

8

MICROECONOMICS OF OUTPUT-PRICE ADJUSTMENTS

Sections —

<u>If Demand Increases</u>	173
<u>If Costs Decrease</u>	178
<u>If Demand Decreases</u>	181
<u>If Costs Increase</u>	184

In order to understand the mechanics of the output-price adjustment process, we need to understand the influences of demand and cost structures upon business behavior. This is our task in this chapter.

Let's **assume** quite realistically that

- (1) a typical business firm faces a downward-sloping demand curve for its product and that this demand curve may be represented as a straight line;
- (2) there are no insurmountable barriers that would prevent firms from entering or leaving an industry (although entry and exit will not necessarily be quick);
- (3) there exists some profit amount that is just sufficient to keep existing firms in an industry but too low to attract new producers into the industry (but market conditions often push the prevailing level above or below this profit amount), and at each output level the corresponding average for this profit amount (i.e., the total amount of this profit divided by the number of units of output) is included among the firm's average costs;

- (4) firms have existing facilities that were engineered – or have evolved – to produce output at some particular rate (or range of rates) for which the average cost per unit of output is lowest, and the average cost per unit rises as the actual output rate moves farther and farther in either direction away from the lowest-average-cost rate(s) of output; **{1}** and
- (5) firms strive to maximize their long-term-sustainable profits (or at least act like profit maximizers in response to demand and cost changes).

Assumption #4 implies that each firm will have a U-shaped **average cost curve** (AC) as depicted in Figure 8-1. And #5 requires that the firm's entire cost curve is as low as negotiations with suppliers and efficient use of inputs with its existing facilities permit.

Consider the firm's **marginal cost** (MC). This is the increase in total cost as output increases one unit. If the average cost is falling (as output increases), the marginal cost has to be less than the prevailing average cost. If the average cost is rising (as output increases), the marginal cost has to be greater than the prevailing average cost. This implies that the firm has a MC curve that cuts up through the bottom of the AC curve as depicted in Figure 8-2.

1 To the left, the higher average costs result from the rising (as output falls) average profit per unit that is included in average costs (see assumption #3 above) and because of rising average **fixed costs** (costs that are not related to output and do not immediately go away if the firm shuts down production). To the right, the rising average costs result from increasingly intensive utilization of staff and facilities as output rises (greater repair and maintenance expenses, higher labor costs per unit of output for extended – evening, night, weekend – work shifts, etc.).

Figure 8-1

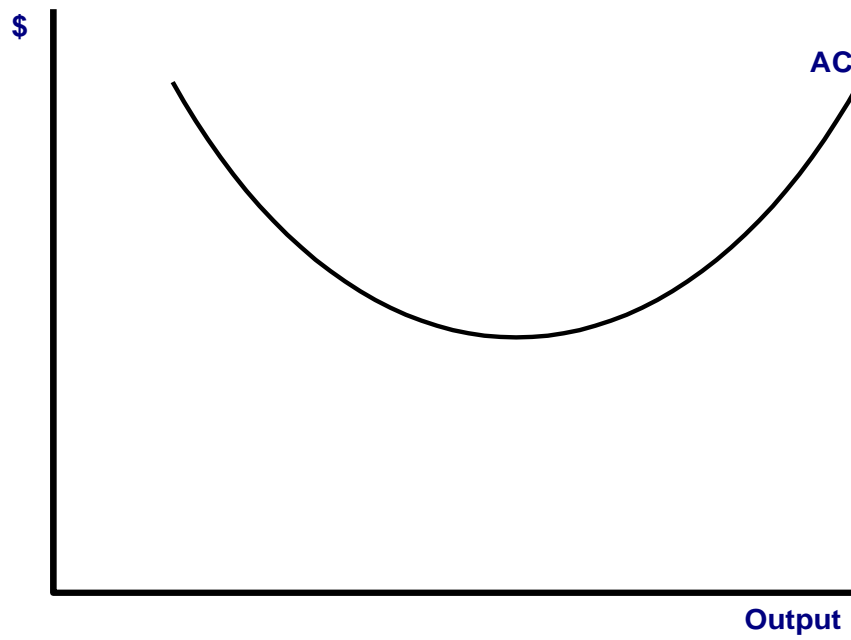
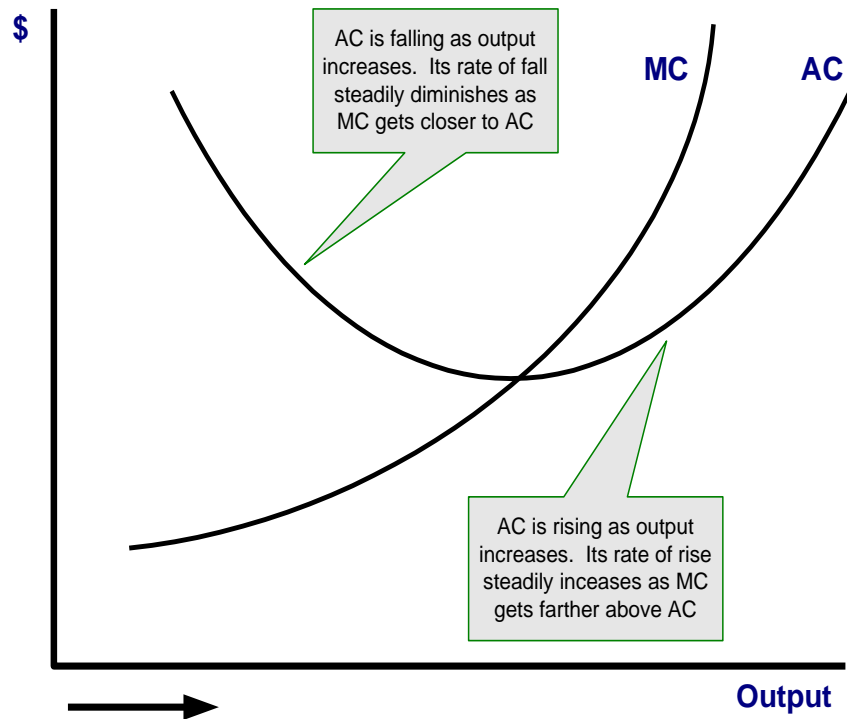
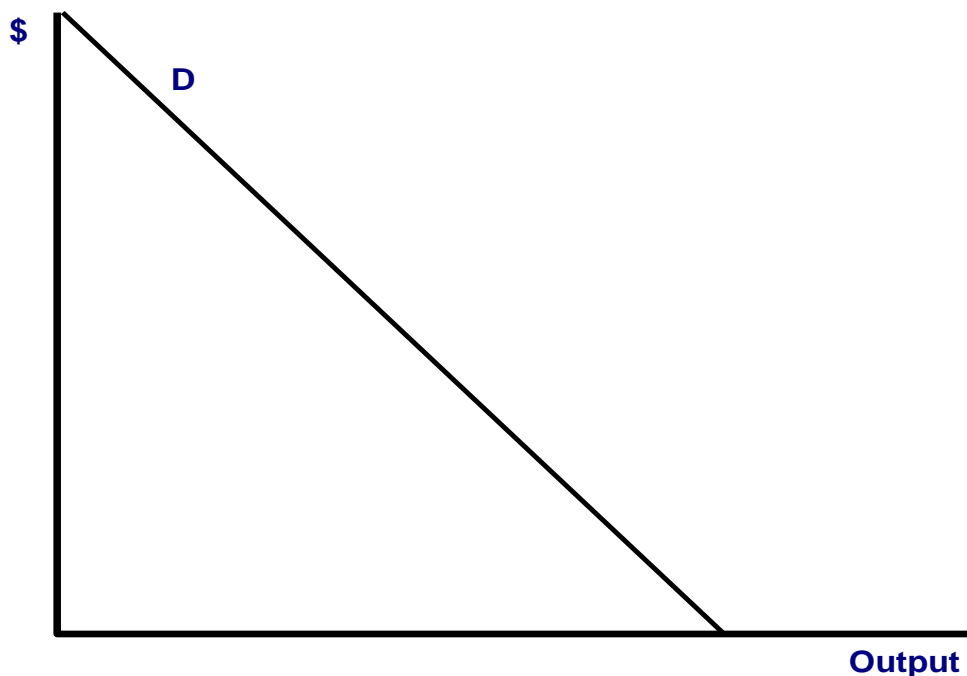


