MANAGERIAL ECONOMICS

Fourth Edition

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WEST PUBLISHING COMPANY
St. Paul New York Los Angeles San Francisco

CHAPTER 13

Price and Output Determination: Pure Competition, Monopolistic Competition, and Monopoly

IN THE PREVIOUS CHAPTERS, theories of demand, production, and cost relationships were developed. In addition, some of the empirical methodology useful in estimating these relationships was introduced. With this background well in hand, we are now ready to tie revenue and cost concepts together into a model of price and output determination for the profit-maximizing firm. This chapter reviews the traditional static partial equilibrium models of price and output determination under certainty for monopoly markets, imperfectly competitive markets, and purely competitive markets. In Chapter 14 special attention is given to the price-output decision that faces firms in oligopolistic market structures. Chapter 18 deals with measures of market structures.

PURE COMPETITION

In Chapter 6 pure competition was defined as a market structure characterized by such a very large number of buyers and sellers that a single buyer's or seller's actions cannot have a perceptible impact on the market price. No product differentiation exists from firm to firm, firms are free to enter and exit from the industry (that is, there are low barriers to entry and exit), and there is no collusion between firms in the industry. The individual firm in such a purely competitive industry is effectively a price taker, since the products of every producer are perfect substitutes for the products of every other producer. Price takers cannot charge a price higher than their competitors, since no one would buy from them. Although they can conceivably charge a price lower than the going price, they accept the going price to maximize profits. This leads to the familiar horizontal or perfectly elastic demand curve of the purely competitive firm. Although we rarely find instances where all the conditions for pure competition are met, securities exchanges and the commodity markets approach these conditions. For instance, the individual pig farmer has little choice but to accept the going price for frozen pork bellies. However, imperfections creep into even this case, since the government provides price supports for farm commodities. In spite of the limited existence of purely competitive markets, individuals and smaller firms are often forced to act as price takers in their economic decisions. Pure competition also gives a basis for comparison of pricing and performance of firms in the more typical imperfectly competitive market structure, such as oligopoly and monopolistic competition.

Short Run

A firm in a purely competitive industry may either make profits or operate at a loss in the short run. In our discussion of price and output decisions, we use the term *profits* to mean returns in excess of a normal return to compensate the entrepreneur for interest on funds invested in the firm and the value of labor services (even though the entrepreneur may not receive an explicit salary from the firm) plus an additional amount that is *just sufficient* to keep the entrepreneur producing the same product, given the special risks associated with its production and sale. In the long run, all firms will operate at an equilibrium output where all profit and losses have disappeared. As more firms enter (leave) the industry in the long run, supply will increase (decrease) and the market price will be driven downward (upward), helping to eliminate excessive profits (losses) for the remaining firms.

In addition to price changes that occur in the long run, another force also drives all firms toward equilibrium as firms enter and leave the industry. In equilibrium all firms will also have identical costs, even though they may use different production and operating techniques. A firm more efficient than its competitors may temporarily exist because some resources, such as managerial talent, firm location, and quality of raw material inputs, are not homogeneous among firms. But if Firm X has a manager whose extraordinary skills generate \$5,000 more in cost savings for Firm X than a similar manager does for Firm Y, it will be in Firm Y's interest to bid for Firm X's more efficient manager by offering a salary that fully compensates for this extraordinary effectiveness. In the world of pure competition where all firms operate under conditions of certainty and with a perfect market mechanism, all savings resulting from the use of more efficient input factors will be eliminated as the competitive bidding process rewards all on a basis equal to their marginal contributions.

in Figure 13.1. The total loss incurred by the firm at Q_1 level of output and price p_1 equals the rectangle p_1CBA. This may be conceptually thought of as the loss per unit (BA) times the number of units produced and sold (Q_1). At price p_1 losses are minimized, since average variable costs AVC have been covered and a contribution remains to cover part of the fixed costs (AH per unit times Q_1 units). If the firm did not produce, it would incur losses equal to the entire amount of fixed costs (BH per unit times Q_1 units). Hence we may conclude that in the short run a firm will produce and sell at that level of output where $MR = MC$, as long as the variable costs of production are being covered ($P > AVC$). If price were p_2, the firm would produce Q_2 units and make a profit per unit of EF, or a total profit represented by the rectangle $FEGp_2$.[2]

Long Run

In the long run, illustrated in Figure 13.2, all inputs are free to vary. Hence no differentiation exists between fixed and variable costs. Under long-run conditions, average cost will tend to be just equal to price and all excessive profits will be eliminated. If price exceeds average costs, more firms will enter the industry, supply will increase, and price will be driven down toward the equilibrium, zero-profit level. In addition, as more firms bid for available input resource factors (labor, capital, managerial talent), the cost of these factors will tend to rise. As mentioned earlier, if some inputs for some firms are especially productive, the

