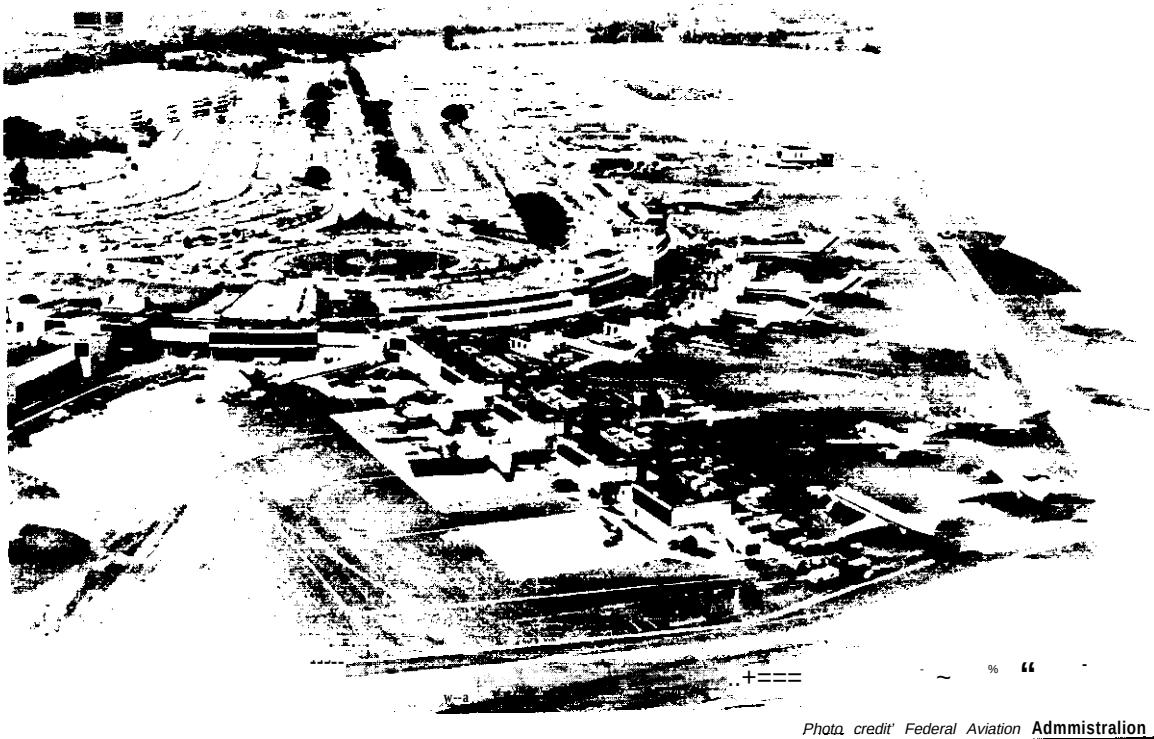
Chapter 5

OTHER APPROACHES TO REDUCING DELAY



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Contents

Table

Figure

Chapter 5

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Airport congestion and delay are at least partly amenable to technological solutions, but there are other approaches to dealing with the problem. Chronic delay is limited to a very few specific times and places, and one of the principal causes is the "peakiness" of traffic flow. Most travel is between a few major airports and at certain times of day. While technological improvements and construction of new facilities can help airports absorb growing traffic demand and lessen delay, these solutions are capital-intensive and may entail prohibitive costs. An alternative approach is to manage the demand to fit within existing capacity.

There are two basic approaches to managing demand, both with the same objective: to ease congestion by diverting some traffic to times and places where it can be handled more promptly or efficiently. This may be done through administrative means; the airport authority or another governmental body may allocate airport access by setting quotas on passenger enplanements or on the number and type of aircraft operations that will be accommodated during a specific period. The alternative approach is economic—to structure the pricing system so that market forces allocate scarce airport facilities among competing users. Thus, demand management does not add capacity; it promotes more effective or economically efficient use of existing facilities.

Any scheme of demand management denies some users free or complete access to the airport of their choice. This denial is often decried as a violation of the traditional Federal policy of freedom of the airways and the traditional "first-come, first-served" approach to allocating the use of airport facilities. Economists reject this argument on the grounds that it is a distortion of the concept of freedom to accord unrestricted access to any and all users without regard to the societal costs of providing airport facilities. Attempts to manage demand are also criticized for adversely affecting the growth of the aviation industry and the level of service to the traveling public. Nevertheless, as growth in traffic has outstripped the ability to expand and build airports, some forms of demand management have already come into use, and many industry observers, including the Task Force on Airport Access, have taken the position that some form of airport use restriction will become increasingly important in dealing with delay and in utilizing existing airport capacity efficiently.1

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1 *Report and Recommendations of the Airport Access Task Force* (Washington, DC: Civil Aeronautics Board, March 1983), p. 21.

ADMINISTRATIVE OPTIONS

Several administrative measures could be adopted to manage demand at individual airports or for a metropolitan region. Among these are: required diversion of some traffic to reliever airports, more balanced use of metropolitan air carrier airports, restriction of airport access by aircraft type or use, and establishment of quotas (either on the number of operations or on passenger enplanements). At the national level, demand might be managed by administrative actions to encourage "rehubbing" or redistributing transfer traffic from busy airports to underused airports.

