10

Airline Pricing, Demand, and Output Determination

Chapter Checklist • You Should Be Able To:

- Describe the trend in domestic passenger airfares during the three decades after World War II, and discuss some of the reasons for this trend
- List the determinants of demand, and explain how each can affect the position of the demand curve
- Distinguish between a *change in demand* and a *change in the quantity demanded*
- Define *elasticity coefficient, elastic demand, inelastic demand,* and *determinants of elasticity*
- Describe the four basic types of airline passenger fares
- Summarize several promotional fare actions initiated by air carriers
- Recognize some of the common rules and regulations used by air carriers in conjunction with fare actions

- Distinguish among *direct operating costs, indirect operating costs,* and *nonoperating costs and revenues*
- Describe the profit-maximizing level of output
- Understand cost-cutting trends imposed by airlines for the 21st century

INTRODUCTION

The policies and practices of U.S. airlines with respect to air travel demand and pricing are both interesting and significant. As they have been implemented over time, they illustrate the importance of the relationships among economics, business, managerial judgment, and governmental regulatory policy.

During the pioneer days of airline development, the airlines tested the responsiveness of demand for passenger service by adjusting prices so that the resulting volume of passenger traffic, combined with mail revenues, would produce the maximum net return. Airline management had to use keen judgment to fix fares that would develop traffic, counter existing competition, and yield revenues that, together with other sources of income, would meet operating and other expenses and generate a reasonable return. At first Congress, and later the Civil Aeronautics Board (CAB), was responsible for regulating passenger and freight rates of airlines engaged in interstate commerce so as to ensure that consumers paid fair prices and the airlines earned adequate revenues. Air mail compensation was used by the Post Office Department before 1934 to direct the development of domestic airline services.

THE TREND IN DOMESTIC PASSENGER AIRFARES

During the pioneer years of air passenger transportation, the cost of aircraft operation precluded the air carriers from seeking passenger traffic at rates on a price-competitive basis with other forms of transportation. Before the awarding of air mail contracts, most carriers engaging in passenger transportation operated in the red, without hope of balancing revenues and expenses. Even in the years following the awarding of the air mail contracts, high passenger fares discouraged the growth of traffic, and light traffic caused the costs of operation to be spread over fewer passengers. The airlines were caught in a vicious spiral of fares and operating-costs distribution for which a solution was imperative, because despite the fact that prices increased from 1926 to 1929, passengers were better able to pay the fares than they were after 1929.

Following the autumn of 1929, drastic reductions were made in air passenger transportation fares until the airlines, operating in direct competition with railroad passenger services, established fares at the approximate level of standard railroad passenger fares plus Pullman charges. Airlines not in direct competition with railroad service also reduced their fares in many cases, but not so drastically as the lines in competition with railroad services. The awarding of mail contracts to air carriers enabled these lines to distribute their costs of operation over mail and passenger traffic and thus reduce the amount of cost borne by the passenger traffic. Some of the air transport lines also developed air-express traffic, and this additional revenue made it possible to stimulate passenger traffic by reducing rates.

The trend in air passenger fares for domestic airlines is shown in Table 10-1. These figures reflect a sharp downward trend from 1929 to 1941. A 5 percent federal transportation tax was introduced in 1941; this was raised to 10 percent in 1942 and to 15 percent in 1943. Faced with the problem of too much traffic and too little capacity during World War II, the carriers eliminated all special fares and discounts, such as round-trip fare reductions, reduced fares for children, and reductions in fares for those who traveled under the Universal Air Travel Plan (an air travel credit card). After the war, as a result of various

TABLE 10-1 Average Air Passenger Fares for Domestic Airlines, 1926–2004

Prejet Era		Jet Era	
1926–1960	*Passenger Revenue (in cents per passenger mile)*	*1961–1996*	*Passenger Revenue (in cents per passenger mile)*
1926–30	12.0, 10.6, 11.0, 12.0, 8.3	1961–65	6.1, 1, 5.9, 5.8, 5.7
1931–35	6.7, 6.1, 6.1, 5.9, 5.7	1966–70	5.7, 6, 5.6, 5.9, 6.0
1936–40	5.7, 5.6, 5.7, 5.1, 5.1	1971–75	6.3, 6.4, 6.6, 7.5, 7.7
1941–45	5.0, 5.3, 5.5, 5.1, 4.5	1976–80	7.8, 8.2, 8.5, 9.0, 11.6
1946–50	4.5, 5.0, 5.7, 5.8, 5.6	1981–85	12.8, 12.8, 12.1, 12.7, 12.2
1951–55	5.6, 5.6, 5.5, 5.4, 5.5	1986–90	11.0, 11.4, 12.3, 13.1, 13.4
1956–60	5.3, 5.4, 5.7, 5.9, 6.0	1991–95	13.2, 12.9, 13.7, 13.1, 13.5
		1996	13.8
		1997	13.97
		1998	14.1
		1999	14.0
		2000	14.6
		2001	13.2
		2002	12.0
		2003	12.3
		2004	12.1

Source: For 1926–37, Aeronautics Branch of the U.S. Department of Commerce; for 1938–2004, Air Transport Association and Civil Aeronautics Board.

CAB show cause orders, carriers began to reduce passenger fares and bring back the prewar discounts. In addition, carriers introduced a number of innovations into their fare structure, including computing fares on a uniform mileage rate. The basic fares between the points served by each airline were developed by multiplying the base rate per mile by the aeronautical miles flown. For example, if the basic rate was 6 cents per mile, and the distance between A and B was 323 miles, the basic one-way fare was $19.38, rounded to the nearest 5 cents, for a fare of $19.40.

Carriers also experimented with a no-show penalty that was 25 percent of the unused portion of the ticket or $2.50, whichever was greater. And most carriers introduced domestic coach service, with fares set at an average of 4 cents per mile, compared to almost 6 cents for regular first-class service.

Average fares climbed again during the Korean conflict in the early 1950s, in response to the increased demand for military airlift capacity. In 1952, the major carriers introduced a $1 per ticket fare increase. This fare increase was unique in that the rate of increase per mile decreased as the trip length increased. This philosophy laid the foundation for fare structures in the years to come, notably that the fare per mile should decline with distance at a rate generally consistent with the behavior of unit costs. Also in 1952, the CAB eliminated the cents-per-mile limits previously used in establishing fares for coach services and instituted a policy that coach fares should not exceed 75 percent of the corresponding first-class fares. The objective of this policy was to encourage the use of coach services—and it worked. By 1955, first-class travel constituted only 59.9 percent of the traffic mix, falling to 45.3 percent by 1960 and to only 21.8 percent by 1965. It has continued to decline ever since.

Air carrier profits plummeted during the recessionary period 1957–58, and the CAB approved an increase of 4 percent plus $1 in the domestic passenger rates on August 1, 1958. In addition, the board permitted the airlines to reduce family-fare discounts from 50 percent to 33.3 percent and eliminate round-trip discounts and free stopover privileges.

The years from 1962 through 1968 saw the price of an average airline ticket decline by more than 13 percent—probably the most significant cost reduction in the history of passenger transportation. The reason, of course, was the tremendous growth in airline traffic and productivity, largely as a result of new jet aircraft, which was so great that it absorbed costs and made possible lower fares. By 1968, productivity gains began to be outpaced by rising labor costs, landing fees, and interest charges, among other expenses. Clearly, fare reductions could not continue. In 1969, a couple of small fare increases were approved by the CAB, but airline profits continued to fall. In 1970, the CAB was engaged in a domestic passenger fare investigation and denied additional general fare increases pending completion. The result was that in 1970, the industry recorded the largest loss in its history up to that time.

Airfares almost doubled during the 1970s, largely due to the tremendous increase in fuel costs, which rose from an average cost per gallon of 11 cents in 1970 to 90 cents by 1980. Fuel expenses represented close to 13 percent of airline operating expenses in 1970 but approached 31 percent by 1980.

This rise in fuel prices and the 1981 air traffic controllers' strike severely affected airline costs and, subsequently, fares. The mid-1980s brought lower fuel prices and continued efforts by deregulated airlines to control costs, especially by revising labor agreements and improving worker productivity. From 1982 to 1987, average costs per seat-mile declined by about 10 percent, which stimulated further reductions in fares. Discounted fares became available, particularly in the longer-haul, high-density markets. Moreover, this general decline in fares took place when the economy was recovering from recession (in 1980 and 1982) and when many new-entrant airlines and holdover carriers were trying to expand their market share.

By 1987, most of the new entrants had either failed or merged with the surviving incumbent carriers, and since then, average yields have increased steadily. The late 1980s and early 1990s saw further contraction in the industry with the demise of Eastern Airlines and Pan Am. Additional upward pressure on fares was brought about by the Iraqi invasion of Kuwait, as three separate fuel surcharges were initiated in the months that followed. Domestic fare levels were affected by the imposition of passenger facility charges and further concentration in the industry.

From the mid-1990s to 2005, passenger airfares have, on average, decreased because of increased competition between new-entrant low-cost carriers and increased competition betwen the majors. As a result of the terrorist attacks on September 11, 2001, air carriers suffered record-breaking financial losses. In early 2006, airlines were still recovering from such losses, forcing the airlines to provide incentives to stimulate air travel. Seat sales and enhanced frequent-flier programs were marketed to the public to increase passenger load factors and revenues. By the end of the fourth quarter of 2002, the airlines in the United States had lost a combined total of approximately $8 billion since the fourth quarter of 2001. More money was lost in the airline industry in this short period of time than in the entire history of aviation combined.

PRICING AND DEMAND

Of all the marketing variables that influence the potential sales of airline seats and cargo capacity, price has received the most attention since deregulation. For over 200 years, economists have emphasized the price variable in describing the level of demand for products and services. Pricing remains a very complex issue in many industries. In the case of air transportation, it is even more complex because of the transition in recent years from a highly regulated industry to a deregulated environment.

Economists have developed a simple yet elegant model of how to set a price. The model has the properties of logical consistency and optimization, but it represents a severe oversimplification of the pricing problem as it exists in practice. There is value, however, in examining the model, because it provides some fundamental insights into the pricing problem and because its very limitations help bring out the complex issues involved in pricing.

Demand is defined as the various amounts of a product or service that consumers are willing and able to purchase at various prices over a particular time period. A demand schedule is simply a representation of a series of possibilities that can be set down in tabular form. Table 10-2 is a hypothetical demand schedule for a particular air carrier route. This tabular portrayal of demand reflects the relationship between the price or fare and the estimated number of passengers who would be willing and able to purchase a ticket at each of these prices.

A fundamental characteristic of demand is that as price falls, the corresponding quantity demanded rises; alternatively, as price increases, the corresponding quantity demanded falls. In short, there is an inverse relationship between price and quantity demanded. Economists have labeled this inverse relationship the **law of demand.** Upon what foundation does this law or principle rest? Basically, common sense and simple observation. People ordinarily will fly more at lower prices than at higher prices. To passengers, high price is an obstacle that deters them from buying. The higher this price obstacle, the less they will buy; the lower the price obstacle, the more they will buy. Passengers will drive instead of fly; businesspeople will turn to telephone conference calls and the like as fares rise.