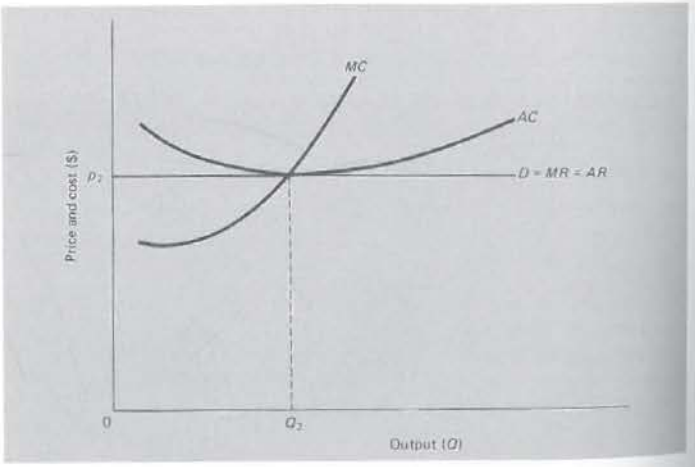

FIGURE 13.2
Long-Run Equilibrium

2. As was shown in Figure 13.1, it is quite possible for the marginal cost function to intersect marginal revenue at more than one place. In this case MC intersects D_2 at points X and F, and D_1 at points Y and A. In the graphic case we may eliminate the X and Y intersections because it is apparent that losses exceed those incurred under the F and A solutions. In fact, an algebraic solution to this problem would indicate that X and Y do not satisfy the required second-order condition.

competitive mechanism will result in their cost being bid up to the point where all cost savings are paid to the more productive input that made initial cost savings possible. The net result is that in the long-run equilibrium all firms will tend to have identical costs, and prices will tend to equal average costs (that is, the average cost curve AC will be tangent to the horizontal price line p_2).

Thus we may say that at the long-run profit-maximizing level of output under pure competition, equilibrium will be achieved at a point where $P = MR = MC = AC$. At this point the firm is producing at its *most efficient* level of output; that is, where long-run average costs are minimized and the industry is in equilibrium.

MARKET PRICE DETERMINATION

We have spoken in a very general way about the market price that a firm in pure competition is forced to accept. Let us examine how this price is determined. Recall that the market demand curve shows the amount of a commodity that consumers would be willing to buy at some point in time at a set of specified prices (holding constant the effects of all other factors). The market supply curve may be given a similar interpretation, indicating the quantity of a product sellers *would* be willing to offer for sale at some point in time and at a set of specified prices (holding constant the effects of all other factors). The supply curve may be interpreted in terms of the cost functions of firms in the industry. The short-run supply curve for any individual firm may be represented by that portion of the marginal cost curve above average variable cost AVC. If price $P(P = MR)$ intersects the marginal cost curve below AVC, the firm will shut down.

Plant shutdown under these circumstances is clearly the best alternative, since losses will be limited to the total amount of fixed charges incurred. To operate when average revenue or price is less than average variable costs would result in additional losses equal to the difference between average variable cost and price times the number of units sold. When price exceeds average variable cost (even if price is less than average total cost), losses will be minimized, since some contribution is made (the difference between price and average variable cost times the number of units sold) to covering fixed costs. At any point above AVC, the firm will be maximizing profit or minimizing losses by producing and selling that level of output where $MR = MC$ (remembering that in pure competition $P = MR$). In Figure 13.1 the supply curve for the firm is represented by the segment of the marginal cost curve labeled JI. The industry supply curve is merely the summation of all individual firm supply curves.[3] The interaction between supply and demand curves is illustrated in Figure 13.3.

The market price will tend toward an equilibrium where the quantity demanded equals quantity supplied, for example, Q^* in Figure 13.3. If a price above the initial equilibrium price (P^*) were charged, such as P_1, the quantity consumers are willing to buy, Q_1, at that price would be less than the number of units producers would be willing to sell, Q_2, and there would be strong market pressure for a price reduction. This is often evident in local real estate markets when there is an economic downturn. The market becomes flooded with homes and prices are reduced.

3. This condition only holds under pure competition when there is a rather wide range of outputs under which approximately constant cost conditions prevail. Under increasing or decreasing cost conditions, this simple additivity property is not strictly correct. Under either condition, the fundamentals of the market price-equilibrating mechanism, illustrated here, do apply.