Diversion of Traffic

In some metropolitan areas, the shortage of airport capacity may not be general, but confined to one overcrowded airport. There may be other airports in the region that could absorb some of the demand. The Federal Aviation Administration (FAA) lists *27* airports in the Chicago area, 51 in the Los Angeles basin, and 52 in the Dallas-Fort Worth region. The vast majority of these airports are small and suited only for general aviation (GA) aircraft, but in some cases there is also an underutilized commercial service airport.

The best regionwide solution to the problem of delay at a major airport may be to divert some traffic away from the busy airport to either a general aviation reliever airport or a lightly used commercial airport. To some extent, this can occur as a result of natural market forces. When delays become intolerable at the busy airport, users begin to divert of their own accord. While those who choose to move to a less crowded facility do so for their own benefit, they also reduce somewhat delays incurred by users that continue to operate at the crowded airport. Public policy might encourage this diversion through administrative action or economic incentives before traffic growth makes conditions intolerable or necessitates capital investment to accommodate peaks of demand at the busy airport.

Diversion of general aviation from busy air carrier airports is often an attractive solution. GA traffic, because it consists mostly of small, slow-moving aircraft, does not mix well with faster, heavier air carrier traffic. GA operators, themselves, especially those flying for recreational or training purposes, want to avoid the delays and inconveniences (and sometimes the hazards) of operating at a major airport. These fliers are often willing to make use of GA airports located elsewhere in the region if suitable facilities are available.

Diversion of GA traffic from commercial air carrier airports has been taking place for many years. As air carrier traffic grows at a particular location, it almost always tends to displace GA traffic. FAA has encouraged this trend by designating **219** airports as "relievers" or "satellites" to air carrier airports, and earmarking funds especially for developing and upgrading these airports.[2] Many other airports, although not specifically designated as relievers, serve the same function; they provide an alternative operating site for GA aircraft well removed from the main commercial airport of the region.

To be attractive to a broad spectrum of GA users, a reliever airport should be equipped with instrument approaches and provide runways capable of handling the larger, more sophisticated GA aircraft. In addition, users need facilities for aircraft servicing, repair, and maintenance as well as suitable ground access to the metropolitan area.

Not all GA aircraft can make use of reliever airports. Some may be delivering passengers or freight to connect with commercial flights at the air carrier airport. Others may be large business jets that require the longer runways of a major airport. Even at the busiest air carrier airports, GA traffic accounts for about **10** percent of total operations (see fig. ***16).***

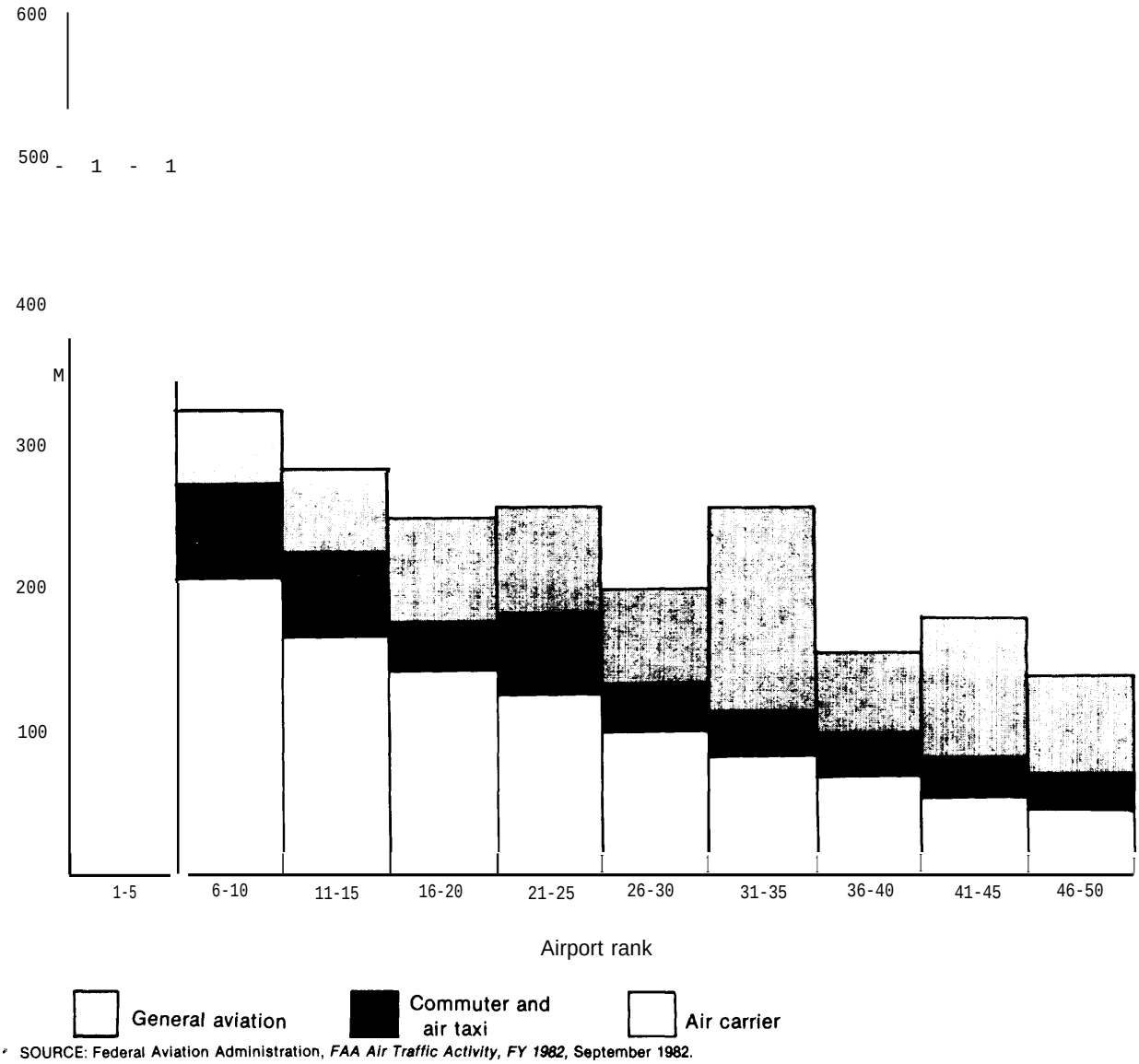
In general, airport authorities do not have the power to exclude GA as a class, although this has been attempted on occasion. For example, in the late ***1970s*** the airport management and city government of St. Louis attempted to exclude all private aircraft from Lambert Airport. This ordinance was overturned by the courts as discriminatory.