Figure 8-2



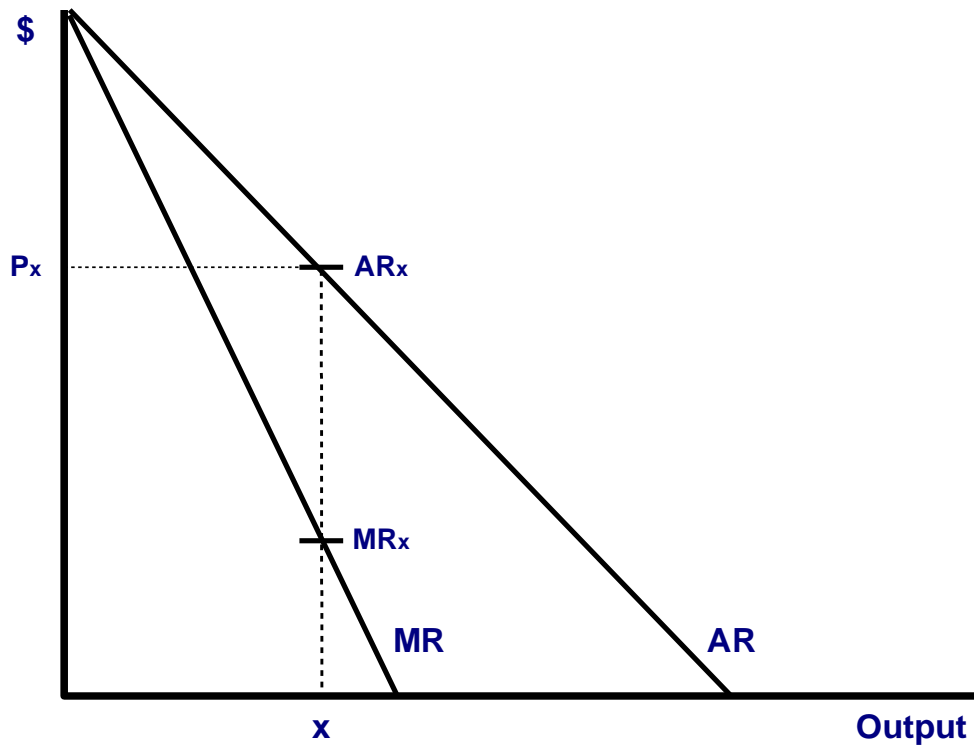
The **demand curve** (D) depicted in Figure 8-3 reflects assumption #1. A firm's demand curve is also its **average revenue** (AR) curve. At any output level, it shows the highest uniform price that the firm can charge for its units of output and still be able to sell that many units. That price would be the firm's average revenue per unit sold. As is true for any falling average, its corresponding marginal must be less than the average. **Marginal revenue** (MR) is the increase in total revenue as sales increase by one additional unit of product. Figure 8-4 shows the AR and MR curves. {2}

Figure 8-3



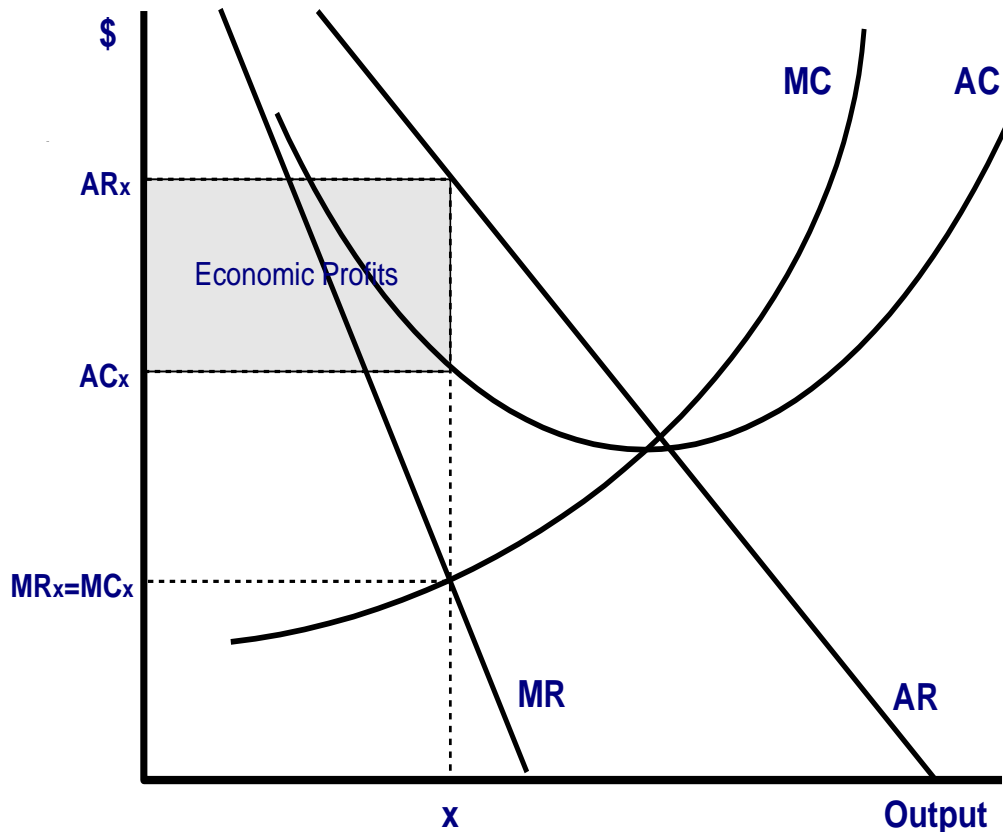
2 For straight-line demand curves, the MR curve lies horizontally halfway between the AR curve and the vertical axis. That geometric rule positions the MR curve; however, the value of the marginal revenue for any particular output corresponds to the vertical height of the MR curve **above** that level of output.