This inverse relationship between price and number of passengers purchasing tickets can be presented on a simple two-dimensional graph measuring estimated number of passengers on the horizontal axis and price on the vertical axis (see Figure 10-1). The resulting curve is called a demand curve. It slopes downward and to the right because the relationship it portrays between price and estimated number of passengers ticketed is inverse. The law of demand—people buy more at a low price than they do at a high

TABLE 10-2 An Individual Air Carrier's Demand for Air Transportation per Month Between Two Cities (hypothetical data)

Price	Estimated Number of Passengers
$75	1,000
70	1,150
65	1,275
60	1,400
55	1,550

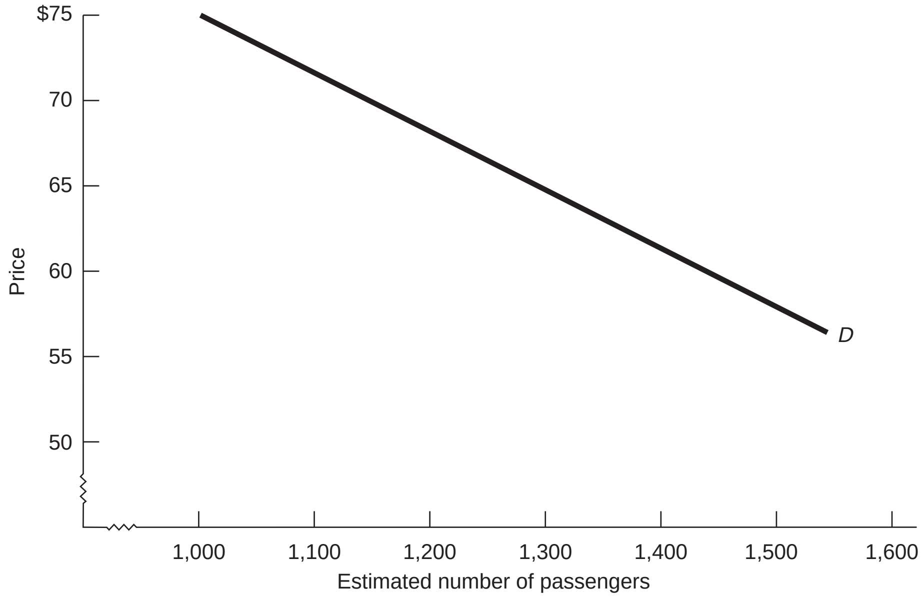

FIGURE 10-1 An individual air carrier's demand for air transportation per month between two cities (hypothetical data).

price—is reflected in the downward slope of the demand curve. What is the advantage of graphing our demand schedule? It permits us to represent clearly a given relationship—in this case, the relationship between price and estimated number of passengers—in a simpler way than we could if we were forced to rely on verbal and tabular presentation.

Determinants of Demand

In constructing a demand curve, a forecaster assumes that price is the most important determinant of the amount of any product or service purchased. But the forecaster is aware that factors other than price can and do affect purchases, in our case, of tickets. Thus, in drawing a demand schedule or curve, the forecaster must also assume that other factors remain constant; that is, the nonprice determinants of the amount demanded are conveniently assumed to be given. When these nonprice determinants of demand do in fact change, the location of the demand curve will shift to some new position to the right or left of its original position (see Figure 10-2).

The major nonprice determinants of demand in the air travel market are (1) the preferences of passengers, (2) the number of passengers in a particular market, (3) the financial status and income levels of the passengers, (4) the prices of competitors and related travel expenses, and (5) passenger expectations with respect to future prices.

Changes in Demand

What happens if one or more of the determinants of demand should change? It will change the demand schedule data and therefore the location of the demand curve. Such a change in the demand schedule data, or, graphically, a shift in the location of the demand curve,

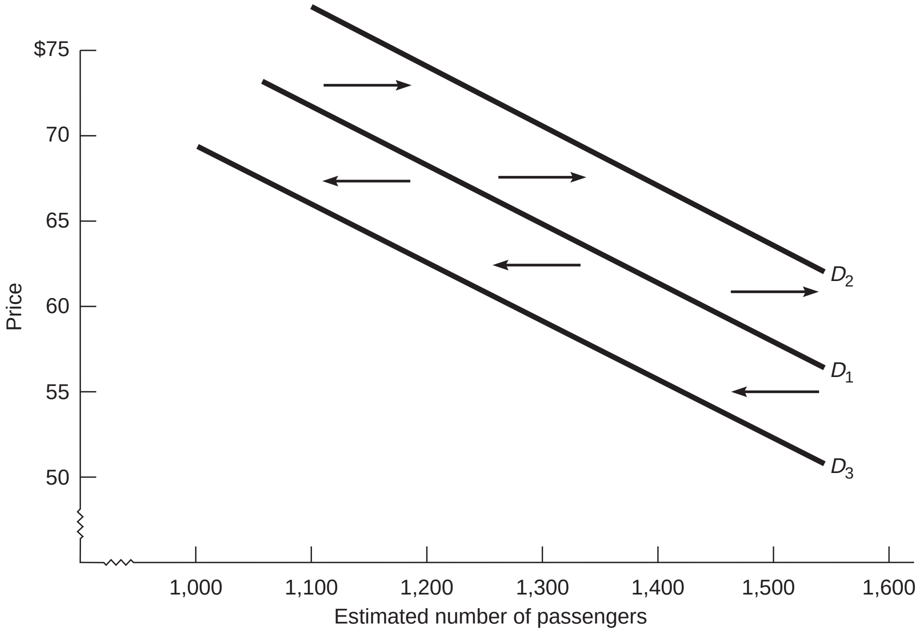

FIGURE 10-2 Effect of changes in demand.

is called a *shift in demand.* For example, if passengers become willing and able to buy more tickets, at each possible price over a particular time period we have an increase in demand. An increase in demand is reflected in a shift of the demand curve to the right, for example, from D_1 to D_2, as shown in Figure 10-2. Conversely, a decrease in demand occurs when, because of a change in one or more of the determinants, consumers buy fewer tickets at each possible price than was forecast. Graphically, a decrease in demand entails a shift of the demand curve to the left, for example, from D_1 to D_3, as shown in Figure 10-2.

Let us now examine the effect on demand of changes in each of the aforementioned nonprice determinants, using the same hypothetical example.

1. *Preferences of passengers.* A change in passenger preferences favorable to an airline—possibly prompted by advertising—will mean that more tickets will be demanded at each price over a particular time period, shifting the curve to the right. An unfavorable change in passenger preferences will cause demand to decrease, shifting the curve to the left. The airline sells fewer tickets than forecast at all prices offered during that time period. Preferences can include a number of factors, including an airline's image (United's "friendly skies," Delta's "professionalism"), perceived safety record, on-time reliability, in-flight and ground services afforded, gate position, type of aircraft flown, frequency of departure, and many more either real or perceived differences that relate to a passenger's preference for one airline over another.

2. *Number of passengers.* An increase in the number of passengers in a market—brought about perhaps by improvements in connecting flights or by population growth—will

constitute an increase in demand. Fewer potential passengers will be reflected by a decrease in demand.

3. *Financial status and income levels of passengers.* This nonprice determinant relates to the state of the economy and the level of such things as personal income, disposable income, and profits (in the case of businesses). Air transportation is very sensitive to fluctuations in the economy. If the economy is in a recessionary period, with higher than normal unemployment and decreased factory orders, both business and pleasure travelers will be flying less. Conversely, when the economy is booming, businesspeople are traveling extensively and workers are not hesitant to make air travel plans.

4. *Prices of competitors and related travel expenses.* An increase in a competitor's price, all other things being equal, will normally prompt some passengers to switch to your airline. The reverse is also true: if you raise your prices and your competitor doesn't, all other things being equal, you will lose some business. An increase in the competitor's price will normally shift your demand curve to the right, and, assuming your prices hold and your competitor's prices drop, your demand curve will shift to the left. Economists refer to these as substitute or competing goods.

   There are other related travel expenses that complement one another. For example, if motel and rental car rates are falling and these items make up 70 percent of the proposed expenses for a trip, the air fare price on a particular trip may be insignificant, relatively speaking. Thus, if a planned $1,000 vacation is unexpectedly obtainable through a package costing $550, the fact that the airfare went from $150 to $165, a 10 percent increase, becomes insignificant.

5. *Passengers' expectations with respect to future prices.* Passengers' expectations of higher future prices may prompt them to buy now in order to beat the anticipated price rises. Conversely, expectations of falling prices will tend to decrease the current demand for tickets.

A *change in demand* should not be confused with a *change in the quantity demanded*. A change in demand is a shift in the entire demand curve, either to the right (an increase in demand) or to the left (a decrease in demand). The passenger's state of mind concerning a ticket purchase has been altered because of a change in one or more of the determinants of demand. As used by forecasters, the term *demand* refers to a schedule or curve; therefore, a change in demand must mean that the entire schedule has changed or that the curve has shifted its position. In contrast, a change in the quantity demanded is the movement from one point to another point—from one price–quantity combination to another—on a fixed demand curve. The cause of a change in the quantity demanded is a change in the price of the ticket under consideration.

Decide whether a change in demand or a change in the quantity demanded is involved in each of the following illustrations:

1. Airline B lowers its price on a particular flight, with the result that Airline A, with a flight departing 15 minutes later, loses passengers.

2. Airline C lowers its price on a particular route segment and experiences an increase in the number of passengers carried.

3. Passengers' incomes rise as a result of a turnaround in the economy, resulting in more vacation traveling.

Elasticity of Demand

The law of demand tells us that consumers will respond to a price decline by buying more of a product or service. But consumers' degree of responsiveness to a price change may vary considerably. Economists, forecasters, and airline price analysts measure how responsive, or sensitive, passengers are to a change in the price by **elasticity of demand.** The demand for some air travel is such that passengers and shippers are relatively responsive to price changes; price changes give rise to considerable changes in the number of passengers carried. This is called **elastic demand.** For other air travel, passengers are relatively unresponsive to price changes; that is, price changes result in modest changes in the number of additional passengers motivated to fly. This is known as **inelastic demand.**

Pricing analysts and others measure the degree of elasticity or inelasticity by the elasticity coefficient, or E_d, in this formula (Δ = change):

$$E_d = \frac{\text{Percentage change in passenger demand}}{\text{Percentage change in price}} = \frac{\%\Delta Q}{\%\Delta P}$$

One calculates these percentage changes by dividing the change in price by the midpoint between the prices and the change in passenger demand by the midpoint between the demands. Thus, we can restate our formula as

$$E_d = \frac{\text{Change in passenger demand}}{\text{Midpoint between passenger demands}} \div \frac{\text{Change in price}}{\text{Midpoint between prices}}$$

We use the midpoints to determine percentage changes to avoid the discrepancy that would occur if we went from one price, say \$100, to \$120, which would result in a 20 percent increase changing from \$100 to \$120, but a 16 percent decrease changing from \$120 to \$100. By using the midpoint, \$110, and dividing it into the change, we arrive at a compromise percentage change of 18 percent whether we go from \$100 to \$120 or \$120 to \$100. Similarly, if the original number of passengers carried at a price of \$100 was 220, and 180 passengers were carried at a price of \$120, the percentage change using the midpoint would be 20 percent.