Where they have had any policy on the matter, local airport authorities have attempted to make GA airports attractive to users by offering good facilities or by differential pricing schemes, This approach is most effective where the commercial airport and the principal reliever are operated by the same entity. The State of Maryland, owner of Baltimore-Washington International Airport, operates a separate GA airport, Glenn L. Martin Field, and has a specific policy of encouraging GA traffic to use it rather than the main airport. The master plan for Cleveland Hopkins International Airport depends on the availability of the city-owned Lakefront Airport as a reliever. If that airport should for some reason cease operation as a GA reliever, Hopkins would experience a great increase in traffic which might necessitate additional construction that is not now planned.

Most local airport authorities, however, do not operate their own GA relievers. Some large airport authorities plan and coordinate activities with nearby reliever airports operated by other municipalities or private individuals, but this has not been the general case. The system of relievers

[2]Over the 10 years of the Airport Development Aid Program, about $140 million was designated for relievers. The Airport Improvement Fund sets aside almost $480 million for the period 1983-87.

Figure 16.-Activity at the Top 50 Commercial Airports (ranked by air carrier operations, fiscal year 1982)



SOURCE: Federal Aviation Administration, *FAA Air Traffic Activity, FY 1982,* September 1982.

in each region has tended to grow up without any specific planning or coordination on the regional level.

Development of GA relievers is not without problems. These airports are also subject to complaints about noise, and they experience the same difficulties as commercial airports in expanding their facilities or in developing a new airport site. Further, because many GA airports are small and function just on the ragged edge of profitability, problems of noise or competing land use can actually threaten the airport's existence. The number of airports available for public use in the United States has been declining. Between **1980** and **1983,** for example, the number of public-use airports declined from ***6,519*** to ***5,897.*** Although most of the airports that closed were small, privately owned facilities, some industry observers worry that the Nation is irrevocably losing many

potential reliever airports, just as it has become clear that they are vital.

Balanced Use of Large Airports

At the largest commercial service airports, GA activity consists primarily of flights by large business and executive aircraft. This type of GA traffic accounts for about **10** to 20 percent of the use of major airports, a figure that many consider the "irreducible minimum. " The delays that persist at these airports are primarily the result of air carrier demand which can be satisfied only by another commercial service airport. In several metropolitan areas, it is clear that the commercial airports are not used in a balanced manner. For example, San Francisco International is experiencing delay problems while nearby Oakland Airport is underutilized. Washington National is overcrowded while Dunes International and Baltimore-Washington International are looking for business. Newark is underutilized compared with busy La Guardia and Kennedy. Similar pairs exist in Chicago (O'Hare and Midway), Dallas (Dallas-Fort Worth and Love Field), and Houston (Houston Intercontinental and Hobby). A policy designed to divert traffic from busy to underutilized airports would have a generally positive effect on the ability of metropolitan areas to accommodate air traffic. Further, it might obviate the need for expansion or expensive technological improvements designed to reduce delays at the busy airport.