Figure 8-4



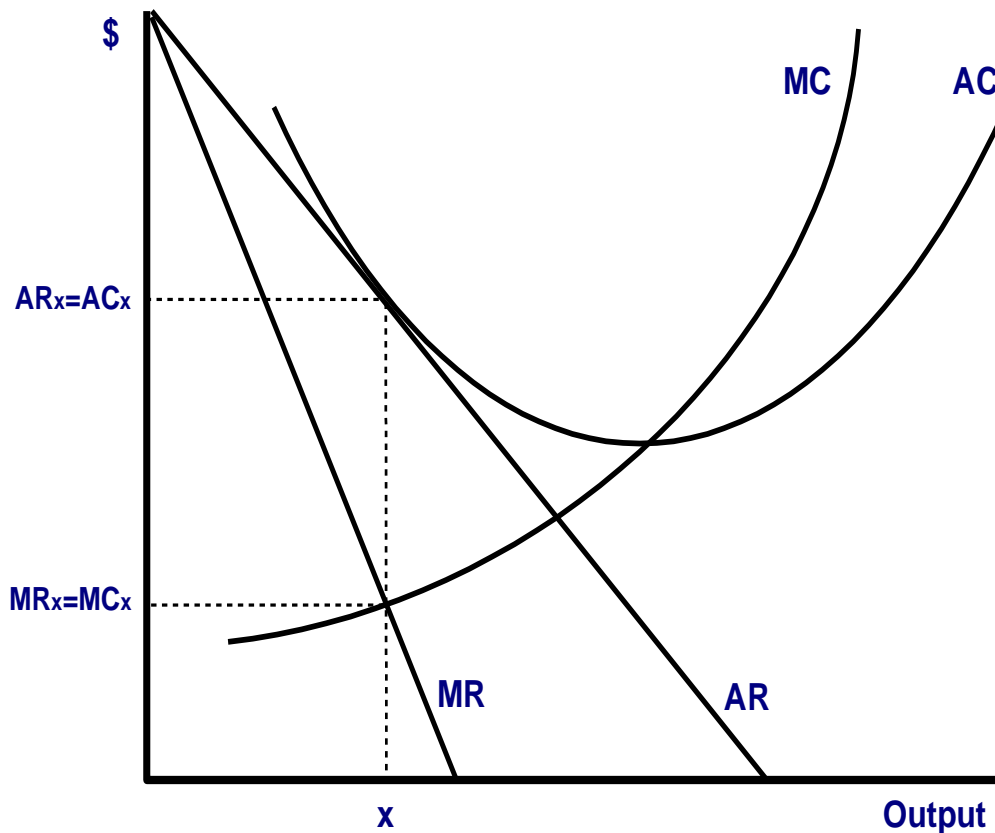
For a firm to maximize its profits, it must operate at the output level where $MR = MC$. At lower output levels, $MR > MC$; so, for each additional unit of output, profits would increase by the excess of MR over MC for that unit. At higher output levels, $MC > MR$; so, for each additional unit of output, profits would decrease by the excess of MC over MR for that unit. See Figure 8-5. The shaded area measures the firm's **economic profits** (the amount by which total profits exceed the minimal profits included among the firm's average costs – see assumption #3 on page 167). “ x ” is the output level per period that will maximize the firm's economic (and, hence, total) profits per period if it sets the price equal to AR_x (the highest price that demanders will pay per unit and still buy x units per period).

Figure 8-5



The existence of positive economic profits (as in Figure 8-5) will attract entry of new firms. As the industry expands, at some point the individual firms will find their demand curves shifting to the left, because so many new firms are entering the market that each individual firm's market share is beginning to shrink. We can expect such entry to continue as long as significant positive economic profits remain available. Figure 8-6 depicts a situation in which economic profits are zero, and hence total profits are the minimum amount that is included among the firm's average costs and are just barely sufficient to keep the firm operating in the industry but not sufficient to attract new firms into the industry.

Figure 8-6



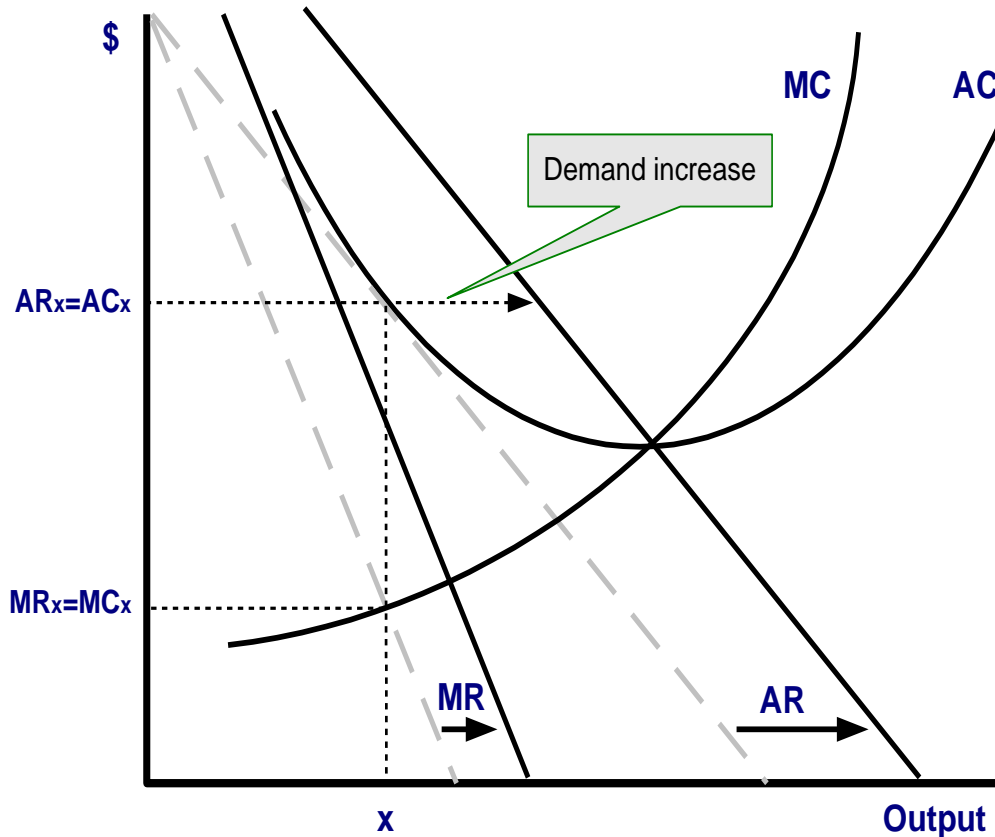
In the discussions that follow, we shall assume that the firm is initially in the situation depicted in Figure 8-6 – operating with a price (AR_x) that equates sales and production (x) and earning maximum profits (its goal), but those profits are minimal (just barely sufficient to keep the firm from exiting the industry) and too low to attract entry of new firms.