Now let us interpret our formula.

Elastic Demand. Demand is elastic if a given percentage change in price results in a larger percentage change in passengers carried. For example, demand is elastic if a 7 percent decrease in price results in a 12 percent increase in the number of passengers carried or if a 4 percent increase in price results in a 10 percent decrease in the number of passengers. In all such cases, where demand is elastic, the elasticity coefficient will obviously be greater than 1. Another way of determining the elasticity is to see what happens to total revenue as a result of the price change. If demand is elastic, a decline

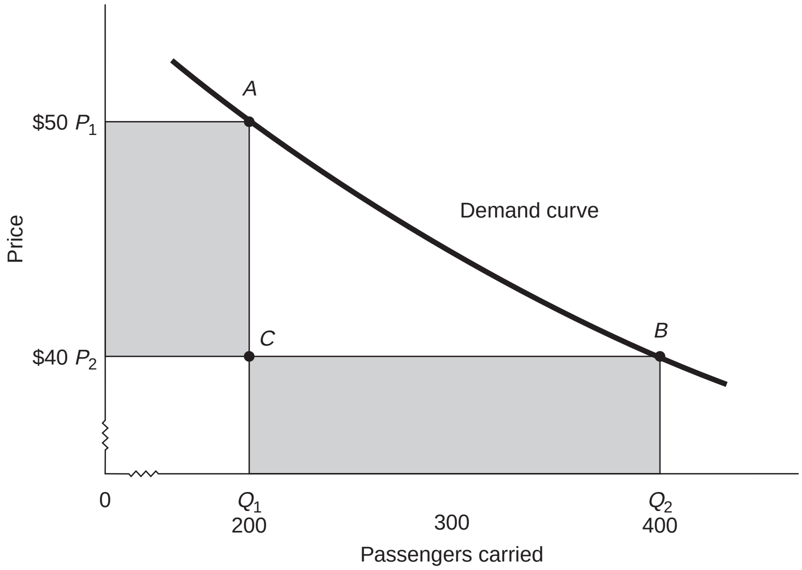

FIGURE 10-3 Elastic demand. When demand is elastic, a decrease in price results in an *increase* in total revenue, and an increase in price results in a *decrease* in total revenue.

in price will result in an increase in total revenue, because even though the price per passenger is lower, enough additional passengers are now being carried to more than make up for the lower price. This is illustrated in Figure 10-3.

Total revenue is price times quantity. Thus, the area shown by the rectangle $0P_1AQ_1$, where P_1 = \$50 and quantity demanded Q_1 = 200 passengers carried, equates with total revenues of \$10,000. When price declines to P_2 (\$40), causing the quantity demanded to increase to Q_2 (400 passengers carried), total revenue changes to $0P_2BQ_2$ (\$16,000), which is obviously larger than $0P_1AQ_1$. It is larger because the loss in revenue caused by the lower price per unit (P_2P_1AC) is less than the gain in revenue caused by the larger sale in dollars (Q_1CBQ_2) that accompanies the lower price. The reasoning is reversible: if demand is elastic, a price increase will reduce total revenue, because the gain in total revenue caused by the higher unit price (P_2P_1AC) is less than the loss in revenue associated with the accompanying fall in sales (Q_1CBQ_2). That is, if demand is elastic, a change in price will cause total revenue to change in the opposite direction. Figure 10-4 may be helpful in remembering this rule.

FIGURE 10-4 Basic rule of elastic demand.

Obviously, when airlines reduce prices, they anticipate that consumers will be responsive (elastic). In other words, they assume that the price drop will be more than offset by a larger percentage increase in consumers, thereby filling seats and cargo capacity and increasing total revenues. If they raise prices and consumers are responsive (elastic), the rise in price will be offset by a larger percentage decrease in consumers, and total revenues will fall.

Inelastic Demand. Demand is inelastic if a given percentage change in price is accompanied by a relatively smaller change in the number of passengers carried. For example, if a 10 percent decrease in price results in a 5 percent increase in the number of passengers carried, demand is inelastic. If an 8 percent increase in fares results in a 3 percent decrease in the number of passengers, demand is inelastic. It is apparent that the elasticity coefficient will always be less than 1 when demand is inelastic. If demand is inelastic, a price decline will cause total revenue to fall. The modest increase in sales that will occur will be insufficient to offset the decline in revenue per passenger, and the net result will be a decline in total revenues. This situation exists for the \$70–80 price range shown on the demand curve in Figure 10-5.

Initially, total revenue is $0P_1AQ_1$ = \$24,000, where price P_1 = \$80 and the number of passengers carried $Q_1 = 300$. If we reduce the price to P_2 (\$70), the passengers carried will increase to Q_2 (325). Total revenue will change to $0P_2BQ_2$ (\$22,750), which is less than $0P_1AQ_1$. It is smaller because the loss in revenue caused by the lower fare (area P_2P_1AC) is larger than the gain in revenue caused by the accompanying increase in sales (area Q_1CBQ_2). Again, our analysis is reversible: if demand is inelastic, a price increase will increase

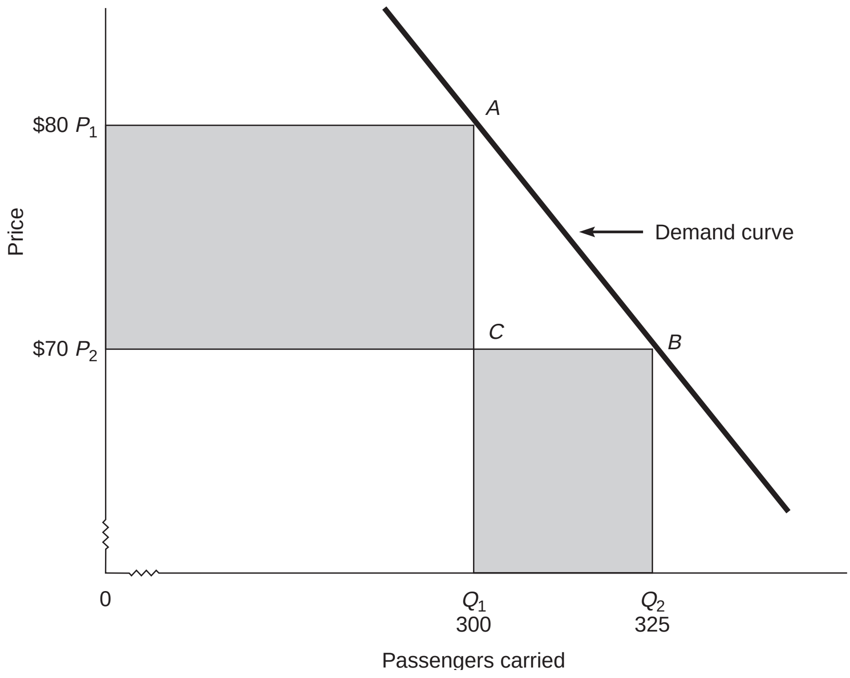

FIGURE 10-5 Inelastic demand. When demand is inelastic, a decrease in price results in a *decrease* in total revenue, and an increase in price results in an *increase* in total revenue.

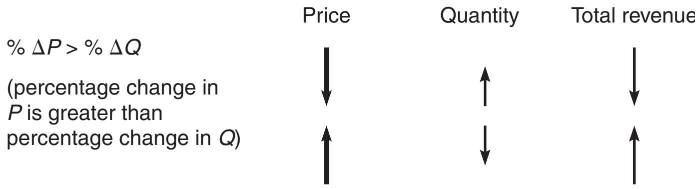

FIGURE 10-6 Basic rule of inelastic demand.

total revenue. That is, if demand is inelastic, a change in price will cause total revenue to change in the same direction. Figure 10-6 may be helpful in remembering the rule.

The borderline case that separates elastic and inelastic demand occurs when a percentage change in price and the accompanying percentage change in number of passengers carried are equal. For example, a 5 percent drop in price causes a 5 percent increase in the number of tickets sold. This special case is termed *unit elasticity,* because the elasticity coefficient is exactly 1, or unity. In this case, there would be no change in total revenue.

Determinants of Elasticity

Competition. Generally speaking, the more competition there is (the more substitutes and alternatives), the more responsive (elastic) consumers will be. For example, if four carriers are operating flights within 15 minutes of one another to a particular city and one offers a lower fare, a passenger likely will fly with that carrier, all other things being equal.

Distance. Long-haul flights tend to be more elastic than short-haul flights. Thus, vacationers will be responsive to a fare reduction of $100 on a $500 fare even if they have to leave between Tuesday and Thursday. Short-haul fare changes tend to be inelastic. A 10 percent increase on a $30 fare is only $3. A carrier will generally not experience a 10 percent or greater decrease in passengers for such a small amount.

Business Versus Pleasure. Business fliers tend to be less responsive to price changes than vacationers or individuals on personal trips. Why? Most businesspeople are on expense accounts and have to make their trips within a certain period of time. Nor are they generally willing to take a late-night flight to take advantage of a discount. Vacationers can arrange their schedules and be much more elastic (responsive) to price changes if it is worth it to them.

Time. Certainly, if we have time, we can be much more responsive to price changes than if we do not. On the other hand, if we have little time and must be at a certain place at a particular time, we generally will be very inelastic with regard to price changes. For example, fares to Los Angeles may be going up by 20 percent next week, but if niece Kellie is getting married there next month, we cannot be responsive by flying out there now to save the extra 20 percent.

NO-FRILLS AIRFARE AND SURVEY WARFARE

The following illustration is based on a true case that happened several years ago when a new "no-frills" airfare was introduced.

As the recession made inroads into the passenger traffic loads of the major airlines, Airline A attempted an experiment with a discount of 35 percent from normal coach fares on certain of its regularly scheduled routes. In an effort to build up its load factor, Airline A tied its discount fare proposal to the offering of no-frills service during the flight, including doing away with complimentary meals, snacks, soft drinks, and coffee, so as to reduce costs and partially offset the lower-priced fares. However, passengers using the no-frills plan could selectively purchase these items in flight if they wished. The no-frills fares were offered only Mondays through Thursdays.

Airlines B and C, both competitors of Airline A on some of the routes on which Airline A proposed to implement no-frills fares, went along with the discount fares. Airline A claimed that 56 percent of the 133,000 passengers who used its no-frills fare from mid-April through June 30 were enticed to travel by air because of the discount plan. According to Airline A, the new passenger traffic generated by discount fares increased its revenues by $4 million during that period. Airline A said that its figures were based on an on-board survey of 13,500 passengers and represented one of the most exhaustive studies it had ever conducted.

J. Smith, vice-president for marketing for Airline A, was quoted at a news conference as saying that the fare had been an "unqualified success," had created a new air travel market, and had generated more than twice the volume of new passengers required to offset revenue dilution caused by regular passengers switching to the lower fare. He said that the stimulus of the fare gave Airline A a net traffic gain of 74,000 passengers during the initial two-and-one-half-month trial. He also cautioned that the success claims he was making for the no-frills fare did not mean that low fares were the answer to the airline industry's excess capacity problems. Yet Smith did go so far as to state that "what no-frills has proved is that a properly conceived discount fare, offered at the right time in the right markets with the right controls, can help airlines hurdle traditionally soft traffic periods."