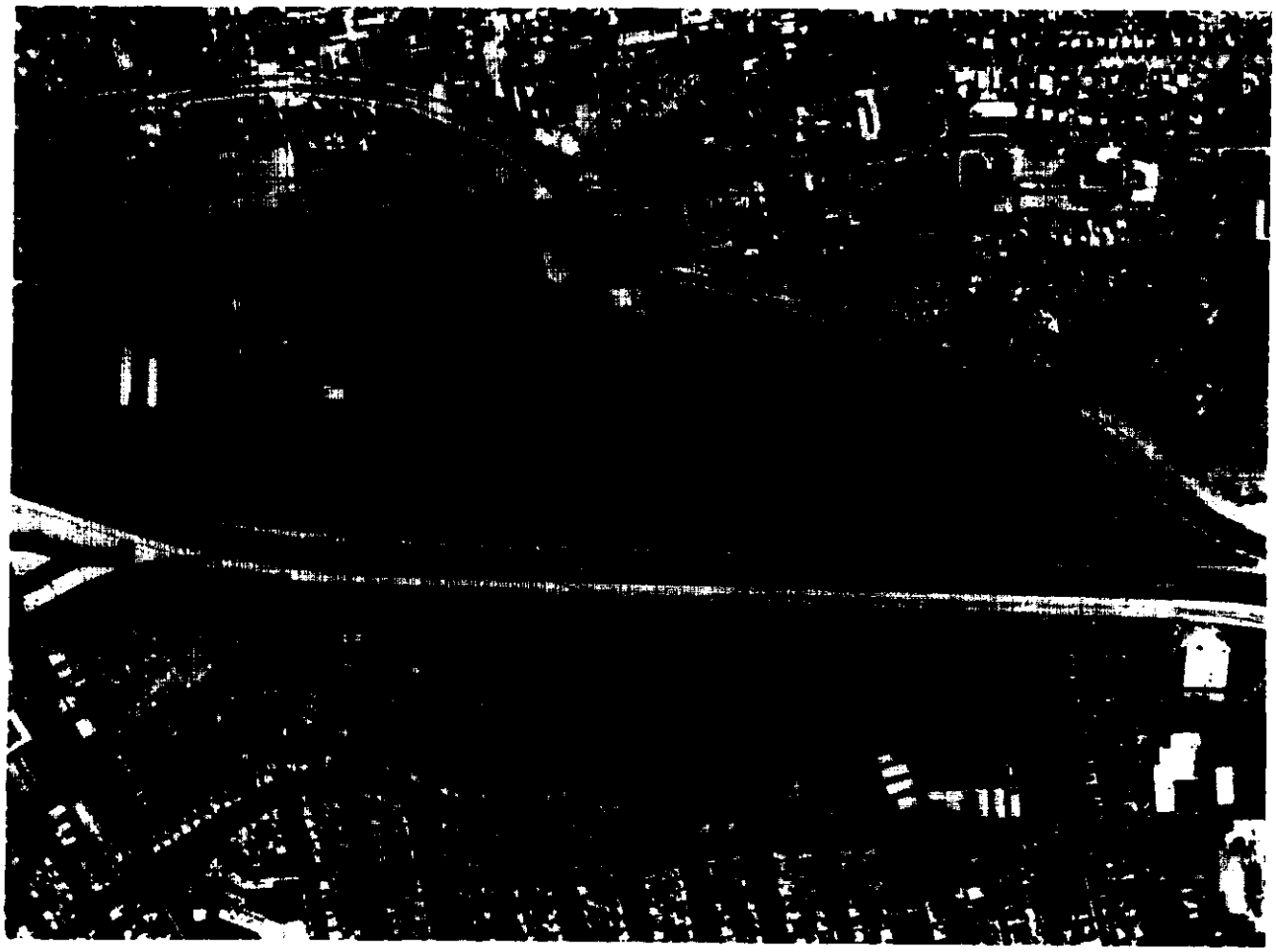


Photo credit: Aviation Division, County of Los Angeles

A threatened reliever airport

Diverting air carrier traffic to alternate airports is not a simple solution; there are a number of problems. One is simply the habits of the traveling public. People are accustomed to using the busier airport. They may prefer the better ground access, the larger choice of flight times and destinations, the greater variety of carriers, and other advantages that the busy airport offers.

Air carriers, sensitive to public preferences, tend to concentrate their service at the busier airport, where they perceive a larger market. It is in the carriers' economic interest to serve the airport where passengers want to go. The busier airport is a known and viable enterprise, while the underutilized alternate airport is a risk. Air carriers are justifiably reluctant to isolate themselves from the major market by moving all their service to the less popular airport. On the other hand, serving both airports imposes an economic burden that carriers seldom choose to bear, as they would incur the additional expense of setting up and operating duplicate ground services. In addition, splitting their passengers between two airports might make scheduling of flights more complicated and lead to inefficient utilization of aircraft.

These obstacles have sometimes been overcome in locations where airport operators have the authority to encourage a diversion of traffic from one airport to another. For example, in the New York area the Port Authority of New York and New Jersey operates all three air carrier airports. In theory, this gives the Port Authority the ability to establish regulatory policies or economic incentives to encourage the diversion of some traffic to Newark. In practice, however, measures adopted to promote traffic redistribution have not been fully effective. The recent growth of traffic at Newark has been due primarily to new carriers entering the New York market and not diversion of established carriers.

In contrast, San Francisco and Oakland airports are operated by separate sponsors. San Francisco, despite severe problems of delay, would rightly be reluctant to encourage passengers and air carriers to move to Oakland. Even though more balanced regional airport use might be achieved and the long-range need for expansion at San Francisco reduced, the short-range effect would be that San Francisco would lose revenues to a competitor. There is no regional authority with the power to promote this reallocation of traffic.