If Demand Increases

Suppose that an industry (with firms as depicted in Figure

8-6) experiences a significant increase in the demand for its product. For a typical firm in that industry, this would be shown as a rightward shift of the AR and MR curves as shown in Figure 8-7. {3}

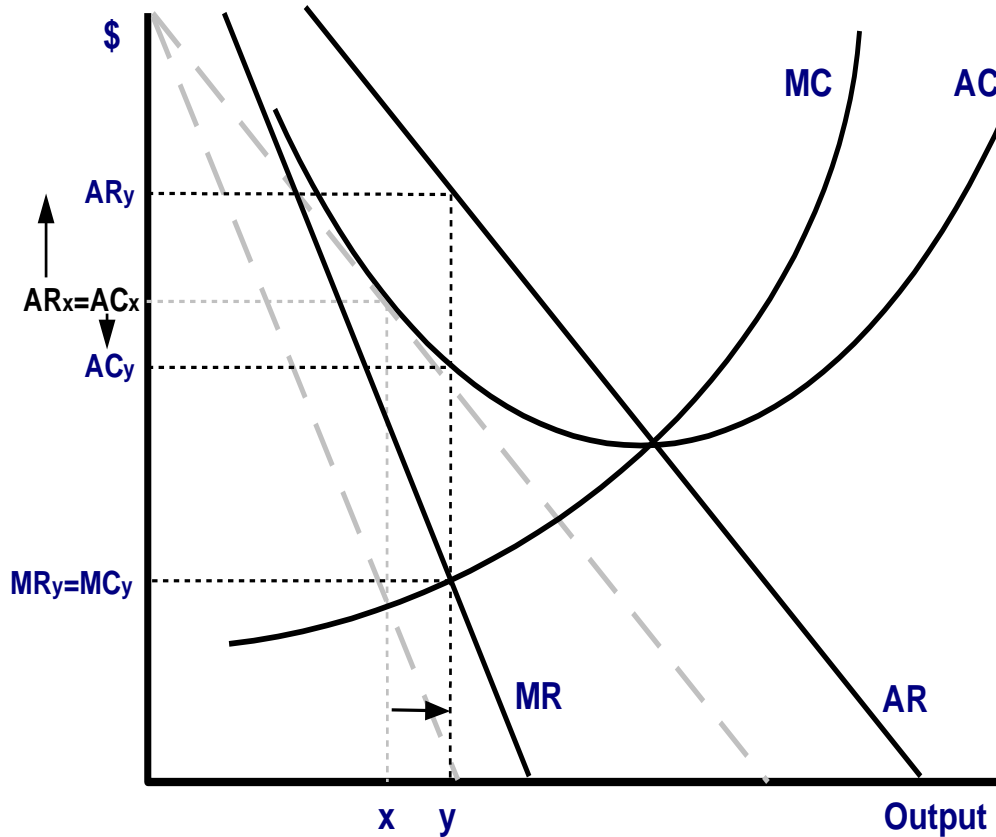
Figure 8-7



With its output at level x and price at AR_x , the firm faces excess demand. With a goal of maximum profits, such a firm will increase its output to y and raise its price to AR_y , as shown in Figure 8-8. At this new combination of price and output, the firm is equating supply and demand and earning positive economic profits. As Figure 8-8 shows, those profits will equal $(AR_y - AC_y)$ times y . This should attract new firms into the industry.

3 The MR curve shifts **horizontally** one-half of the distance that the AR curve shifts.

Figure 8-8



This entry may take quite awhile, but eventually the industry would expand until the AR and MR curves are pushed (by expanding competition) back to their original positions. By then, the larger number of firms will have increased industry output by the full amount of the initial demand increase; the price will have returned to its original level, and the positive economic profits will be gone. However, there are things that could go wrong with this process.

Barriers to entry (license requirements, patents, environmental or congestion concerns, etc.) could limit the amount of entry. Output would be unable to expand enough to push the price all the way back down to its original level. In

such cases, some economic profits would remain, and output would not expand by the full amount that demanders had originally requested.

Growth of the industry and its output could also be cut short by a rising cost level as the industry grows. Such a rise in costs could be because the industry's suppliers are responding to the rising demands for their products and services by charging more for the growing industry's inputs. With its average costs rising as the industry expands and its product price falling because of increased output, the economic profits will erode quickly. Industry growth will stop when economic profits are gone, and this will occur when its product price has fallen to meet the rising average cost. The price will not have fallen all the way back down to its original level, and output will have expanded by less than the full amount that demanders had originally requested.**{4}** An extreme version of rising costs could actually push price up and totally block any output increase!

