(q)}{q}$ to $\frac{C(q)+T}{q}$
- The AC curve shifts up and to the right.

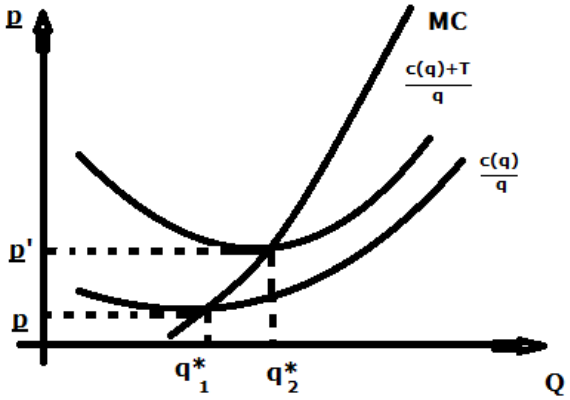

Figure 6.e15 Taxation effect in LR

Without entry costs firms produce q^*_1 in the LR. With entry costs firms produce q^*_2 in the LR. We know that $\frac{c(q_2^*)}{q_2^*} > \frac{c(q_1^*)}{q_1^*}$.

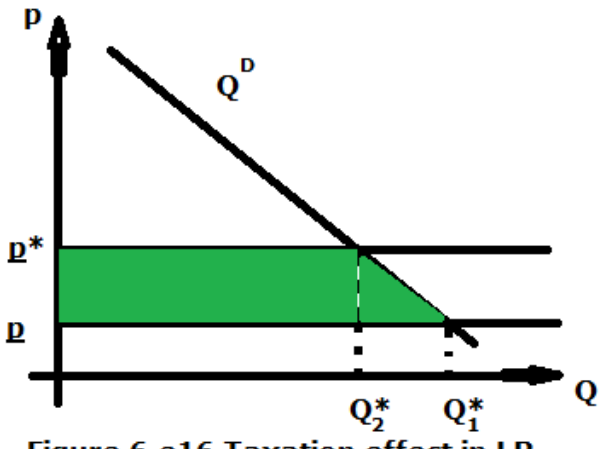

Figure 6.e16 Taxation effect in LR

In figure 6.e16, LR equilibrium shifts form Q^*_1 to Q^*_2. Surplus goes down by an amount equal to shaded area minus taxes collected is $\frac{TQ_2^*}{q_2^*}$.

8. Four facts that do not match well

- Many times profits seem to persist in the long run
- Entry and exit take place at the same time (gross and net rates)
- Firms enter under a smaller size than average and then grow
- Size distributions are asymmetric

9. An explanation: competitive selection

- Firms have different levels of efficiency
- Firms are uncertain about their own efficiency
- This explains the facts:
  - ✓ - profits
  - ✓ - simultaneous entry and exit
  - ✓ - growth
  - ✓ - distribution of efficiency, sizes ...and keeps efficiency

10. Monopolistic competition (Chamberlin)

- A large number of firms, negligible impact on rivals, but product is differentiated:
  - ✓ demand curve is not longer horizontal
  - ✓ eg. restaurants, shampoos...
- Pricing of the monopolistic firm: MR MC
  - ✓ price may be higher than marginal cost
  - ✓ if different from AC, short-run equilibrium that will induce entry

- Long-run equilibrium:
  - ✓ - free entry displaces demand and drives profits to zero
  - ✓ - prices are higher than marginal costs
  - ✓ - prices are higher than the minimum of AC
- Welfare:
  - ✓ - No full "allocative" and "productive" efficiency
  - ✓ - But we should take into account the benefits of "product variety"

Part 2: Monopoly (Ch. 5)

Normally there is a long list that covers various possibilities from monopoly to competition: pure monopoly, dominant firm, oligopoly, monopolistic competition, perfect competition. In this chapter, we deal with the cases where one firm dominates the entire market, or almost the entire market.

- Monopoly definition
- Monopoly v.s. perfect competition
- Dominant firm
- Regulation
- One frequent case and its regulation: essential facilities

1. Monopoly:

The model of monopoly is based on the assumption that there is a well-defined market with one single supplier. The monopolist sets price p and consumers demand quantity D(p); or, to put it in the reverse form: to sell a quantity q, the seller must set a price p(q), there p( ) is the inverse function of D( ). By producing q, the monopolist incurs a cost C(q). Finally, it is assumed that the seller chooses a price to maximize profits.