Restriction of Access by Aircraft Type

One means of diverting certain traffic from a busy airport to one with unused capacity is to restrict access to the busy airport on the basis of aircraft type or use. Restriction of aircraft access to airports by size or performance characteristics might affect airport capacity and delay in several ways. First, the mix of aircraft using a runway system helps to determine capacity. When aircraft are of similar size, speed, and operating characteristics, runway acceptance rate is greater than when performance characteristics vary widely. Similar aircraft can be more uniformly and accurately spaced on approach and departure, thereby smoothing out irregularities in the traffic stream, which is a major factor causing delay. Thus, at airports where the bottleneck is in the runway system, restrictions which narrow the range of aircraft using that system might have a beneficial effect. Diversion of small GA or commuter aircraft to other airports or construction of a separate short runway dedicated to their use could improve the ability of the airport to handle larger transports or the overall traffic mix.

A second implication of limiting access to specific aircraft types is that it might reduce the need for capital improvements required to accommodate a larger variety of aircraft. For example, Washington National Airport does not accept jumbo jet aircraft or long-range flights (nonstop flights in excess of 1,000 miles). FAA's policy is to divert these flights to Dunes. Allowing larger aircraft into National would probably necessitate changes in runways, taxiways, aprons, and gates. In addition, the larger number of passengers per aircraft would put additional strain on National's already congested terminal and landside facilities, making a number of collateral improvements necessary.

Access restrictions at Washington National are combined with a cap ***on*** passenger enplanements. Although the cap is still under debate, it is currently set at **16** million passengers annually. (National currently handles 13 million.) FAA consid-

ers the cap necessary because limiting aircraft size, without also setting a ceiling on the number of passengers, might lead to more aircraft operations than the airport can handle safely or efficiently and worsen the congestion that already exists at National.

The purpose of the access restrictions, the cap on passengers, and the quota system (discussed below) is to divert traffic from National Airport to Dunes. Most local airport managers would not be able to adopt such measures unless there were a nearby underutilized airport, also under their control, to handle the diverted traffic. To forbid some portion of the traffic to use an airport without an available alternative would most likely be construed as a restriction of interstate commerce or discriminatory practice.

Quotas

One technique of demand management now in use at a few airports is the quota system—an administratively established limit on the number of operations per hour. Because delay increases exponentially as demand approaches capacity, a small reduction in the number of hourly operations may have a significant effect on delay. This makes the quota an attractive measure for dealing promptly (and inexpensively) with airport congestion.

Examples of airports with quotas are O'Hare, La Guardia, JFK, and Washington National—airports covered by the FAA high-density rule. The quotas at these airports were established by FAA in 1973 based on estimated limits of the air traffic control (ATC) system and airport runways at that time. FAA is currently considering lifting the rule at some of these locations because of improvements made to airport facilities and slower than expected growth in air traffic. An example of a locally imposed quota is John Wayne Airport in Orange County, CA, which limits scheduled air carrier operations to an annual average of 41 operations per day. This quota is based on noise considerations as well as limitations on the size of the terminal and gate areas.

During busy hours, demand for operational "slots" typically exceeds the quota. At the airports covered by the high-density rule, the slots are allocated among different user classes. For example, at National, where there are ***60*** slots available per hour, ***37*** are allotted to air carriers, 11 to commuter carriers, and 12 to general aviation. During Visual Meteorological Conditions, more than 60 operations can be handled, and aircraft without assigned slots may be accommodated at the discretion of air traffic controllers and the airport manager.

At airports where the quota system is in force, slots may be allocated in various ways—through a reservation system, by negotiation, or by administrative determination. The GA slots are generally distributed through a reservation system—the first user to call in for a reservation gets the slot. However, for commuters and air carriers, the slots at the high-density-rule airports are allocated by negotiation. Two scheduling committees, one made up of carrier representatives and one of commuter representatives, meet under antitrust immunity to negotiate the flights to be allotted to each user. If the negotiators fail to reach agreement ("default"), FAA reserves the right to allocate slots.

Under airline regulation, when the number of carriers and routes were fairly stable, the work of the scheduling committee was easy—merely allocating the existing number of slots to the incumbent carriers. Since 1979, however, the committees have had to accommodate new entrants and the changing market strategies of incumbent carriers. On several occasions since 1979, the negotiators at Washington National have been close to defaulting, and FAA had to consider seriously using administrative means to distribute slots.

One objection to quota systems is that they tend to favor incumbents over new entrants. Another is that quotas allocate scarce slots without any price signals to show whether capacity is being used efficiently; there is no long-range guide provided by the market to show what improvements might be economically justified or which users most value their operating rights. These problems can be partly overcome through selling or auctioning slots as discussed below.

Photo credit: Business and Commercial Aviation Magazine

Business and corporate aviation—a growing sector

Rehubbing

A systemwide response to alleviate delays at busy airports is redistribution of operations to other, less busy airports in other regions. Some air carriers, especially those with a high proportion of interconnecting flights, may voluntarily move their operations to underutilized airports located at some distance from the congested hub. Transfer passengers account for a large percentage of traffic at some large airports. About three-fourths of passengers at Atlanta, and nearly half of passengers at Chicago, Denver, and Dallas-Fort Worth arrive at those airports merely to change planes for some other destination. here is an advantage for carriers in choosing a busy airport as a transfer "hub' '-they can offer passengers a wide variety of possible connections. However, when the airport becomes too crowded, the costs of delay may begin to outweigh the advantages of the large airport, and carriers may find it attractive to establish new hubs at smaller, less busy airports.