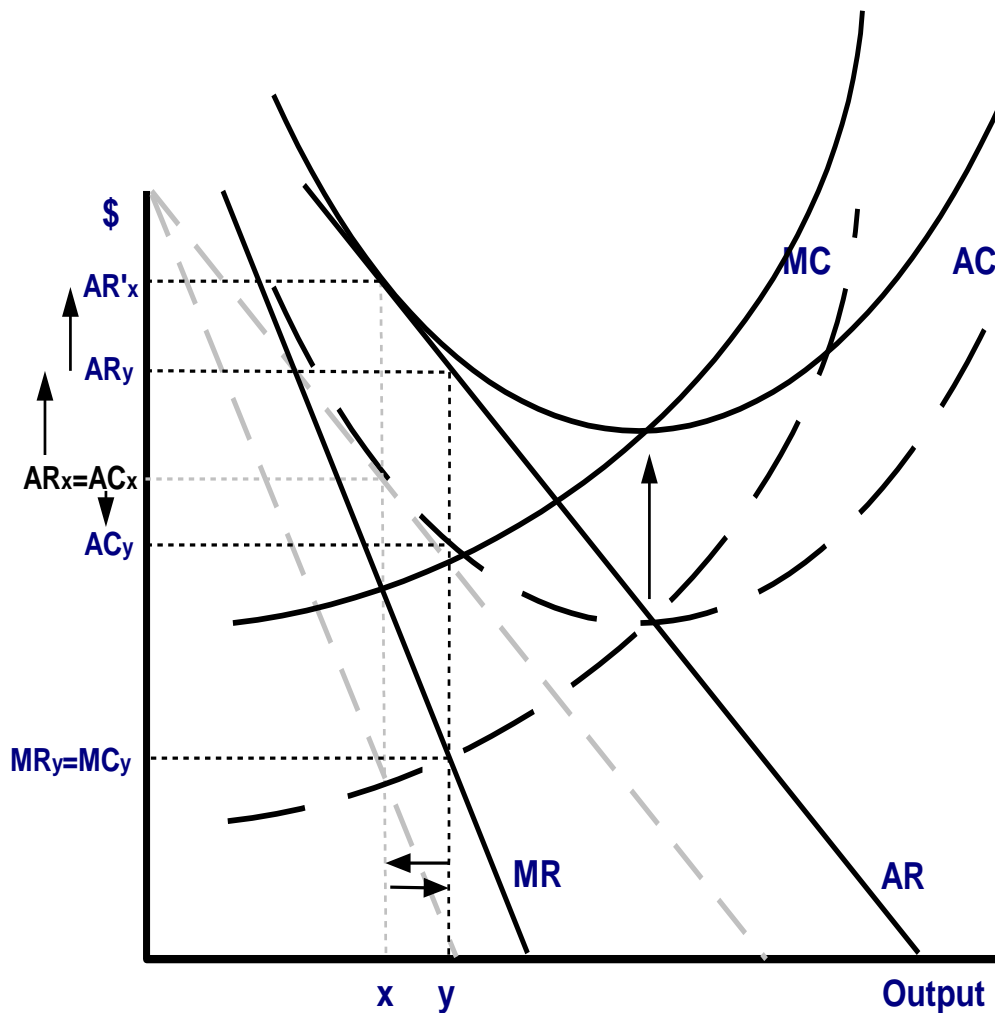
It is possible, but not at all likely, that a firm's employees and other input suppliers have sufficient clout to make a grab for the economic profits depicted in Figure 8-8 before those profits have had a chance to attract new firms into the industry.**{5}** In such a case, the firm's cost structure

4 We must recognize that the opposite could happen. As the industry grows, both it and its suppliers might be able to achieve average cost reductions that depress the industry's operating costs. In this case, price would actually drop below its original level, and output would rise by more than the original amount requested by demanders.

5 This becomes much more likely if the price rise depicted in Figure 8-8 is occurring in a context of widespread price increases (inflation) that have been going on for quite some time. To protect their incomes, workers and other input suppliers will have built **cost of living escalator clauses** into their wage and other input supply contracts.

immediately rises (absorbing much, if not all, of the economic profits). Figure 8-9 shows an extreme case of full capture of the economic profits. Price is pushed all the way up to AR'_x ; the economic profits are gone, and output returns to its original level. The increase in demand has yielded only a rise in price and no change in output at all.

Figure 8-9



The arguments in this section suggest that

we may anticipate that an industry's response to an

*increase in demand will be mostly in terms of increased industry size and output with little if any net upward effect upon price **unless** there are significant extraordinary circumstances (such as those considered on pages 175 through 177) that could reduce the output increase (possibly to zero) and leave the price above (possibly well above) its initial level.*

If Costs Decrease

At any given time, many businesses will enjoy reductions in their cost structures (taking the form of downward shifts in their average cost curves). This may be the result of technological advances, more productive labor (because of education, more or better tools, etc.), and possibly cheaper imported materials because of a higher exchange value for the dollar. Let's consider how we can expect these firms to react. Figure 8-10 shows a drop in cost structure for a firm that was in an initial situation as depicted in Figure 8-6.

When costs fall, the output level that equates MR and MC (and hence maximizes profits) moves to the right (to z). In order to sell the increased output, the firm will need to reduce its price to AR_z . Notice that the firm's average costs will have fallen far more (to AC_z) and that, at the output level z , the firm will now be enjoying substantial economic profits — equal to $(AR_z - AC_z)$ times z .

The firm's situation (in Figure 8-10) is comparable to the one in Figure 8-8 following a demand increase. And, as in that case, firms will enter this industry (attracted by the economic profits). As the new firms come in, the AR and MR curves for

the existing firms will shift to the left (showing sales lost to the new competition). The entry will continue until the AR curve becomes tangent to the new lower AC curve as in Figure 8-11, and economic profits are once again zero. By then, the typical firm's output will be back down to x . Its AC will have risen from AC_z to AC'_x (which is now lower than AC_x in Figure 8-10 by the amount of the fall in the average cost level). Also, the firm's price will have dropped from AR_z to AR'_x (which is less than AR_x in Figure 8-10 by the amount the average cost level fell). Although the firm's output is no longer up, the industry's output is up (because firms have entered). So, price is down by the amount of the cost level decrease, and industry output is up.