Notice that because price and output are related by the demand function. It is the same thing to choose the optimal price or to choose the optimal output. That means when the monopolist sets the price, the supply quantity has been determined as well.

This is the extreme opposite of perfect competition. Thus there are not too many good examples for market share nearly 100%.

- US utilities companies
- US cable companies used to be local monopolists until entry by satellite companies and increase in availability of high speed internet
- Examples: Microsoft has nearly a 100% market share-monopoly. Unsuccessfully claimed in court that they were not a monopolist because of close substitutes.

But markets with dominant firms (50%-100% market share) are more common and yield outcomes similar to monopoly markets.

- Ipods have a large market share in the mp3 market. All competitors are much smaller.

Monopolist's profit maximization occurs when the firm uses the optimal rule that marginal revenue equals marginal cost. It can be shown that this implies the well know elasticity rule:

$$\frac{p - MC}{p} = \frac{1}{\epsilon}$$

A monopolist should set a price-cost margin that is greater the lower is the price

elasticity of demand.

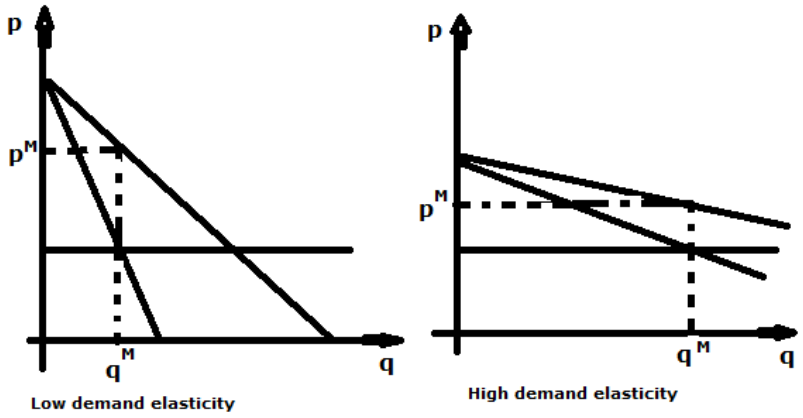

Figure 5.1 Demand Elasticity and Optimal Monopoly Margin

Figure 5.1 illustrates the optimal price (and margin) for different demand functions. The graph on the left shows a low-elasticity demand curve. As the graph shows, optimal price (and margin) are greater than for a high-elasticity demand curve.

2. Monopoly v.s. perfect competition

   2.1.Objectives

   What is the monopolist's objective? To maximize profits just like perfectly competitive firms. The only difference is that they take into account how their behavior affects prices.

   Given a demand curve, Q(p) max

$$\pi = \max\{p(Q) * Q - C(Q)\}$$

   The monopolist's FOC yield, MR=MC, same as before,

$$\pi = \max\{p(Q) * Q - C(Q)\}$$

$$FOC: \frac{dp}{dQ}Q + p(Q) - MC(Q) = 0$$

$$\frac{dp}{dQ}Q + p(Q) = MC(Q)$$

   Where $\frac{dp}{dQ}Q + p(Q)$ is marginal revenue, and $MC(Q)$ is marginal cost.

   The monopolist's MR (unlike a perfect competitive firm's):

- falls as output increases because of declining prices.
- Since $\frac{dp}{dQ} < 0$, a firm behaving as a monopolist will always produce less than that a firm behaving as prefect competitor.

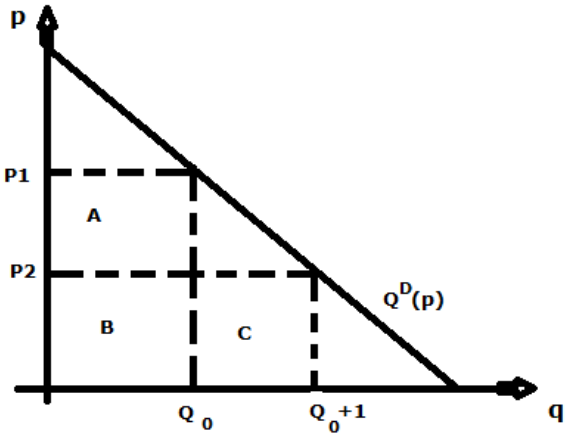

Figure 5.e1 Monopoly v.s. perfect competition-optimal quantity

When a monopolist increase output from Q_0 to Q_0+1, revenue increase, by the extra amount of revenue he receives, area of C=(Q_0+1- Q_0) p2. But revenue decreases because he has to reduce price from p1 to p2, for the first Q_0 units sold. Area of A=(p1-p2) Q_0.