This "rehubbing" of the airport system is already a trend (a subject to be examined further in ch. *8).* Redistribution of operations has certainly been facilitated by the deregulation of the airline industry, which allowed carriers greater freedom in restructuring their routes. Medium-size airports appear to be receiving increased air carrier activity since deregulation, and some carriers are shifting their transfer operations to these less congested facilities. For example, Piedmont has developed Charlotte (North Carolina), Dayton (Ohio), and Baltimore-Washington (Maryland) as regional hubs. Western has developed Salt Lake City (Utah) as its principal hub. In addition to relief from congestion, carriers who have moved to less busy airports find another, perhaps more compelling, advantage. Because there is often little service by competing carriers at those locations, the hubbing carrier has greater control of passengers, who can transfer only to departing flights of the airline that brought them, not to a competitors.

While it is doubtful that rehubbing has actually reduced delay problems at major airports, it does seem clear that development of transfer hubs at medium airports has allowed for growth that might not have been possible had the carriers sought to concentrate their activities at the major hubs. Further, rehubbing has taken advantage of a certain "overcapacity" in the national airport system by making greater use of the facilities available at medium airports.

ECONOMIC OPTIONS

Administrative limits on airport use—whether by restricted access for certain types of aircraft, by demand balancing among metropolitan area airports, or by selection imposition of quotas—offer the promise of immediate and relatively low-cost relief of airport congestion. As long-term measures, they may not be as attractive. Administrative limits tend to bias the outcome toward maintenance of the status quo when applied over a long period of time. Since the economic value of airport access is not fully considered in setting administrative limits, incumbents cannot be displaced by others who would place a higher value on use of the airport. Further, incumbents and potential new entrants alike have no way to indicate the true economic value they would place on increased capacity. Economists contend that a vital market signal is missing and that airport operators and the Federal Government cannot obtain a true picture of future capacity needs. Administratively limiting demand, they say, creates an artificial market equilibrium that—over the long term-distorts appreciation of the nature, quality, and costs of air transportation service that the public requires. Economists, therefore, favor a scheme of allocating airport access that relies on the mechanism of price.

At present, price plays a rather weak role in determining airport access or in modulating demand. Access to public use airports, except for the few large airports where quotas are imposed, is generally unrestricted so long as one is willing to pay landing fees and endure the costs of congestion and delay. Landing fees, most often based solely on aircraft weight and invariant by time of day, make up a very small fraction of operational cost—typically 2 to 3 percent for air carriers and even less for GA. Further, landing fees are not uniform from airport to airport. In many cases, landing fees are set so that—in the aggregate—they make up the difference between the cost of operating the airport and the revenues received from other sources such as concessions, leases, and automobile parking fees.[3]

[3]See ch. 6 for a more detailed examination of airport pricing methods.

This leads economists to the conclusion that landing fees are somewhat arbitrary and do not reflect the costs imposed on the airport by an aircraft operation.[4] Economists suggest that, by including airport costs and demand as determinants of user fees, delay could be significantly reduced. The two most commonly advocated methods of achieving this are differential pricing and auctioning of landing rights.

Differential Airport Pricing

Many economists argue that weight-based landing fees are counterproductive because they do not vary with demand and, consequently, provide no incentive to utilize airport facilities during offpeak hours. Further, they do not reflect the high capital costs of facilities used only during peak hours. Thus, economists contend, a more effective pricing method would be to charge higher user fees during peak hours and lower fees during offpeak hours. Theoretically, the net effect of such a pricing policy would be a more uniform level of demand.

Much of the traffic moved away from peak hours by higher landing fees would probably be GA. Correspondingly, the benefits of peak-hour fees would be greater at airports with a high proportion of GA activity. But, peak-hour fees could also be structured so as to affect the pattern of air carrier activity. These charges would have to be fairly high because landing fees represent only a small fraction of air carrier operating costs and because increases can be passed on to passengers.

Despite increases in landing fees, carriers would want to continue to use the airport at peak times, either to have access to a large number of passengers or because long-haul scheduling problems

[4]The following, based on a survey conducted by Peat, Marwick, Mitchell & Co, in July 1982, is a sampling of aircraft landing fees at six airports:

1. Miami International—79a per 1,000 lb.
2. Boston Logan International-$1.246 per 1,000 lb.
3. Chicago O'Hare International-$1.095 per 1,000 lb.
4. Denver Stapleton International–34c per 1,000 lb.
5. Honolulu Internationa145c per 1,000 lb.
6. Houston Intercontinental-85 .7~ per 1,000 lb.

require them to serve a particular airport during certain hours. Thus, they would absorb some increase in landing fees, just as they absorb the cost of delays, as part of the cost of doing business. However, some flights might be moved to offpeak hours if the charges were high enough. In fact, it is possible that properly structured peak-hour prices, if they were reflected in fares, could have an effect not only on the airlines' scheduling patterns but on passengers' travel habits as well. If significant savings were possible, some passengers would choose to travel during offpeak hours.