Airline B reported a different experience. Its studies showed that only 14 percent of the 55,200 passengers who used its no-frills fare between mid-April and May 31 represented newly generated traffic, with the remaining 86 percent representing passengers diverted from higher fares who would have flown anyway. It said that the effect of the fare in the six major markets it studied was a net loss in revenue of $543,000 during the initial one and one-half months. At the same time, Airline B attacked the credibility of Airline A's survey, noting that its own data were based on an exhaustive and scientific blind telephone survey among persons who did not know the purpose and sponsor of the survey. Airline B claimed that this type of study was more apt to produce unbiased results than Airline A's on-board survey.

Other airlines joined Airline B in challenging Airline A's survey results. Airline C, for example, claimed that the no-frills fare did not even come close to offsetting the dilution it experienced in revenues. Other airline officials observed that although Airline A might have succeeded through its heavy promotion of the no-frills fares in diverting some business from other carriers, they felt that Airline A's claims of generating many passengers who otherwise would not have flown were "preposterous."

Those airlines in direct competition with Airline A on the routes on which the discount fares were tried were vehemently opposed to continuing the discounts. In their view, the no-frills approach constituted "economic nonsense." They announced a policy of matching Airline A's discount fare only where forced to for competitive reasons.

Some Questions for Discussion

1. Does Airline A's experiment suggest that the demand for airline service at discount prices is elastic or inelastic? Do Airline B's results indicate that demand is elastic or inelastic?

2. Which of the two studies, Airline A's on-board survey or Airline B's telephone survey, do you think would yield the most reliable estimate as to the true elasticity of demand? Is it possible or likely that the elasticity of demand for Airline A is different from the elasticity of demand for Airline B? Why? How would you account for the differences in the experiences of Airline A and Airline B with discount fares?

TYPES OF PASSENGER FARES

Several types of fares are included in the passenger fare structure. **Normal fares** (also called *standard* or *basic fares*) are the backbone of the fare structure in that they apply to all passengers at all times (without restriction) and are the basis for all other fares. Separate normal fares are provided for each class of service: first class, coach, and economy.

Common fares are an unusual application of normal fares in that they apply a specific fare to points other than the points between which the fare is determined. An example of a common fare is shown in Figure 10-7.

Joint fares are single fares that apply to transportation over the joint lines or routes of two or more carriers and that are determined by an agreement between them. Joint fares are becoming very popular between the major and national carriers and commuter (regional) lines.

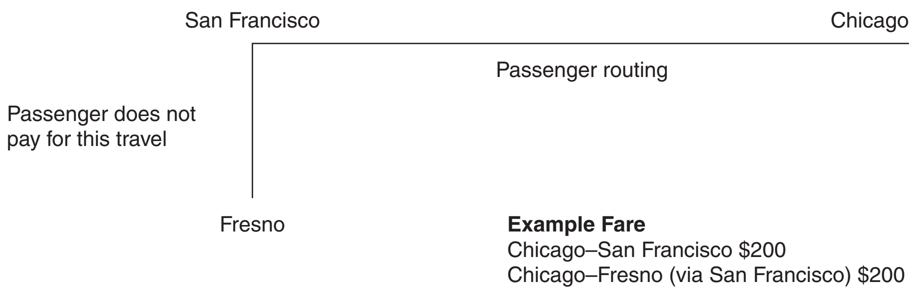

FIGURE 10-7 Common fare. Passengers in this example pay the same fare whether they are flying from Chicago to San Francisco or to Fresno.

Promotional fares are discounted fares that supplement the normal fare structure. They are always offered with some kind of restriction, such as minimum length of stay, day of the week, or season. Restrictions serve to minimize the risk of diverting full-fare traffic and maximize the generative benefit associated with the fare reduction. Examples include family-plan fares, excursion fares, group fares, and standby fares.

Promotional fares are normally used where load factors are below the optimum level. (Where load factors are above the optimum level, full-fare passengers would be displaced by discounted-fare passengers, thereby reducing revenue.) These discounted fares, because they are lower than normal fares, do reduce revenue yield per passenger. However, this reduction in yield is only undesirable, as we discussed in the section on elasticity, when the additional traffic generated is not enough to offset the price reduction

THE PRICING PROCESS

The basic twofold responsibility of airline pricing analysts appears to be simple and straightforward. They must (1) monitor, analyze, and respond to hundreds, sometimes thousands, of daily fare changes implemented by competitor airlines and (2) routinely develop pricing initiatives to strengthen and/or fortify their company's position in the marketplace. In moving from conceptual responsibility to real-time practice, however, airline pricing becomes quite complex. In broad terms, the pricing process can be characterized as being heavily dependent on automation, having many different fare levels subject to change as a competitive response.

All major airlines participate in the fare filing process via the **Airline Tariff Publishing Company (ATPCO),** which is jointly owned and funded by 19 U.S. and foreign carriers. The ATPCO serves as an electronic clearinghouse for fare information and changes. Seven days a week, ATPCO accepts fare changes submitted by all participating airlines, consolidates and processes the changes overnight, then transmits and displays these changes to all carriers by 6:00 A.M. The ATPCO was established in the 1940s, at a time when airline pricing was still regulated by the CAB. The ATPCO's role in pricing was quickly heightened with the advent of airline deregulation, which spawned intense price competition among carriers. Its importance has also grown with the increased role of automation, particularly of computerized reservations systems, which now serve as the source of automation for most of the nation's 42,000 travel agency locations.

At any point in time, because carriers collectively serve tens of thousands of origin and destination (O & D) city-pairs, with each O & D having several different fare levels, the total fare inventory managed by the ATPCO exceeds 2 million individual fares. Any single airline's share of the ATPCO's database may amount to several hundred thousand fares. Each year, the ATPCO processes millions of domestic fare changes. An average day may involve over 130,000. For each carrier, this could mean several thousand each workday, which requires some degree of analysis and, in most cases, some type of competitive response.

It is against this backdrop of fast-paced change, fueled by continuing advances in automation, that the pricing staffs of the nation's airlines formulate, and regularly reformulate, their basic pricing strategies and craft daily tactical maneuvers that are part science, part art.

Pricing Strategies and Objectives

The current literature on pricing describes several different strategies or objectives that a firm might pursue, from simple survival pricing for cash, to fighting for market share, to pricing at a premium over competitors to complement a superior product or service quality. Applying these textbook strategies to the airlines is complicated, because carriers don't charge only one price for their services. Instead, they offer a hierarchical array of fares designed to appeal to both price-sensitive leisure travelers and less price-sensitive business travelers. Further complications arise from various other factors that characterize the market for airline services. These include (1) the predictable seasonal pattern of demand, especially for leisure travel, (2) the influence of override commissions that many airlines pay to travel agencies, (3) the dynamic nature of airline schedules and the strong relationship that exists between schedule frequency and passenger demand, and (4) the tendency for individual carrier pricing strategies and objectives to vary by market and over time.

Despite the difficulties (and subjectivity) of fitting these general strategies to individual airlines, the exercise can be a meaningful one, particularly if a fixed and relatively brief time frame is defined and if strategies are identified for each carrier. American Airlines, for example, tends to be a profit-focused premium pricer and a price leader in most markets, whereas United tends to be a quick follower rather than leader. Southwest Airlines represents the extreme case of a low-fare pricer, strongly focused on obtaining and maintaining market share and on diverting traffic from auto, bus, and rail travel. Also, some of the financially distressed airlines operating under the protection of Chapter 11 bankruptcy laws clearly have priced primarily for survival. It is noteworthy as well that, despite the differences among airlines, all carriers tend to maintain price parity with their rivals. This is due to the commodity nature of airline service, which may be diminishing somewhat as the supply of air service is controlled by fewer more financially stable airlines.

Although identifying the fundamental strategies of competing carriers is an essential part of airline pricing, it is every bit as important, and perhaps more so, to understand and execute effectively the day-to-day tactics of pricing.

Pricing Tactics

Pricing tactics can be broadly categorized as (1) fare actions and (2) adjustments to fare rules and/or restrictions. Normally, daily pricing activity involves both tactics. The following discusses some of the more common actions within each category.

Fare Actions. For the most part, fare actions involve changes—increases or reductions—to actual fare levels, in contrast to the rules, restrictions, and/or footnotes that accompany most fares. Changes can be market specific, regional, or mass market in scope.

Introductory fares. When a carrier begins service in a new market, it typically offers unrestricted low fares for a period of 30 to 45 days. Key competitors normally match these fares, with restrictions. Provided that introductory fares are not extended beyond the conventional time frame, they usually don't lead to any sort of "upping of the ante" by competitors (for example, extending the period of availability or discounting the fare even further).

System excursion-fare sales. During seasonally weak traffic periods, carriers frequently offer a systemwide sale of excursion fares. Sales are conducted, on average, for a period of 7 to 10 days, with travel allowed two to four months into the future. As a rule, provided that the carrier isn't conducting a "fire sale" simply to generate cash, the volume of seats offered in such a sale is limited and controlled on a flight-by-flight basis. American's SuperSaver and MaxSaver fares are some of the more prominent examples.

System business-fare sales. This type of sale is similar to the system excursion-fare sale, except that it involves higher-level business fares. Common motives are to stimulate demand and brand switching and to provide added value. The typical approach in this case is to introduce a one-way or round-trip fare, between 15 and 30 percent less than the full coach (Y-class) fare, with the requirement that the fare be purchased at least three to seven days before travel. Seats offered at this fare tend to be plentiful.

Connect market sales. In markets where an airline offers multiple nonstop flights, the carrier will tend to limit the number of seats sold at discounted fares, because its flights represent a higher-quality service than, for example, connecting-flight service. In these instances, a competing carrier offering only connecting service may periodically attempt to gain increased market presence and steal market share by introducing a low fare in its markets. The business risk faced by the connecting-service carrier is that the competition may attempt the same strategy in the initiator's own nonstop markets.

Target segment pricing. These special fares are lower than normal published fares and are aimed at a well-defined target audience, such as military personnel, senior citizens, or students. For passengers to take advantage of these fares, some form of identification is usually required. Because the audience for these fares is small, the risk of diluting current revenues is minimal.

Flight-time-specific fares. To shore up a particularly weak flight in a market or as a basic competitive maneuver, carriers will sometimes offer lower time-specific or flight-specific fares. A common example is "night-flight" fares (for example, after 8 P.M.) that are 20 to 40 percent below comparable fares on earlier flights with higher demand. There is a risk in offering this kind of fare, because the improvement in the night flight's load factor and the increase in revenue may come at the expense of earlier, stronger flights in the same market as passengers alter their normal travel patterns to obtain the lower fare. When such cannibalization occurs, total market revenue may actually decline.

Mileage-based pricing. Although there are almost always aberrations due to competitive pressures, carriers generally attempt to relate price to distance flown, consistent with some price/mileage curve or mathematical function.