Since perfect competitor ignore "A", his MR curve always lies above the monopolist. So he will produce more. Figure 5.e2 illustrates this.

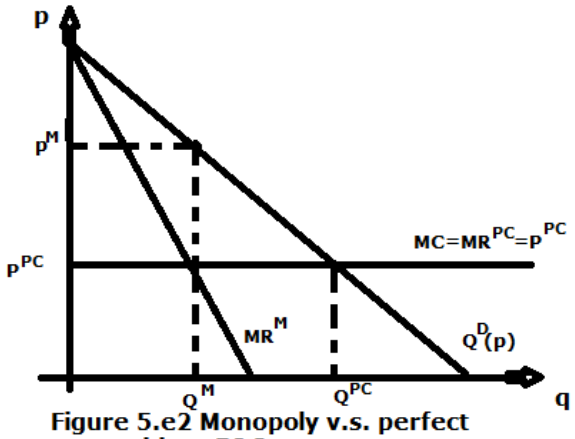

Figure 5.e2 Monopoly v.s. perfect competition- FOCs

So monopolist restricts output in order to charge a higher price.

2.2. Welfare loss from monopolist

A perfect competitive firm chooses q such that p=MC(q). In figure 5.e2, we can see the PC firm chooses no markup over cost. The percentage of price that is markup over cost equal zero. For monopolist, obvious that $\frac{p_M^* - MC(Q_M^*)}{p_M^*} > 0$.

Two things happen to welfare. Figure 6.e3 illustrates this. Under perfect competition, welfare=A+B+C+D+E and is efficient. Under monopoly,

- 1) welfare falls to A+B+D. Welfare loss="deadweight loss"=C+E
- 2) part of consumer surplus B shifts over to producers

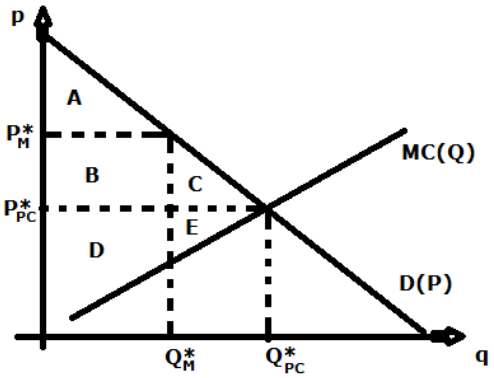

Figure 5.e3 Monopoly v.s. perfect competition-welfare loss

Note that the deadweight loss (DWL) is related to markups over cost.

$$DWL = \frac{1}{2}(p_M^* - C^*(Q^M))(Q_{PC}^* - Q_M^*)$$

Where $(p_M^* - C^*(Q^M))$ *shows that firm*$'$*smarkup closely related to DWL.*

- Deadweight loss closely related to monopolist's price-cost margin. This price-cost margin $\frac{p-c}{p}$ is often used as measure of monopolist's markup power.

  If the monopolist can charge a high price relative to costs, he has market power.
- The ability of firms to charge a high markup depends critically on demand characteristics. The more willing consumers are to accept high prices (and not substitute to other goods), the higher the markup is.

Monopolist FOC:

$$p(Q) + \frac{dp(Q)}{dQ}Q = MC(Q)$$

$$\frac{p(Q) - MC(Q)}{p(Q)} = -\frac{dp}{dQ}\frac{Q}{p(Q)} = \frac{-1}{\frac{dQ}{dp}\frac{p}{Q}} = \frac{1}{\epsilon}$$

When demand is elastic, $\frac{dQ}{dp}$ is a large negative number, so markups are small. When demand is inelastic, $\frac{dQ}{dp}$ is a small negative number and markups are large. Recall that elasticity of demand =% change in quantity demanded after a 1% increase in price.