UC Berkeley
Haas School of Business
Economic Analysis for Business Decisions
(EWMBA 201A)
Fall 2012

Competitive markets and economic efficiency (PR 8.1-8.6 and 9.1-9.6)
Maximizing short- and long-run profits

Lectures 5-6

Aug. 25, 2012

Perfectly competitive markets (PR 8.1)

The theoretical ideal of perfect competition rest on three important assumptions:

[1] Price taking

Each individual firm (resp. consumer) sells (resp. buys) a sufficiently small proportion of total market output so its decisions have no impact on market price.

[2] Product homogeneity

The products of all the firms in the market are perfectly substitutable with one another so no firm can raise the price of its product above the price of the other firm without loosing all its business.

$\Rightarrow$ Oil, iron, lumber, cotton and other raw materials and so-called commodities are fairly homogeneous.

[3] Free entry and exit

Firms can easily enter or exit (if cannot make a profit) the market and consumers can easily switch from one firm to another.

$\Rightarrow$ There is fierce competition in the pharmaceutical industry but it cannot be perfectly competitive because firms hold patents that give them unique rights to produce drugs.

Q When a market is competitive?

A Most real-world markets are not perfectly competitive in the sense that each firm faces a horizontal demand curve (more below).

There is no simple rule of thumb to measure the *extent* to which a market is competitive. It is necessary to analyze the strategic interaction among market participants (game theory).

Simple pricing

In the model of perfect competition, each firm must charge the same price per unit to all of its consumers (no matter who the buyer is or how many units the buyer purchases). Simple pricing applies when

- the identity of the buyer cannot be observed or inferred at reasonable cost.

- the firm cannot prevent *arbitrage* among buyers when buyers can purchase multiple units.

Profit maximization by a competitive firm (PR 8.2-8.3)

A firm's profit is the revenue it takes in minus its cost. If we let $R(q)$ the revenue from selling q units, then its profit from selling q units is

$$\pi(q) = R(q) - C(q)$$

where $C(q)$ is the total cost of q units, and if the firm sets a price of p per unit – engages in simple pricing – then $R(q) = pq$.

In choosing the amount to produce and sell, the firm seeks to find the quantity q that maximizes profit $\pi(q)$. We use an asterisk to denote the profit maximizing quantity q^*.

The discrete case

Saying that q^* is the profit-maximizing quantity is the same as saying that

$$\pi(q^*) \geq \pi(q) \text{ for any } q \neq q^*.$$

In particular, consider the quantities $q^* - 1$ and $q^* + 1$. We know that

$$\pi(q^*) \geq \pi(q-1) \text{ and } \pi(q^*) \geq \pi(q+1),$$

and substituting $R(q) - C(q)$ for $\pi(q)$ yields

$$R(q^*) - C(q^*) \geq R(q^* - 1) - C(q^* - 1) \text{ and}$$
$$R(q^*) - C(q^*) \geq R(q^* + 1) - C(q^* + 1).$$

Rearranging,

$$R(q^*) - R(q^* - 1) \geq C(q^*) - C(q^* - 1) \text{ and}$$
$$C(q^* + 1) - C(q^*) \geq R(q^* + 1) - R(q^*).$$

Let $MR(q) = R(q) - R(q - 1)$ and $MC(q) = C(q) - C(q - 1)$ and rewrite this last pair of inequalities as

$$(i)\ MR(q^*) \geq MC(q^*) \text{ and } (ii)\ MR(q + 1^*) \leq MC(q + 1^*).$$

A *necessary* condition for q^* to be the profit-maximizing output is that expressions (i) and (ii) both hold true.

The continuous case

Profit $\pi(q)$ is maximized at a point at which an additional (small) increment to output leave profit unchanged, that is

$$\frac{\Delta\pi}{\Delta q} = \frac{\Delta R}{\Delta q} - \frac{\Delta C}{\Delta q} = 0.$$

Thus, in the continuous case, a *necessary* condition for q^* to be the profit-maximizing output is that

$$\frac{\Delta R}{\Delta q} = \frac{\Delta C}{\Delta q}$$

(the $MR(q) = MC(q)$ rule).

Sufficiency and the shutdown rule

The above results are only necessary conditions; that is, they only identify possible candidates for being the profit-maximizing quantity.

There is a condition, however, that insures that, if the firm should be in business at all, the conditions stated above are also sufficient.

We will establish the sufficiency condition for the continuous case (a similar argument applies to the discrete case).

If the following conditions hold

$$\begin{array}{rl} (i) & MR(q^*) = MC(q^*) \\ (ii) & MR(q) > MC(q) \text{ for all } q < q^* \\ (iii) & MR(q) < MC(q) \text{ for all } q > q^* \end{array}$$

then q^* is the profit-maximizing quantity for the firm to produce (if it should be in business at all).

Another way to view this result is that q^* is the profit-maximizing quantity (if it should be in business at all) if marginal revenue crosses marginal cost once at q^* and does so from above.

The marginal revenue of a competitive firm

In a competitive market, how much output the firm decides to produce and sell have no effect on the market price of the product (price taking). Therefore,

$$R(q) = pq \text{ for all } q.$$

and as a result the marginal revenue, average revenue and price are all equal. As a result, the profit maximizing quantity q^* of a perfectly combative firm satisfies

$$MC(q^*) = p$$

(if it should be in business at all).

– PR Figures 8.3 and 8.4 here –

The firm and market (short-run) supply curves (PR 8.5-8.6)

- The firm's supply curve of the firm specifies how much output the firm will produce at every possible price.

- The firm will produce at a point at which price is equal to marginal cost, but will shut down if price is below average variable cost.

- Therefore, the firm's supply curve is the portion of the marginal cost curve for which marginal cost is greater than average variable cost.

- The industry supply curve is the summation of the supply curves of the individual firms in the market.

– PR Figures 8.6 and 8.9 here –

Takeaways

The important takeaways are

- Marginal revenue equals marginal cost at the optimal quantity produced (this equality may be approximate in the discrete case).
- Marginal revenue comes from an underlying demand curve. Demand curves themselves come from consumer preferences.

The individual and market demand curves

- Consumers tend to buy more of the good that has become cheaper and less of those that become *relatively* more expensive.

- The market demand relate the quantity of a good that all consumers in a market will buy to its price.

- Only factors that influence the demands of many consumers will also effect market demand.

The analysis of competitive markets (PR 9.1-9.6)

- The equilibrium price and quantity in a competitive market maximizes the economic welfare of producers and consumers.

- The model of competitive markets can be used to study the welfare effects of different government polices.

- Next we will evaluate the "gains" and "losses" to consumers and producers from different government polices.

– PR Figures 9.1, 9.2, 9.5, 9.7, 9.8, 9.10 and 9.11 here –

Problem set III

- PR 8 – exercises 1-7.

- PR 9 – exercises 2, 3, 5 and 7.

Have a great Labor Day holiday!