Figure 8-10

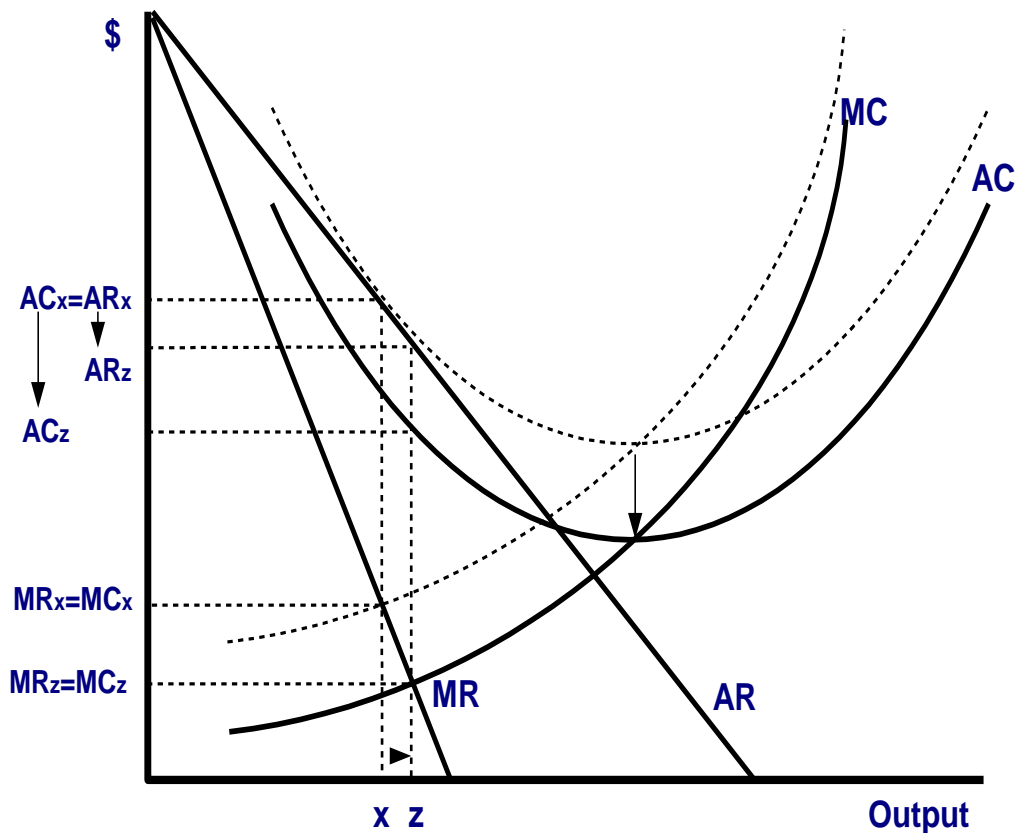
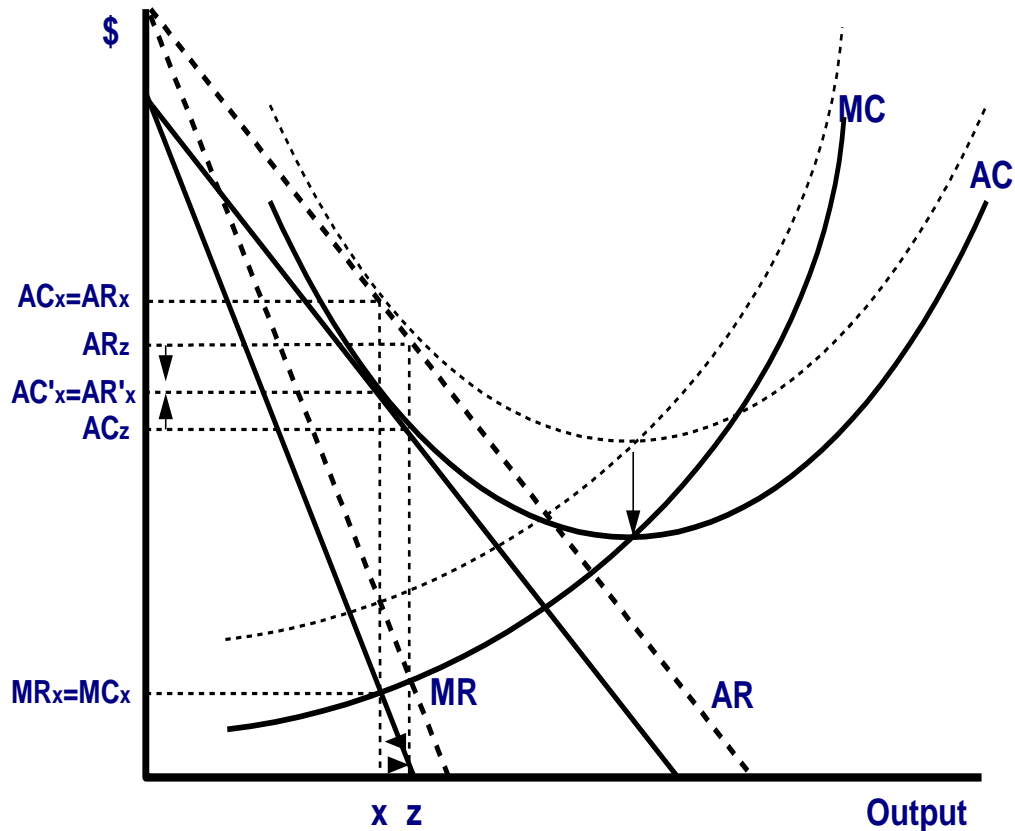


Figure 8-11



As we observed on pages 175 through 177, the entry of new firms might be impaired (maybe even completely blocked by patents or other entry barriers) or stifled (if the firm's suppliers make a successful grab for the economic profits). In such cases, price would fall less than the full amount that costs initially fell, and the output expansion would be reduced. A 100% successful economic profit grab by suppliers could return costs and price to their initial levels, and there would be no output increase at all.

The arguments in this section suggest that

*we may anticipate that an industry's response to a cost structure decrease will be in terms of increased industry size and output with price down by as much as the full initial fall in average costs **unless** there are significant extraordinary circumstances (such as those considered on pages 175 through 177) that could reduce (possibly to zero) the output increase and the price reduction.*

If Demand Decreases

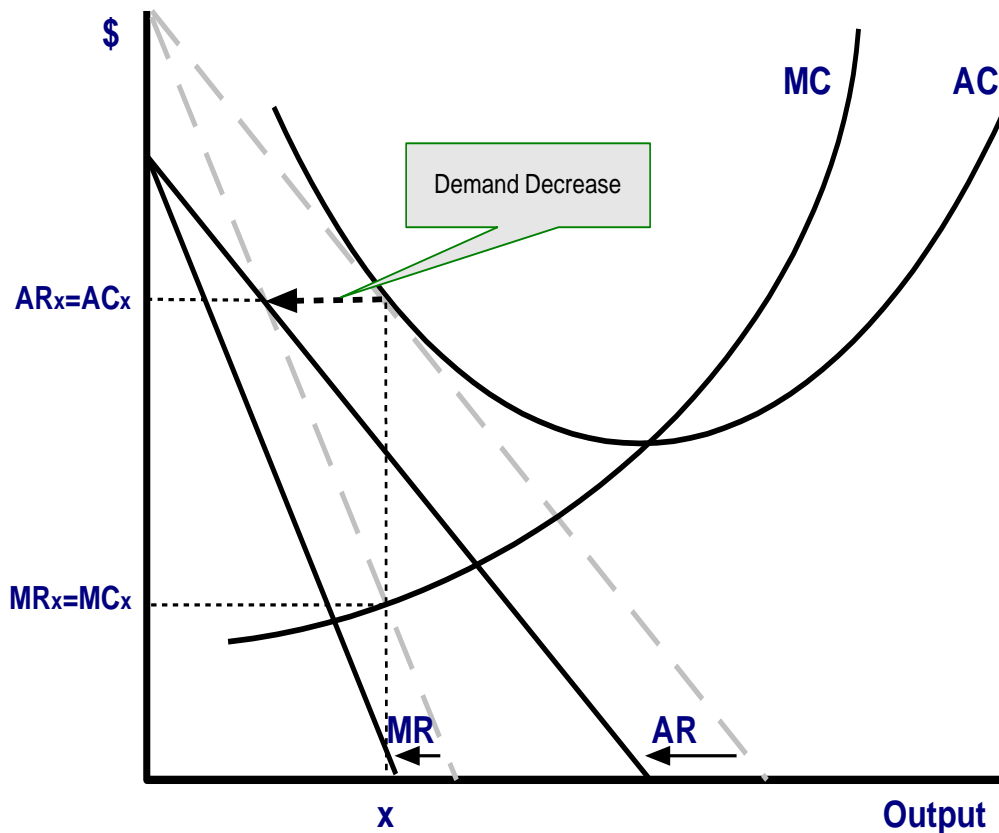
Now, let's consider what would happen if an industry (whose typical firm is in the situation depicted in Figure 8-6) suffers a significant drop in product demand (a leftward shift of the AR and MR curves). See Figure 8-12.