It it is difficult to project accurately the changes in patterns of airport use that might be brought about by peak-hour surcharges. FAA has estimated that peak-hour surcharges, along with improvement of the ATC system, would reduce anticipated air carrier delay costs by approximately ***80*** percent at the Nation's ***25*** busiest airports over the next ***25*** years.[5] A recent Congressional Budget Office (CBO) report suggests that, although expansion may be inevitable at many airports, peak-hour surcharges could significantly delay the need for expansion and reduce financial pressure at a number of airports.[b] Another important aspect of peak-hour surcharges noted by CBO is that, even if they do not reduce traffic levels at peak hours to the desired levels, they could provide airports with increased revenues to expand facilities and, consequently, to reduce delays.

Some observers reject this line of reasoning. They contend that, to be effective in shifting demand to slack periods, peak-hour charges would have to be set so high that they would be politically unacceptable. Further, there is no assurance that airlines would not average the higher costs of peak-hour access at certain airports with the lower cost at other times and places and pass this along to all passengers as a general fare increase. Airlines would thus create an internal cross-subsidy in their fare structure to cover the higher costs of access to some airports. Since the average fare increase would likely be small, the economic

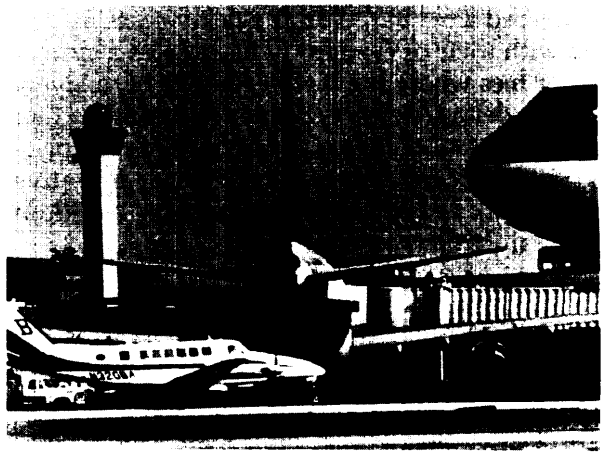


Photo credit; Federa/ Aviation Administration

Competition

signal to the public would be diminished such that it would have scant effect on travel behavior.

A major problem with the concept of peak-hour surcharges is how to determine the level of surcharge. One widely advocated method is to charge the airport user the full marginal costs of airport facilities. In other words, each airport user pays a share of the additional capital and operating costs to the airport authority of providing service **at** the time demanded. For example, if a user lands at an airport during a period of peak demand where two or more runways are necessary to handle the traffic, the charge should include a contribution to the cost of building, operating, and maintaining those additional runways. On the other hand, if the user lands during an offpeak hour when the one runway in use is not sought by others, there would be no additional charge. While both onpeak and offpeak users would pay fees to cover maintenance, wear and tear, or other costs, only peak-hour users would pay the additional costs associated with the time of use. The resulting user fees would be directly related to the levels of airport activity, producing the desired effect of higher fees during peak hours and a strong price signal to use the airport at offpeak hours.

Some contend that a system of marginal cost pricing should be based on the dela$_y$ costs which each peak-hour user imposes on other users. For example, during peak hours, airport users would

[5]Policy Analysis **of *the Upgraded Third*** Generation ***Air Traffic Control System*** (Washington, DC: Federal Aviation Administration, January 1977), p. 71.

[b]***Public Works Infrastructure: Policy Considerations*** **for *the*** 1980s (Washington, DC: Congressional Budget Office, April 1983), p. 113.

be charged a fee based on the delay costs associated with their operations. This creates a system of user fees where the fees become progressively larger as delays increase. Proponents contend that using marginal delay costs as the basis for pricing airport access provides a stronger incentive for off-peak airport use than a scheme based on marginal facility costs alone.

Implementing a policy of differential pricing—whether based on marginal facility cost, marginal delay cost, or some purely arbitrary scheme—is difficult. It is likely that a significant increase in airport user fees will raise questions of equity. Higher fees might be more burdensome for small airlines and new entrants than for established carriers. There are a number of examples where airport operators have attempted to increase user fees and been challenged by air carriers and general aviation. In some cases, air carrier landing fees are established in long-term contracts that cannot be easily changed.[7]

GA users often contend that differential pricing is discriminatory because it favors those with the ability to pay and illegal because it denies the right to use a publicly funded facility. Economists rebut this argument by pointing out that time-of-use price is neither discriminatory nor illegal so long as price differences reflect cost differences and that it is fair and just to set prices based on the costs that each user imposes on others and on society generally.

Despite the difficulties inherent in increasing airport user fees, there are two well-documented examples of differential pricing policies that have been in effect for several years. In the early 1970s, the British Airport Authority implemented peak-hour surcharges at London's Heathrow Airport. In the late 1960s, the Port Authority of New York and New Jersey began imposing peak-hour surcharges on general aviation. Both differential pricing policies sought to move traffic to offpeak hours, even though the pricing methods employed were considerably different.