Zone pricing. This is a somewhat more streamlined variation of mileage-based pricing. From Chicago, for example, destinations might be grouped into one of several regions (for example, Midwest, East Coast, Florida/South, West Coast), with each regional group carrying the same price. Logically, longer-distance regions are priced higher than shorter-distance ones.

Value-added pricing. Because fares can be matched so quickly through the ATPCO system, carriers sometimes seek a value advantage rather than an outright price advantage. Examples of value-added tactics are an offer of first-class seating for coach fares and extra frequent-flier credits for the purchase of higher-level fares. Ultimately, value-added price offerings also tend to be quickly matched by all competing carriers.

Adjusting Rules and Restrictions. This second set of tactics involves the periodic adjustment of rules and restrictions that accompany most fares rather than the dollar amount of the fares. Common rules and restrictions tactics include the following:

Advance purchase requirements. Airlines routinely adjust advance purchase requirements on excursion and discounted business fares. Advance purchase cutoffs are one of the key "fences" airlines erect to prevent business travelers from taking advantage of excursion fares. The advance purchase restriction on the lowest excursion fares tends to range from 7 to 30 days, while 3 to 7 days is the norm for business fares. The advance purchase restriction can be likened to a demand throttle: in periods of strong demand, longer advance purchase requirements prevail, on the presumption that higher-fare traffic will materialize as the departure date approaches. Conversely, in times of weak demand, advance purchase requirements are less restrictive, that is, shorter.

One-way versus round-trip purchase requirements. Excursion fares are usually designed to require a round-trip purchase, primarily because their dollar value is so low. Conversely, higher-price business fares are usually offered on a one-way basis and typically can be combined with lower one-way fares, if available, to complete an itinerary. In an effort to maximize revenues, airlines will convert one-way business fares to round-trip purchase fares when three conditions exist: (1) the carrier offers a round-trip schedule pattern that will satisfy the passenger; (2) there is a high probability that any resulting fare increase (as passengers are unable to combine a higher one-way fare with a lower one) will more than offset an associated impact on demand; and (3) there is a strong likelihood that key competitors will match the move.

Minimum or maximum stays. Most lower excursion fares carry restrictions such as "requires a minimum three-day or Saturday night stay." The objective is to erect yet another purchase "fence" that business travelers cannot clear.

Fare penalties. These penalties apply to lower excursion fares and are triggered when a passenger cancels a reservation. Common examples are penalties of $25, $50, 50 percent of the ticket value, or even total forfeiture or nonrefundability if it involves the lowest excursion fares. The objective is to impose these penalties as a revenue offset to the low fares and, more important, to shift seat inventory risk to the passenger. Carriers will periodically try to gain a secondary pricing advantage over one another by relaxing these types of penalties, but competitive matching is usually the end result.

Directional pricing. If an airline's sales are not appropriately balanced at either end of an O & D city-pair, perhaps because it lacks schedule strength in one of the cities, the carrier may attempt to lower fares on a directional basis from the weaker city.

Peak and off-peak pricing. Depending on the seasonality of demand in particular markets, as well as time-of-day and day-of-week patterns of demand, airlines will define certain days of the week and/or times of the day as "peak," which carry a $20 to $30 premium over "off-peak" prices.

Sales, ticketing, and travel windows. As carriers periodically introduce low "sale" fares, they strive to craft a delicately balanced combination of sale, ticketing, and travel periods. They want a sale period that is long enough for the advertising message to be heard but short enough to create a sense of purchase urgency—7 to 10 days is the norm. They also want a "ticket by (date)" defined to ensure a degree of control over the pricing initiative, as well as appropriate travel periods for the sale fares. Allowed travel periods usually span 60 to 120 days, during seasonally weak times of the year (for example, January–February and September–October). Travel periods that are too short don't generate the volume of traffic the airlines are seeking. Travel periods that are too long risk dilution of stronger, higher-yield traffic periods.

Pricing Analysis

The decision to use any one, or a combination, of the tactics described is essentially a decision to raise or lower a fare. For example, increasing the advance purchase restriction from 3 to 7 days on a discounted business fare will force a certain number of passengers to buy the next higher fare. Correspondingly, by relaxing the advance purchase requirements on excursion fares from 21 days to 7 days and/or allowing for more off-peak days during the week, more passengers will be able to take advantage of a lower fare.

The proper economic analysis supporting the decision to change fares will differ, depending on whether it involves a fare reduction or an increase. In both instances, elasticity expectations are critical, but so are other factors, especially in the case of a fare decrease.

Steps in Analyzing a Fare Decrease. The pricing analysts first calculate the expected revenue gain (or loss) attributable exclusively to elasticity and then do the following:

1. *Subtract dilution.* Dilution results from those passengers purchasing the proposed lower fare who would have traveled anyway at the prior higher fare.

2. *Subtract refunds.* Airlines normally obligate themselves through the so-called guaranteed-fare rule to refund the dollar difference between a fare or ticket that has already been purchased and a proposed lower fare in the same fare class, provided that the passenger will still be able to travel on the date and flight originally reserved and meet the travel restrictions of the new lower fare (for example, advance purchase and minimum stay requirements).

3. *Subtract advertising.* To the extent that previously unbudgeted funds are dedicated to a particular pricing initiative, such an expenditure should be deducted as a step in calculating the net revenue gain, or loss, realized from the fare initiative.

4. *Subtract additional variable passenger costs.* Certain costs vary directly with passenger volume. Traffic liability insurance, food, and reservations fees are the expenses

most commonly identified as truly variable costs. As a final step in estimating the net revenue generated from a fare reduction, the additional variable passenger costs incurred should also be deducted, particularly if the traffic increase is expected to be large.

5. *Add spill.* When a newly introduced fare is especially low and is matched by all major competitors in the market, it has the potential to stimulate primary demand to such a high level that certain carriers may benefit by picking up traffic that is "spilled" to them by other carriers that cannot accommodate all of their potential traffic due to excessively high load factors.

6. *Add rejected demand by other airlines.* At times, certain airlines will tightly restrict the number of seats sold at a particular discounted-fare level, on the assumption that they can fill the same seats with higher-fare passengers. This can result in a "rejected" demand by the restrictive carrier, which can be absorbed by another carrier that is less restrictive in controlling its own discount seat inventory.

Steps in Analyzing a Fare Increase. In the case of a fare increase, there are fewer factors to consider in estimating the net economic impact. The formula becomes simply: revenue gain or loss from elasticity plus passenger variable costs avoided. With the introduction of a fare increase, spin and rejected demand are irrelevant. Likewise, there is no potential for refunds, and it is highly unlikely that a carrier will choose to advertise a fare increase. The one important nuance is that passenger variable costs will be lowered as a function of each passenger who, facing a higher fare, chooses not to fly or selects an alternate mode of transportation.

The Role of Inventory Management

The objective of **inventory management** is to maximize individual flight revenue. In the simplest terms, inventory analysts face the task of selling as many seats as possible at the highest possible fares. This usually means making available an adequate number of lower-fare seats far in advance of the departure date in order to accommodate price-sensitive business travelers. It's a tricky balancing act that requires a keen understanding of the competitive dynamics and traffic composition of individual markets and flights. Additionally, it is the analyst's responsibility to overbook the flights just enough to make up for the number of passengers who can be expected not to show up for their flight.

What makes the inventory management job especially difficult is that bookings for any particular departure may begin to materialize months before the time the flight actually departs, and it's not unusual for an individual analyst to be responsible for 50 to 100 daily departures. As eight or more fare classes are multiplied across the extended control time frame of weeks or months, and as these factors are multiplied again over the workload of 50 to 100 daily flight departures, the job of inventory management can become quite complex.

Ultimately, inventory analysts are evaluated on their ability to do the following simultaneously: (1) minimize "low-yield revenue spin" (the unnecessary loss of lower-fare excursion revenue resulting from the allocation of too few discount-fare seats); (2) minimize "high-yield revenue spill" (the unnecessary loss of higher-fare business revenue resulting from the allocation of too few high-fare seats); (3) minimize the cost of "spoiled" seats

(seats spoil when demand is sufficient to fill the aircraft but the analyst underestimates the number of no-show passengers and the flight departs with empty seats); and (4) minimize the cost of denied boardings (when a passenger is denied boarding because an analyst has overestimated the no-show rate on a high-demand flight, the airline usually must place the passenger on another carrier, at a relatively high ticket price).

AIRLINE COSTS

Cost is a major determinant in pricing the airline product. The price or average revenue per passenger mile flown must be sufficient to cover average cost per passenger mile flown. Broadly speaking, airline costs can be categorized as operating costs or nonoperating costs.

Direct Operating Costs

Direct operating costs are all those expenses associated with and dependent on the type of aircraft being operated, including all flying expenses (for example, flight crew salaries and fuel and oil), all maintenance and overhaul costs, and all aircraft depreciation expenses.

Flight Operations. The largest category of direct operating costs is for flight operations. It includes the following items:

Flight crew expenses. These expenses involve not only direct salaries and traveling expenses but also allowances, pensions, and insurance. Flight crew costs can be calculated directly on a route-by-route basis or, more commonly, can be expressed as an hourly cost per aircraft type. In the latter case, the total flight crew costs for a particular route or service can be calculated by multiplying the hourly flight crew costs of the aircraft being operated on that route by the **block speed** time for that route. Block speed is the average speed of an aircraft as it moves through the air.

Fuel and oil. Another major cost element of flight operations is fuel and oil. Fuel consumption varies considerably from route to route in relation to the stage lengths, aircraft weight, wind conditions, cruise altitude, and so forth. Thus, an hourly fuel cost tends to be even more of an approximation than an hourly flight crew cost, so fuel consumption normally is computed on a route-by-route basis. In addition to aviation fuel, oil consumption must be determined. However, oil consumption is negligible and, rather than trying to calculate it directly for each route, the normal practice is to establish hourly oil consumption for each type of engine. The oil consumption on a particular route is then calculated from the number of engines on the aircraft flying the route multiplied by the hourly oil consumption for that engine and by the block speed time. Fuel and oil costs include all relevant taxes and duties, such as taxes on fuel and oil levied by governmental units, and fuel throughput charges levied by some airport authorities on the volume of fuel uplifted.

Airport and en route charges. Airlines must pay airport authorities for the use of the runway and terminal facilities. Airport charges normally have two elements: (1) a landing fee related to the weight of the aircraft and (2) in some cases, a passenger facility charge levied on the number of passengers boarded at that airport. Additionally, if an aircraft stays at an airport beyond a stated time period, it will have to pay parking or hangarage fees. These are relatively small compared to the basic landing and passenger charges. It should be noted that not all airports use a standardized system for implementing charges. Many airports, especially those seeking increased business, are willing to negotiate charges on an individual basis. This is especially true of secondary or peripheral airports where facilities are underutilized. In many cases, underutilized airports are willing to contribute resources toward the marketing of new air service as well as to reduce costs for various ground handling charges.