As a profit maximizer, the best response for a firm that is facing a demand decrease is to cut output to z and reduce price to AR_z as depicted in Figure 8-13. Unfortunately, whereas operating at output z and price AR_z will equate supply and demand for the firm and maximize its profits, the firm will be operating with negative economic profits equal to $(AR_z - AC_z)$ times z . That is the best that the firm can do!

Profits in this industry will be unacceptably low, and firms will begin to leave. As firms leave and competition diminishes, the AR and MR curves of the firms that have been able to "hold on" will shift rightward. The exodus of firms will continue until the AR and MR curves get back to their original positions. By then the product price, firm output, and firm profits will be back to their original levels, and the smaller number of firms will be

producing the reduced amount of product that the industry's customers desire. In a private enterprise system, the industry must get back to at least minimally acceptable profitability or it will vanish.

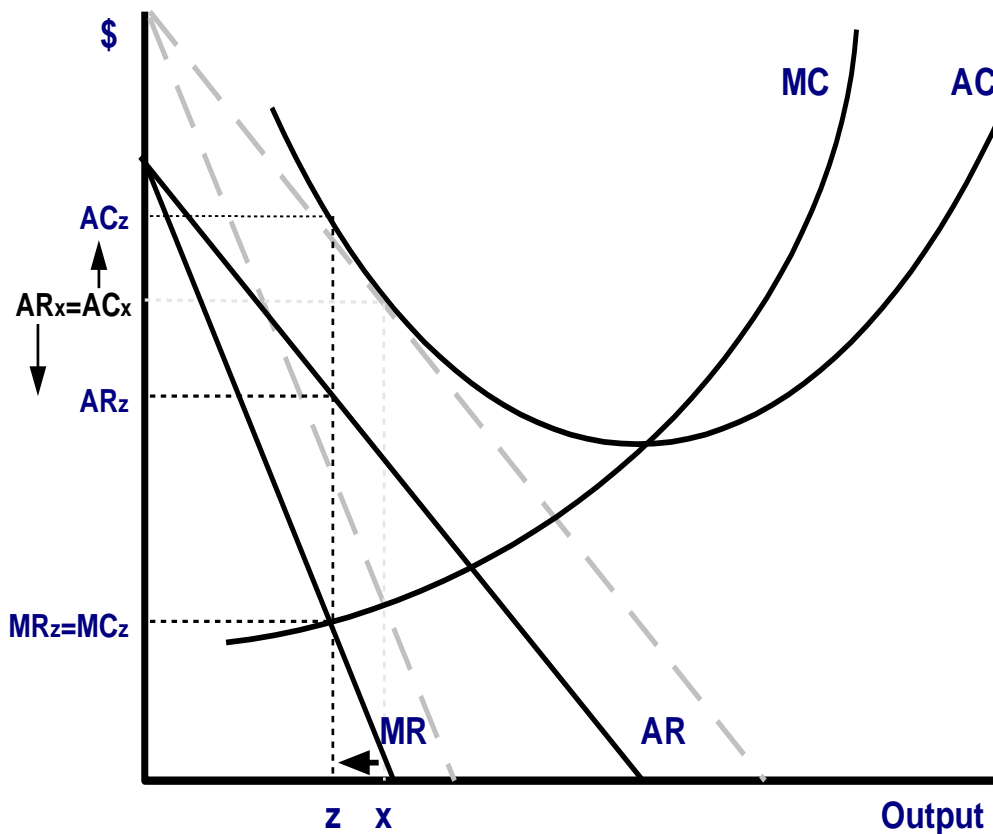
Figure 8-12



Unlike the demand increase case, there are few things likely to alter this outcome. Whereas the firm's workers and other input suppliers are not at all likely to volunteer reductions in their remuneration and thereby absorb some of the firm's negative economic profits, the firm — as it struggles for survival — may demand wage and fringe benefit concessions from workers and may try to pressure other suppliers into cutting their prices. This is a common feature of businesses'

reorganization plans submitted during bankruptcy proceedings. Such efforts at cost cutting don't always succeed and are not always even tried. Basically, input costs are far less flexible at moving downwards than they are at moving upwards! Nonetheless, to the extent that negative economic profits actually do result in significant costs reductions, not so many firms would need to leave the industry. Output would not need to fall far enough to enable price to rise all the way back up to its original level. The negative economic profits would be eliminated with price still somewhat below its original level.

Figure 8-13



The arguments in this section suggest that

*we may anticipate that an industry's response to a decrease in demand will be mostly in terms of decreased industry size and output with little if any net downward effect upon price **unless** there are significant extraordinary circumstances (such as those considered in the preceding paragraph) that could reduce the output decrease (possibly to zero) and leave the price below (possibly well below) its initial level.*

If Costs Increase

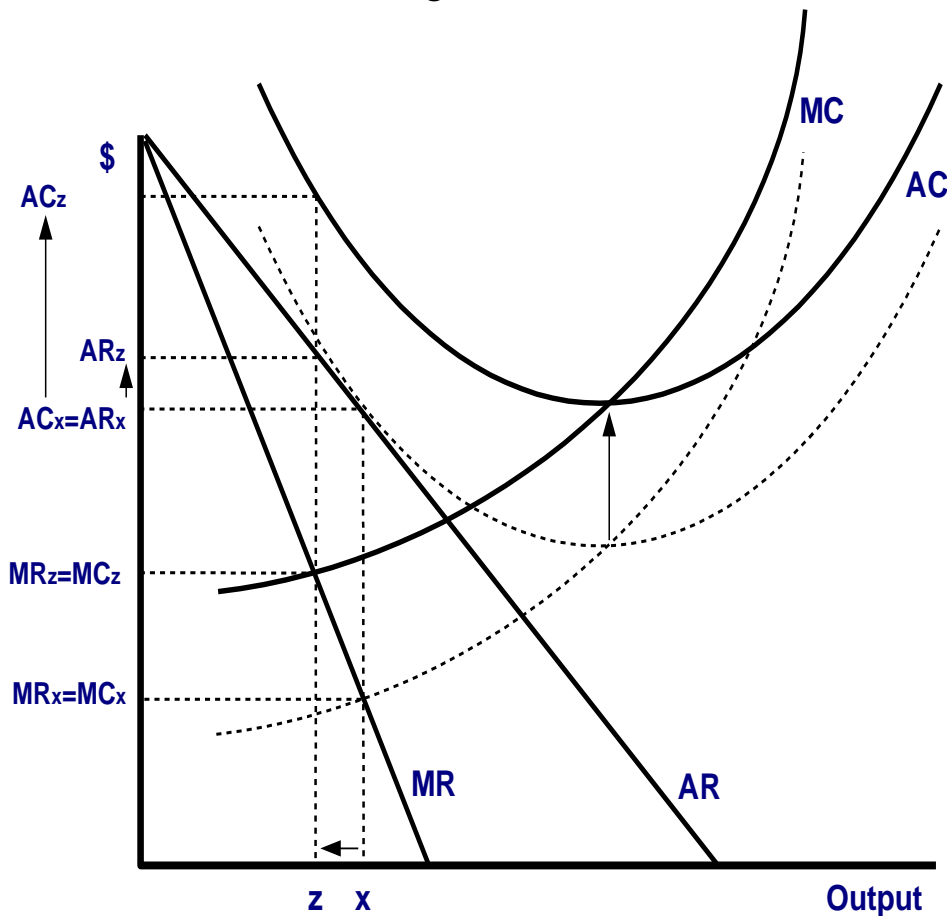
Producers will respond to increased production costs by trying to pass them through to their customers via price increases. Wage increases (that are not based upon worker productivity increases) are a frequent source of cost increases.^{6} Another source of cost increase is the depletion of many of the high-grade and easy-to-get deposits of basic raw materials that support the production process – namely: oil, gas, coal, and ores. The higher costs of tapping less accessible deposits and of processing lower-grade ores are inevitably passed along to the producers who use these materials. American producers also have to pay more for imported materials and components when prices rise abroad and when the U. S. dollar drops in value relative to foreign currencies. Shortages (whether real or contrived!) of materials (including agricultural products) and energy also push costs

