

Chapter 15

Monopoly

15.1 Introduction

Recall that in Chapter xxxx we saw that the elasticity of demand facing the firm was related to the firm's market share, the elasticity of supply of other firms facing the industry, and the elasticity of market demand:

$$\epsilon_d = \frac{1}{ms} E_d - \left(\frac{1}{ms} - 1 \right) E_S.$$

If the firm's market share was small and the elasticity of supply by other firms in the industry was large, then the elasticity of demand facing the firm would be large, given the elasticity of market demand. As the firm's market share is goes to 1 and the elasticity of supply by other firms in the industry is goes to 0, the elasticity of demand facing the firm approximates the elasticity of market demand E_d .

In this Chapter we begin studying **market structure**, or the effect that relaxing the assumption of a perfectly competitive market has on the conclusion of our economic models. We begin with the case of a single firm in the industry: the **monopoly**. With a single firm in the industry, market share is exactly equal to 1 and the elasticity of supply by other firms in the industry is exactly equal to 0. The elasticity of demand facing the monopoly is exactly equal to the elasticity of market demand, E_d , and as long as market demand is not perfectly elastic, it seems reasonable to assume that, unlike a competitive firm, the monopoly will consider the effect that its optimal quantity decision has on the price it is able to charge. This

leads to a key observation: for a monopoly marginal revenue is not equal to price. Relative to a perfectly competitive market, then, the monopoly will restrict quantity and increase price. Since price is not equal to marginal cost, resources are not efficiently allocated and there may be important welfare losses.

The next question we turn to deals with the reasons for a monopoly. These can be technical (Natural Monopoly, although consider Demsetz), barriers to entry like medallions, etc.

To be completed.

The monopoly's position is unstable since it is making pure profits that other firms would like to compete away. Therefore, despite the fact that the monopoly is the sole firm in the market the threat of entry may severely curtail its ability to price above marginal cost.

To be completed.

Monopoly rents fall as the demand function the monopoly faces is more elastic, for example, when the good the monopoly produces has more and closer substitutes.

To be completed.

15.2 The Monopoly's Economic Problem

Consider the economic problem of a firm that faces perfectly competitive factor markets, but has a monopoly in the goods market. The monopoly wishes to maximize profits and consequently minimizes its costs of production. As we saw in Chapter xxx, the result of the cost minimization problem is a minimum cost function, $C(w, r, y)$. Armed with its conditional factor demands and minimum costs function the monopoly wishes to maximize profit and, consequently, solves:

$$\max_y p(y)y - C(w, r, y).$$

As we discussed in the introduction, we see that the demand curve facing the monopoly coincides with market demand; therefore, $p(y)$ denotes the inverse market demand curve.

In the case of perfectly competitive markets, firms face a perfectly elastic demand function and, therefore, the effect that its output decision has on price is negligible. Marginal revenue is constant and equal to price. In the case of monopoly, however, we explicitly consider the effect that output has on price since this effect may be substantial. The first order condition of the monopoly's profit maximization problem is given by:

$$[y] : p(y) + y \frac{dp(y)}{dy} - \frac{dC(w, r, y)}{dy}.$$

In the case of perfectly competitive markets, $\frac{dp(y)}{dy}$ is negligible and marginal revenue is equal to price.

Setting the first order condition equal to zero and rearranging we obtain:

$$\left(1 + \frac{y^m}{p(y^m)} \frac{dp(y^m)}{dy}\right) p(y^m) = \frac{dC(w, r, y^m)}{dy},$$

where y^m denotes the optimal monopoly quantity. Notice that the term in parenthesis is related to the elasticity of market demand:

$$E_d = \frac{dy(p)}{dp} \frac{p}{y}.$$

Therefore, the monopoly's first order condition is:

$$\left(1 + \frac{1}{E_d}\right) p(y^m) = \frac{dC(w, r, y^m)}{dy},$$

and as is usually the case, the monopoly chooses its optimal quantity by setting marginal revenue equal to marginal cost.

Since $E_d < 0$,

$$p(y^m) > \left(1 + \frac{1}{E_d}\right) p(y^m),$$

and marginal revenue exceeds price. There is a markup that is inversely proportional to the elasticity of market demand. The key difference between a perfectly competitive market and monopoly is that while a perfectly competitive firm can expand sales and not affect price, the monopoly can only reduce sales if it lowers the price on all units sold (we assume that the monopoly can not price discriminate). In monopoly, then, marginal revenue is not a constant function of output but is a decreasing function of output.

Also, notice that

$$p \geq \frac{dC(w, r, y^m)}{dy},$$

with equality only if demand is perfectly elastic. This observation has important welfare implications since it will ultimately show that there is an important misallocation of resources involved in monopoly.

Finally, note that at the optimum marginal revenue is positive. This indicates that the monopoly will always operate on the elastic portion of the demand curve.

In Figure Monol, we compare the pricing and output outcomes of a perfectly competitive firm with those of a monopoly. (See handwritten notes).

15.3 Shutdown

To be completed.

15.4 Monopoly Rents

To be completed.

15.5 Welfare Cost of Monopoly

To be completed.

15.6 Conditions for Monopoly

15.6.1 Technical Conditions

To be completed.

15.6.2 Incentive to Collude

To be completed.

15.7 Applications

15.7.1 X-Inefficiency

Are monopolies more efficient than competitive firms? Not in minimizing cost Liebenstein's x-inefficiency paper as an application.

To be completed.

15.7.2 Learning-by-Doing

For Monopoly, also remember to include a dynamic version of Reny's LBD example.

To be completed.

15.7.3 Durable Goods Monopoly

We have studied the monopoly problem when the good produced is perishable. What happens when the monopolist produces a durable good such as a light bulb. Then, the monopolist creates his own demand and is unable to exploit monopoly power. This is the **Coase Conjecture**.

15.8 Exercises

Exercise 15.8.1 Consider a monopoly that has constant cost function given by:

$$C(y) = cy.$$

Let market demand be given by the linear function:

$$y(p) = a - bp.$$

- a. What is the monopolist's objective function?
- b. What is the monopolist's output and price?

Exercise 15.8.2 Consider a monopoly that has the convex cost function given by:

$$C(y) = \frac{1}{2}y^2.$$

Let market demand be given by the constant elasticity function:

$$y(p) = Ap^{-\epsilon}.$$

- What is the monopolist's objective function?
- What is the monopolist's output and price?

Exercise 15.8.3 Consider a monopoly that has constant cost function given by:

$$C(y) = cy.$$

Let market demand be given by the linear function:

$$y(p) = a - bp.$$

Exercise 15.8.4 Consider a monopoly that has the constant cost function given by:

$$C(y) = cy.$$

Let market demand be given by the constant elasticity of substitution:

$$y(p) = \frac{p^{r-1}m}{1+p^r},$$

where $r = \frac{\rho}{1-\rho}$ is directly to ρ the elasticity of substitution.

- Find the inverse demand function.
- What is the monopoly's profit maximization problem?
- Solve the monopoly's profit maximization problem.
- What is the monopoly's output?
- What is its price?
- What happens to quantity and price as ρ varies between 0 and infinity?
- What is the economic intuition?