Aircraft insurance costs. The aircraft hull and liability insurance expenses amount to a relatively small part of flight operation costs. The hull premium is generally calculated as a percentage of the value of the flight equipment and may range from 1 to 2 percent, or lower, depending on the airline, the number of aircraft insured, and the geographic areas in which its aircraft operate. Liability premiums are generally based on the estimated number of revenue passenger miles flown. Additional coverages, such as war risk coverage, may be purchased for an additional premium. The estimated annual premium can be converted into an hourly insurance cost by dividing it by the projected aircraft utilization, that is, by the total number of block speed hours that each aircraft is expected to fly during the year.

Other flight-operations expenses. Finally, there may be some expenses related to flight operations that do not fall into any of the preceding categories. These additional expenses may include the cost of flight crew training and of route development. However, if training costs are amortized over two or three years, then they are generally grouped together with depreciation. Some airlines may have to pay rental or lease charges for the hiring or leasing of aircraft or crews from other airlines. These expenses are usually considered part of flight-operations costs.

Maintenance and Overhaul Costs. Total maintenance costs cover a wide range of costs related to different aspects of maintenance and overhaul. Flight equipment maintenance costs are divided into three categories: direct maintenance on the airframe, direct maintenance on the engines, and a maintenance burden. The maintenance burden is basically the administrative and overhead costs associated with the maintenance function that cannot be attributed directly to a particular airframe or engine but allocated on a fairly arbitrary basis. U.S. air carriers must furnish the DOT with these three categories of maintenance costs separately for each aircraft type that they operate. These data are published quarterly and provide an excellent basis for the comparison of maintenance costs among airlines and also among different aircraft types and engines.

Individual carriers, having estimated the total maintenance costs for one particular aircraft type, may convert these costs into an hourly maintenance cost by dividing them by the total number of block speed hours flown by all the aircraft of that particular type operated by the airline.

Depreciation and Amortization. Depreciation of flight equipment is the third component of direct operating costs. Airlines tend to use straight-line depreciation over a given number of years, with a residual value of 0 to 15 percent. Depreciation periods can vary by aircraft, with the period for wide-body jets ranging from 14 to 16 years. For smaller short-haul aircraft, depreciation periods are shorter, generally 8 to 10 years.

The annual depreciation charge or cost of a particular aircraft in an airline's fleet depends on the depreciation period adopted and the residual value assumed. For example, an aircraft with a purchase price of $90 million and another $10 million for spare parts depreciated over a 15-year period to a 10 percent residual value would carry a depreciation of $6 million per year:

Price of aircraft and spares	$100
less residual value (10%)	- 10
divided by 15 years	$ 90
Annual depreciation	$ 6

If an airline chooses a shorter depreciation period, then the annual depreciation cost will rise. The hourly depreciation cost of each aircraft in any one year can be established by dividing its annual depreciation cost by the aircraft's annual utilization, that is, the number of block speed hours flown in that year. Thus, if our example aircraft achieved 3,000 block speed hours in a year, its hourly depreciation cost would be $2,000 ($6 million divided by 3,000). If the annual utilization could be pushed up to 4,000 hours, then the hourly cost would be cut to $1,500 ($6 million divided by 4,000). Clearly, any changes in the depreciation period, in the residual value, or in the annual utilization will affect the hourly depreciation cost.

Many airlines amortize the costs of flight crew training, as well as any developmental and preoperating costs related to the development of new routes or the introduction of new aircraft. In essence, this means that such costs, instead of being debited in total to the year in which they occur, are spread out over a number of years. Such amortization costs are grouped together with depreciation.

Indirect Operating Costs

Indirect operating costs are all those costs that will remain unaffected by a change of aircraft type because they are not directly dependent on aircraft operations, including expenses that are passenger related rather than aircraft related (such as passenger service costs, costs of ticketing and sales, and station and ground costs) and general and administrative costs.

Station and Ground Expenses. Station and ground costs are all those expenses, apart from landing fees and other airport charges, incurred in providing an airline's services at an airport. Such costs include the salaries and expenses of the airline staff located at the airport and engaged in the handling and servicing of aircraft, passengers, or freight. In addition, there are the costs of ground handling equipment, of ground transportation, of buildings and offices and associated facilities, and of communication equipment. Costs also arise from the maintenance and insurance of each station's buildings and equipment. Rents may have to be paid for some of the properties used.

Passenger Service Costs. The largest single element of costs arising from passenger services is the payroll, allowances, and other expenses related directly to aircraft cabin staff and other passenger service personnel. Such expenses include hotel and other costs associated with overnight stops, as well as the training costs of cabin staff where these are not amortized. Because the number and type of cabin staff may vary by aircraft type, some airlines consider cabin staff costs to be an element of flight-operations costs and, as such, a direct operating cost.

A second category of passenger service costs are those directly related to the passengers. They include the costs of in-flight catering, the meals and other facilities provided on the ground for the comfort of passengers, and expenses incurred as a result of delayed or canceled flights.

Reservations, Sales, and Promotional Costs. All costs associated with reservations, sales, and promotional activities, as well as all office and accommodation costs arising from these activities, are included in this category. Staff expenses at retail ticket offices, whether at home or abroad, also are included. In addition, the costs of all advertising and any other form of promotion, such as familiarization flights for journalists or travel agents, fall in this category. Finally, commissions or fees paid to travel agencies for ticket sales normally are included.

General and Administrative Costs. General and administrative costs are usually a relatively small element of an airline's total operating costs, because many administrative expenses can be related directly to a particular function or activity within the carrier, such as maintenance or sales. Consequently, general and administrative costs should include only those expenses that are truly general to the airline or that cannot readily be allocated to a particular activity. Interairline comparison of these general costs is very difficult, because airlines use different accounting systems.

Nonoperating Costs and Revenues

Nonoperating costs and revenues include those expenses and revenues not directly related to the operation of an airline's own air transportation services. Major nonoperating costs and revenues include the following:

1. Gains or losses arising from the retirement of property or equipment, both aeronautical and nonaeronautical. Such gains or losses arise when there is a difference between the depreciated book value of a particular item and the value that is realized when that item is retired or sold off.

2. Interest paid on loans, as well as any interest received from bank or other deposits. For some accounting purposes, some carriers include interest paid on aircraft-related loans as an operating cost.

3. All profits or losses arising from an airline's affiliated companies, some of which may be directly involved in air transportation, such as an owned commuter carrier.

4. A wide range of other items that do not fall into the preceding three categories, such as losses or gains arising from foreign exchange transactions or from sales of shares or securities.

5. Direct government subsidies or other government payments.

Fixed Versus Variable Costs

The traditional classification of costs just described is essentially a functional one. Costs are allocated to specific functional areas within the airline, such as flight operations and maintenance, and are then grouped together in one or two categories, as either direct or indirect operating costs. This cost breakdown is of considerable value for accounting and general management purposes.

To aid in economic analysis and management decision making, variable costs and fixed costs must be distinguished. Clearly, some costs may be immediately avoidable as a result of some management decision. Furloughing employees and eliminating meal service on certain flights would be examples. Other costs associated with mortgage payments on buildings and hangars may not be avoided except in the long run. The most common way of distinguishing between those costs that can be varied in the short run and those that cannot is through the concept of variable costs and fixed costs. Airlines identify those elements of cost generally accepted as being direct operating costs and further subdivide them into fixed costs and variable costs.

Variable Costs. **Variable costs** are those costs that increase or decrease with the level of output, or **available seat-miles** (**ASMs**), that an airline produces. (A seat-mile is one passenger seat transported one statute mile.) These costs, for the most part, are avoidable in the short term. For example, if a flight or series of flights is canceled, the airline is no longer responsible for flight crew expenses, fuel charges, landing fees, and the costs of passenger meals. These are fairly self-evident. Less obvious are the engineering and maintenance costs, which should be classified as variable. Certain maintenance checks of different parts of the aircraft, involving both labor costs and the replacement of spare parts, are scheduled to take place after so many hours of flying or after a prescribed number of flight cycles. (A *flight cycle* is one takeoff and landing.) Because a large part of direct maintenance is related to the amount of flying or the flight cycles, canceling a service will immediately reduce both the hours flown and the flight cycles and will save some engineering and maintenance expenditures, most notably on the consumption of spare parts, and some labor costs.

Fixed Costs. **Fixed costs** are those direct operating costs that, in total, do not vary with changes in ASMs.-They are costs that are unavoidable in the short term. Having planned schedules for a particular period and adjusted its fleet, staff, and maintenance requirements accordingly, an airline cannot easily cut back its schedules and services beyond a certain minimal level because of its obligation to the public. Thus, fixed operating costs may not be avoidable until the carrier can change its scheduled service.

Although most indirect operating costs are fixed costs in that they do not depend in the short term on the amount of flying undertaken, others are more directly dependent on the operation of particular flights. This is particularly true of some passenger service costs, such as in-flight catering, and some elements of cabin crew costs. Fees paid to service organizations or other airlines for ground handling of aircraft, passengers, or freight may be avoided if a flight is not operated. Some advertising and promotional costs may be avoidable in the short run. This leaves within the indirect cost category costs that are not dependent on the operation of particular services or routes. Lease payments on flight equipment and maintenance burden security services are clear examples of costs that are fixed in the short term.

Cost-Cutting Trends

Leading up to the early 2000s, airlines commenced application of cost-cutting measures to reduce rising operational costs. Many of the world's airlines had huge deficits that were further increased after the 2001 terrorist attacks in the United States, putting many airlines over the edge. Huge losses forced airlines to implement additional cost-cutting strategies basically overnight.

In the short term, airlines furloughed or laid off employees, with some carriers rehiring employees on a part-time basis. Aircraft fleet sizes were reduced, having a negative impact on frequency. To compensate for reduced frequency, some airlines used larger aircraft on selected routes. Airlines operating on traditional hub-and-spoke systems reduced or eliminated service to selected destinations. Alliances between air carriers were increased, resulting in increased market share and cross-utilization of resources. In some cases, airlines merged or filed for bankruptcy protection. For example, in late 2002, US Airways filed for bankruptcy with the hope of restructuring and reemerging as a successful carrier. Since 9/11, in addition to US Airways, United, Delta and Northwest have filed for bankruptcy. As of early 2006, US Airways and United have reemerged. American Airlines, the largest carrier in the world at the time, made an announcement saying that filing for bankruptcy was just a matter of time if the industry did not pick up. Fortunately, for American, the airline has not filed for bankruptcy as of early 2006.

The trends briefly discussed are expected to continue for the foreseeable future. To remain afloat, airlines are being forced to cut pennies wherever reasonably possible while maximizing revenue. For the major airlines, downsizing is a difficult process and, in some cases, next to impossible. However, opportunities are created for smaller airlines, especially those in the low-cost sector.