⁶ Technological advances are making labor more productive. But, whenever labor demands and gets wage increases that exceed its productivity increases, businesses' costs rise (reducing or even eliminating profitability).

upward via production disruptions and/or scarcity-spawned higher prices that producers must pay for these materials and this energy. Government regulations that support efforts to clean up the environment and to make the workplace safer contribute to cost increases, because pollution abatement and safety enhancement often require considerable expenditure to purchase, install, operate, and maintain the necessary facilities.

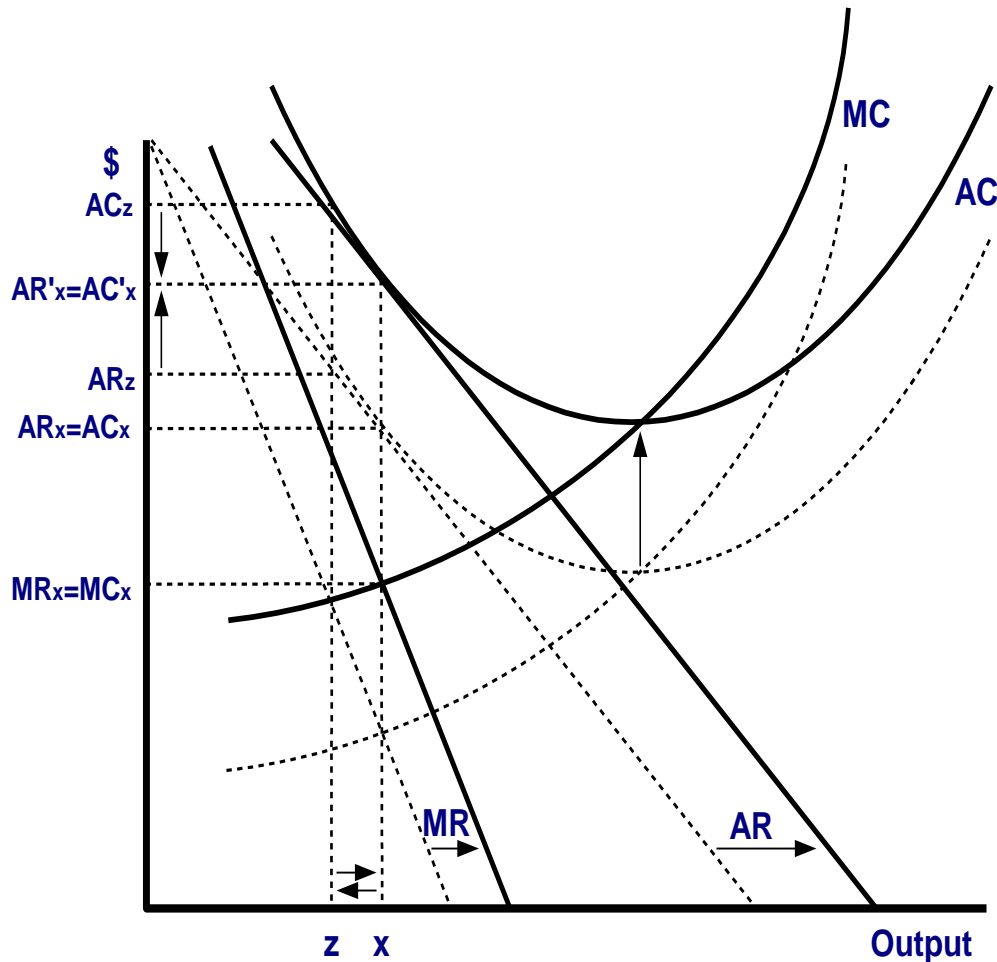
Figure 8-14 shows (as in Figure 8-6) a profit-maximizing firm (operating at output x and selling its output at a price of AR_x) in an industry that is in long-run equilibrium (the industry is neither growing nor shrinking; firms in the industry are typically earning zero economic profits). When costs rise, the output level that equates MR and MC (and hence maximizes profits) moves to the left (to z). With reduced output, the firm will be able to raise its price to AR_z . Notice that the firm's average costs will have risen far more (to AC_z) and that, at the output level z , the firm will now be maximizing profits (actually minimizing its losses) — suffering substantial negative economic profits equal to $(AR_z - AC_z)$ times z .

Figure 8-14



Firms will leave this industry, and – as they do – the AR and MR curves for the remaining firms will shift to the right. The exodus will continue until the AR curve becomes tangent to the new higher AC curve as in Figure 8-15. By then, the typical firm's output will be back up to x . Its AC will have fallen from AC_z to AC'_x (which is now higher than AC_x in Figure 8-14 by the amount of the rise in the average cost level). Also, the firm's price will have risen from AR_z to AR'_x (which exceeds AR_x in Figure 8-14 by the amount of the rise in the average cost level). Although the firm's output is no longer down, the industry's output is down (because firms have left). So, price is up by the amount of the cost level increase and industry output is down.

Figure 8-15



This outcome has the same caveats as discussed earlier on pages 182 and 183. Any cost concessions won would permit elimination of the negative economic profits without so many firms having to leave the industry and without the price having to rise by the full amount of the original cost increase.

The arguments in this section suggest that

*we may anticipate that an industry's response to a cost structure increase will be in terms of decreased industry size and output with price up by as much as the full initial rise in average costs **unless** there are*

significant extraordinary circumstances (such as those considered on pages 182 and 183) that could reduce (possibly to zero) the output decrease and the price increase.