PRICING AND OUTPUT DETERMINATION

Pricing and output determination for airlines is as much an art as a science. There is no simple or, for that matter, singular way to approach the analysis. We will start our analysis by reviewing the demand side of the picture. As noted previously, the demand curve facing any airline slopes downward and represents an inverse relationship between price and passengers carried: the lower the price, the greater the amount of passenger traffic generated. In addition, passengers are responsive to price changes. At first, they may be very responsive (elastic) to price reductions, and that might stimulate a large percentage change in passengers carried. Unfortunately, at some point, further price cuts will not stimulate additional traffic in sufficient numbers to offset the reduction in total revenue caused by the price cut. In other words, passengers will become unresponsive (inelastic). Columns 1 and 2 in Table 10-3 portray this situation. We assume in this particular instance that our hypothetical airline must accept a price cut in order to generate additional **revenue passenger miles (RPMs).** A revenue passenger mile is one passenger transported one mile in revenue service. Our fare in this case is expressed in dollars per mile, commonly referred to as *yield.* Yield is actually defined as the air transport revenue per unit of traffic carried, or total passenger revenue per RPM. Basically, it is the same as price, average revenue (AR), or fare per mile. Column 3 represents the total revenue for each level of RPMs generated during this particular period. Column 4 shows the marginal, or extra, revenue that results from additional RPMs.-The data in Table 10-3 are shown graphically in Figures 10-8 and 10-9.

TABLE 10-3 Demand and Revenue Schedule for an Airline over a Particular Period of Time (hypothetical data)

Yield (price or AR) per Mile	RPMs (millions)	Total Revenue (thousands)	Marginal Revenue (thousands)
$0.265	0.800	$212.0	
			$119.5
0.260	1.275	331.5	
			132.6
0.255	1.820	464.1	
			88.4
0.250	2.210	552.5	
			35.5
0.245	2.400	588.0	
			6.0
0.240	2.475	594.0	
			-6.5
0.235	2.500	587.5	
			-9.0
0.230	2.515	578.5	
			-11.5
0.225	2.520	567.0	
			-12.2
0.220	2.522	554.8	

Total Costs in the Short Run

Now let's turn our attention back to the cost side of the picture. The costs an airline incurs in producing available seat-miles (ASMs) depend on the types of adjustments it is able to make in the amounts of the various resources it employs. The quantities of many resources used—labor, fuel, and so forth—can be varied relatively quickly in the short run. But the amounts of other resources demand more time for adjustment. For example, acquiring new aircraft or building new hangars can be varied only over a considerable period of time. The *short-term period* refers to a period of time too brief to permit the airline to alter its capacity yet long enough to permit a change in the level at which the existing fleet of aircraft is utilized. An airline's overall capacity is fixed in the short run, but ASMs can be varied by applying larger or smaller amounts of labor, materials, and other resources to that capacity. In other words, the existing fleet can be used more or less intensively in the short run. Through better scheduling and more efficient use of labor, the airline can increase ASMs in the short run, but there is a limit.

As the airline adds resources to a fixed capacity, its output (ASMs) might increase at an increasing rate for a while if it had been underutilizing its existing capacity. However, beyond some point, ASMs would increase at a *decreasing* rate until ultimate capacity in the short run was reached. This economic principle is called the **law of diminishing returns.**

Table 10-4 illustrates the law of diminishing returns numerically. ASMs increase at an increasing rate up to 2.6 and then continue to increase at a decreasing rate up to capacity in the short run. Column 3 shows that the total variable costs associated with each level of ASMs flown are not constant. As ASMs increase, variable costs actually increase at a *decreasing* rate from 1.7 to 2.6 million ASMs. Eventually, variable costs increase at an *increasing* rate. The reason for this behavior of variable costs lies in the law of diminishing returns. The total cost shown in column 4 is self-defining: it is the sum of fixed and variable costs at each level of ASMs. Figure 10-10 shows graphically the fixed, variable, and total costs presented in Table 10-4.

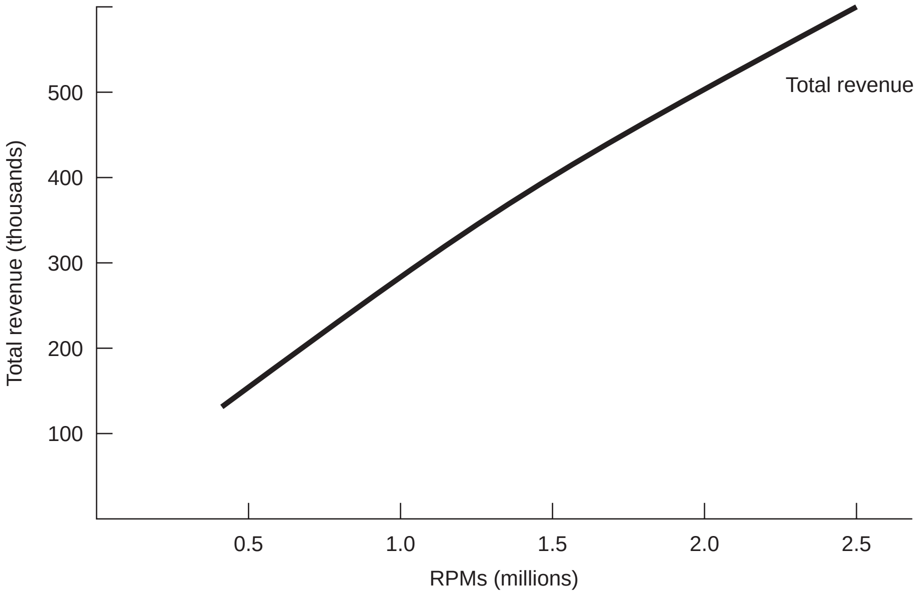

FIGURE 10-8 Total revenue and RPMs for an individual airline over a particular period of time (hypothetical data).

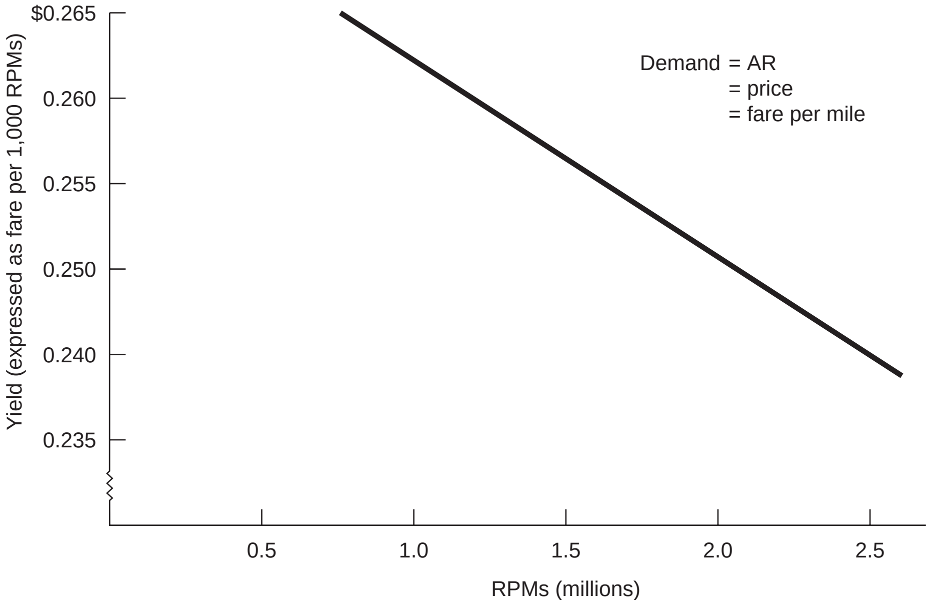

FIGURE 10-9 Yield expressed in fare per 1,000 RPMs for an individual airline over a particular period of time (hypothetical data).

TABLE 10-4 Total Fixed-Overhead Costs, Total Variable Costs, and Total Costs for an Airline over a Particular Period of Time (hypothetical data)

ASMs (millions)	Total Fixed Cost (thousands)	Total Variable Cost (thousands)	Total Cost (thousands)	Marginal Cost (thousands)
1.0	$100	$160	$ 260	
1.7	100	170	270	$ 10
2.6	100	240	340	70
3.4	100	300	400	60
4.0	100	370	470	70
4.5	100	450	550	80
4.9	100	540	640	90
5.2	100	650	750	110
5.4	100	780	880	130
5.5	100	930	1030	150

Load Factor

One more piece is needed before we can complete our pricing analysis. In Chapter 6, *passenger load factor* was defined as revenue passenger miles divided by available seat-miles. In developing a demand schedule, a pricing analyst assumes that all of the ASMs produced by the airline company will not be filled by RPMs.-(This was discussed in detail in Chapter 6.) Consequently, it is reasonable to assume that a carrier will not experience a 100 percent load factor on all routes or on all flights, during the period of time for which the analyst has made the price and RPM forecast. For purposes of analysis, it is assumed that the load factors shown in Table 10-5 are associated with the ASMs and RPMs previously shown.

Load factors normally increase with reductions in ASMs, because the carrier would cut back on those flights and routes that have experienced the lowest load factors and poorest profits. Those remaining would be the ones that have experienced the highest load factors and greatest profits—hence, the higher overall average.

As a practical matter, the analyst also realizes that systemwide load factors above 75 percent or below 55 percent are not realistic. To maintain an average of 75 percent is quite an achievement, considering the number of flights and passengers it would take at 90 percent or above to offset the low load factors experienced during off-peak hours and resulting from flights made to position aircraft into large hubs for the morning or afternoon bank of flights. Load factors below 55 percent would also not be practical because profit would not be realized.

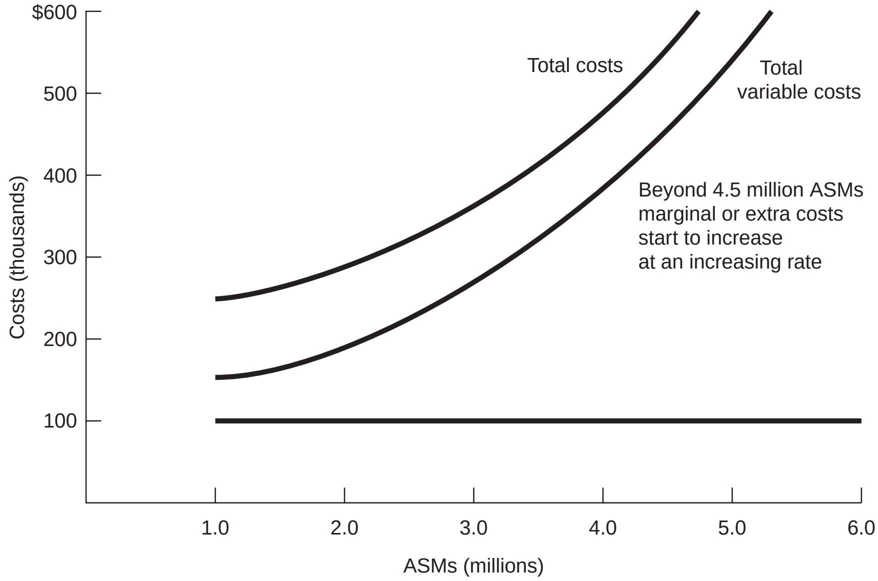

FIGURE 10-10 Total costs and ASMs for an individual airline over a short period of time (hypothetical data).

TABLE 10-5 Systemwide Passenger Load Factor for an Airline over a Particular Period of Time (hypothetical data)

Load Factor		
ASMs (millions)	*RPMs (millions)*	Estimated System Load Factor
1.0	0.800	80%
1.7	1.275	75
2.6	1.820	70
3.4	2.210	65
4.0	2.400	60
4.5	2.475	55
4.9	2.500	51
5.2	2.515	48
5.4	2.520	47
5.5	2.522	46

Profit Maximization in the Short Run

Given prices, RPMs, total revenues, total costs, and load factors, the airline is faced with the question of what level of ASMs will maximize profits or, at worst, minimize losses. Table 10-6 includes the data from both tables 10-3 and 10-4, plus the profit (+) or loss (-) at each level of output. Assuming that this is a profit-maximizing airline, it should produce 3.4 million ASMs, which will generate 2.21 million RPMs at a price or average revenue (yield) of $0.250 per mile and a total revenue of $552,500. The load factor at this level of output will be an acceptable 65 percent. The 3.4 million ASMs will cost this airline $400,000 to produce, and the airline will experience profits of $152,500. If the airline were more concerned with holding its market share in certain markets by increasing scheduled flights and decreasing load factors to a systemwide level of 55 percent, it could still experience profits of $44,000. Beyond 4.5 million ASMs, it is not generating enough traffic (passengers have become unresponsive to further price reductions) to offset the costs associated with this level of output.

Figure 10-11 compares total revenue and total cost graphically. This airline's profits are maximized at the level of output (3.4 million ASMs and 2.21 million RPMs) at which total revenue exceeds total cost by the maximum amount. Unfortunately, if the RPMs shown in Figure 10-11 do not materialize and if demand decreases at all price levels over this particular time period, revenues will fall, squeezing the profit area shown in the diagram. If prices are in the inelastic range (in other words, if passengers are unresponsive to further price reductions), the only choice for the airline is to reduce capacity (cut back ASMs). In so doing, it will reduce variable and total costs, improve load factors, and, it is hoped, maintain profitability.

TABLE 10-6 Profit-Maximizing Output for an Airline over a Particular Period of Time (hypothetical data)

ASMs (millions)	Yield (price or AR) per Mile	RPMs (millions)	Total Revenue (thousands)	Total Fixed Cost (thousands)	Total Variable Cost (thousands)	Total Cost (thousands)	Profit (+) or Loss (–) (thousands)
1.0	$0.265	0.800	$212.0	$100.0	$160.0	$ 260.0	$ –48.0
1.7	0.260	1.275	331.5	100.0	170.0	270.0	+61.5
2.6	0.255	1.820	464.1	100.0	240.0	340.0	+124.1
3.4	0.250	2.210	552.5	100.0	300.0	400.0	+152.5
4.0	0.245	2.400	588.0	100.0	370.0	470.0	+118.0
4.5	0.240	2.475	594.0	100.0	450.0	550.0	+44.0
4.9	0.235	2.500	587.5	100.0	540.0	640.0	–52.5
5.2	0.230	2.515	578.5	100.0	650.0	750.0	–171.5
5.4	0.225	2.520	567.0	100.0	780.0	880.0	–313.0
5.5	0.220	2.522	554.8	100.0	930.0	1030.0	–475.2

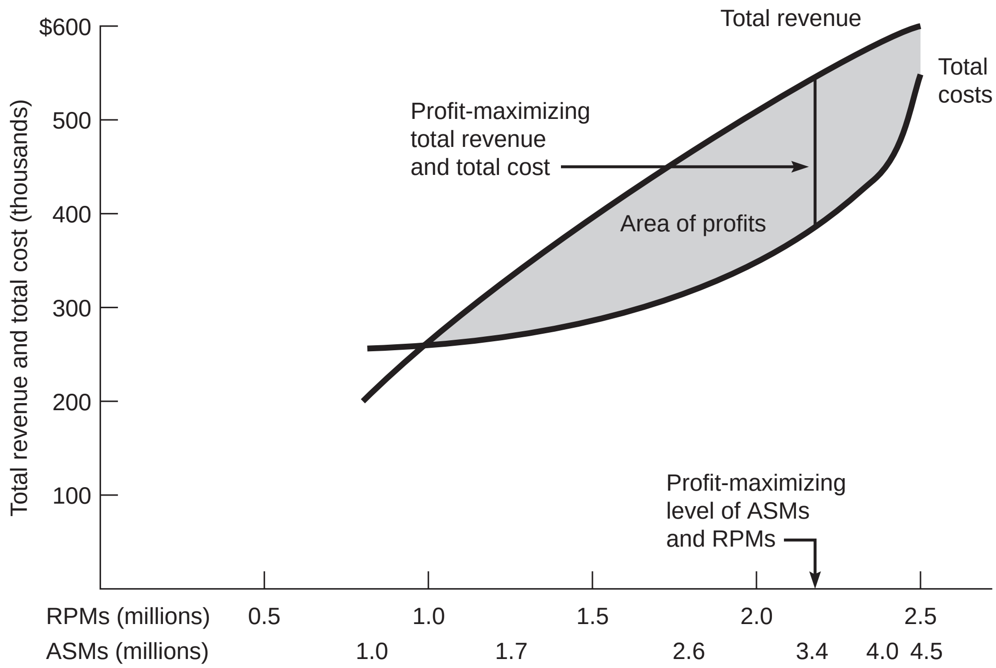

FIGURE 10-11 Total revenue and total costs for an individual airline over a short period of time (hypothetical data).

KEY TERMS

demand
law of demand
elasticity of demand
elastic demand
inelastic demand
normal fares
common fares
joint fares
promotional fares
Airline Tariff Publishing Company (ATPCO)
inventory management
direct operating costs
block speed
indirect operating costs
nonoperating costs and revenues
variable costs
available seat-miles (ASMs)
fixed costs
revenue passenger miles (RPMs)
law of diminishing returns

REVIEW QUESTIONS

1. What was the primary reason for the changes in average air passenger fares between 1929 and 1941, 1950 and 1953, 1960 and 1970, 1973 and 1986, 1987, 2001 and the present?

2. Explain the law of demand as it relates to air travel. What are the nonprice determinants of air travel demand? What happens to the demand curve when each of these

determinants changes? Distinguish between a change in demand brought about by price and one caused by the nonprice determinants.

3. What effect will each of the following have on the demand for Airline A's passenger traffic?

   a. Competitor B improves its on-time performance.
   b. Competitor B offers a special promotional fare on the same route as Airline A's.
   c. Competitor C increases the number of connecting flights at a particular airport served by Airline A.
   d. A spur line connecting the airport with an interstate highway is completed.
   e. The airport authority requests that a commuter airline share ticket and gate space with Airline A.
   f. Airline A's image is tarnished as a result of a recent wildcat strike.
   g. Competitor D increases its advertising, accentuating in-flight services.
   h. Competitor E experiences a serious crash on takeoff.
   i. The economy experiences an upturn, unemployment drops, and business expansion is under way.
   j. A hotel chain offers a specially priced three-day package, including rental car.

4. What does the coefficient of elasticity of demand measure? What is meant by *elastic demand?* By *inelastic demand?*What effect will the following changes have on total revenue?

   a. Fares are reduced and demand is elastic.
   b. Fares are raised and demand is inelastic.
   c. Fares are reduced and demand is inelastic.
   d. Fares are raised and demand is elastic.

5. Determine the elasticity of demand for the following demand schedule (use the total revenue test to check your answers):

Fare	Passengers Carried	Total Revenue	E_d
$160	622		
150	730		
140	782		
130	804		

6. What are the major determinants of elasticity of demand? Use these determinants to judge whether the demand for the following services is elastic or inelastic:

   a Short-haul, primarily business-market flights
   b. Long-haul, primarily vacation flights
   c. Short-haul flights with extreme competition from surface modes of transportation
   d. Mid-week promotional fare directed at the pleasure market

7. Distinguish between *normal* and *promotional* fares. What is meant by *common fares?* By *joint fares?*

8. What is the primary function of the Airline Tariff Publishing Company (ATPCO)? Why is the application of textbook strategies to airline pricing so difficult? How do introductory fares differ from excursion fares? What are *target segment, mileage-based, zone,* and *value-added pricing?*

9. Give an example of an advance purchase requirement, a fare penalty, and peak/off-peak pricing. Why is the decision to use any one, or a combination, of these tactics essentially a decision to raise or lower a fare? Describe the steps involved in analyzing a fare decrease. Describe the steps involved in analyzing a fare increase. What is the objective of inventory management? Why is it such a difficult job? Inventory analysts are evaluated on the basis of their performance in four areas. What are those areas?

10. Define and briefly describe five direct operating expenses. What is meant by *maintenance burden?* Give an example of depreciation and an example of amortization. What are indirect operating costs? Give several examples of nonoperating costs and revenues. What is the relationship between variable costs and available seat-miles (ASMs)? Give several examples of fixed costs.

11. Give several examples of direct (variable) expenses and of fixed-overhead expenses. What is the relationship between ASMs and RPMs? Given a fixed fleet of aircraft and other resources in the short run, why do ASMs increase at a decreasing rate up to some maximum limit? Why does the total revenue curve bend, finally reach a peak, and then drop off?

12. Describe in your own words the profit-maximization point (use ASMs, RPMs, total revenue, and total cost in your answer). What is meant by *marginal cost* and *marginal revenue?* How do we determine passenger load factors?

WEB SITES

http://www.airlinebiz.com

http://www.air-econ.com

http://www.atpco.net

http://www.airwise.com

SUGGESTED READINGS

Cherington, P. W. *Airline Price Policy: A Study of Domestic Airline Fares.* Cambridge, Mass.: Harvard University Press, 1958.

Dornbusch, Rudiger, and Stanley Fischer. *Economics.* New York: McGraw-Hill, 1983.

Gordon, Robert J. "Airline Costs and Managerial Efficiency." In National Bureau of Economic Research, *Transportation Economics.* New York: Columbia University Press, 1965.

Kotler, Philip. *Marketing Management—Analysis, Planning, Implementation, and Control* (6th ed.). Englewood Cliffs, N.J.: Prentice-Hall, 1992.

Meyer, J., and C. Oster, Jr. *Deregulation and the New Airline Entrepreneurs.* Cambridge, Mass.: MIT Press, 1984.

Miller, R. *Domestic Airline Efficiency.* Cambridge, Mass.: MIT Press, 1963.

O'Connor, William. *An Introduction to Airline Economics* (6th ed.). Westport, CT: Praeger, 2000.

Radnoti, George. *Profit Strategies for Air Transportation*. New York, NY: McGraw-Hill, 2002.

Schwieterman, J. P. "Fare Is Fair in Airline Deregulation: The Decline of Price Discrimination." *AEI Journal of Government and Society* (July–August 1985): 32–38.

Spencer, Milton H. *Contemporary Economics* (5th ed.). New York: Worth, 1983.

U.S. Senate, Committee on the Judiciary, Subcommittee on Antitrust, Business Rights, and Competition. *Airline Hubs: Fair Competition or Predatory Pricing?* Hearing Before the Subcommittee on Antitrust, Business Rights, and Competition of the Committee on the Judiciary, U.S. Senate, 105th Congress, 2d session. Washington, D.C.: U.S. Government Printing Office, 1998.

Williams, George. *Airline Competition: Deregulation's Uncertain Legacy.* Aldershot, UK: Ashgate, 1994.

Williams, George. *The Airline Industry and the Impact of Deregulation.* London: Avebury, 1994.