Because of the large volume of international traffic, activity at Heathrow increases significantly during the summer months, compounding delay problems. As a result, the surcharges imposed at Heathrow in 1972 were set on both an hourly and seasonal basis. The hours of greatest delay were from 8:00 a.m. to 1:00 p.m. During the summer, surcharges were applied for the entire S-hour period each day. During the remaining months, surcharges were levied only for the period between 9:00 and 11:00 a.m., Monday through Friday. The effects of peak-hour surcharges at Heathrow were not clear cut. During 1972 and 1973, there was an apparently steady movement of traffic away from peak periods. This trend, however, was reversed in the following year and fluctuated thereafter, leaving some doubt as to the effectiveness of the surcharges.

The surcharges imposed by the Port Authority of New York and New Jersey were aimed specifically at general aviation using of the three major commercial airports in the New York metropolitan area. During July 1968, 17 percent of all aircraft operations at the three commercial airports were delayed by more than 30. minutes.8 During that same month, GA traffic constituted *25* percent of the airport traffic—30 percent during peak hours. In an effort to shift this GA traffic away from peak hours, the Port Authority increased the landing fee for aircraft with fewer than *25* seats to *$25* during peak hours—a fivefold increase. The fee remained at the $5 level during offpeak hours.

Peak-hour surcharges produced significant results at all three New York airports. Following the imposition of the surcharges, GA activity during August and September decreased 19 percent overall and 30 percent during peak periods. More important, delays—in terms of the percentage of aircraft operations experiencing delays of over *30* minutes—declined markedly.

To be sure, there are factors other than surcharges that affect airport use; and, undoubtedly, some could have influenced the outcomes in both New York and London. For example, the fuel

[7] In 1981, the Indianapolis Airport Authorities brought suit against six airlines for refusing to pay new landing fee rates. The court, eventuaI1y, decided in favor of the airlines, ruling that the rate increase was unreasonable. In 1976, a court in North Carolina ruled that the Raleigh-Durham Airport couId only raise its landing fees to 22.3a per 1,000 lb instead of the proposed 33 to 35¢ per lb.

[8] Port Authority of New York and New Jersey Memorandum, Aviation Department, "Effects of FAA Allocations, Summer 1969," Nov. 20, 1969.

crisis of 1973 unquestionably influenced the traffic at Heathrow and masked somewhat the effects of the surcharge. A controller slowdown at New York's airports during the summer of 1968 intensified delay problems and could have accounted for some of the traffic diversion attributed to the surcharges.

In general, peak-hour surcharges represent an attempt to manage demand by charging cost-based landing fees. Access to airports is not limited except by the user's willingness to bear the additional cost imposed during peak hours. Another method of reducing peak-hour airport activity involves limiting airport access through a process by which landing rights (slots) are auctioned to the highest bidder. The auction is a hybrid process—partly administrative, partly economic—in which access is regulated, but the right of access is distributed through a market-oriented mechanism.

Slot Auctions

Slot auctions have been advocated as the best method of allocating scarce airport landing rights on the grounds that, if airport access must be limited, it should be treated as a scarce resource and priced accordingly. The method to accomplish this is a system whereby the price of airport access is determined by demand. Slot auctions allow peak-hour access only to those users willing to pay a-market-determined price.

Slot auctions are particularly unpopular with new air carriers, who feel that they would be inhibited in serving new markets or perhaps excluded altogether. These earners contend that auctions would place them at a disadvantage with incumbent airlines, which could hoard slots and, potentially, limit competition.

There are several practical problems in implementing slot auctions. First, there is the question of who should actually organize the auction—the local airport authority or the Federal Government. Local authorities are probably in the best position to determine accurately the number of available slots, but some experts argue that the Federal Government has a systemwide perspective that is better suited to determining the overall effects of slot allocations on airport traffic nationally.

Photo credit: Federal Aviation Administration

slots

A related problem is who should receive the proceeds of the auction. Some contend that the proceeds should be turned over to the airport authority, which bears the burden of operating the facility and making necessary capital improvements and maintenance outlays. Others argue that, like other user fees, funds raised by auctions should be placed in the Airport and Airway Trust Fund and distributed as needed for airport capital projects. A novel approach, advanced by the Port Authority of New York and New Jersey, is that funds obtained from peak-hour slot auctions should be distributed to airlines operating offpeak thereby providing them an incentive to offer service at such times. [g]

[g] J. Ott, "U.S. Reviews Airport Slot Policy," ***Aviation Week & Space Technology, Apr. 16, 1984,*** pp. 32-33.

Another problem is the status of the slots once they have been auctioned. One view is that they become the property of the airlines, to be bought and sold at will. Another is that they should remain the property of either the local airport authority or the Federal Government, which could retain control over the transferal of slots through another auction.

Finally, there is the special problem of international users who need to gain access to Federal immigration and customs facilities, which are available only at certain airports. If an aircraft entering the United States is required to clear customs and immigration and can do so conveniently only at an airport with slot restrictions, equity would appear to dictate that access be afforded, and at no additional cost. On the other hand, such aircraft are using a valuable commodity for which others must compete and pay, and there is little economic justification in distinguishing between domestic and foreign flights since both impose equal cost on the airport at the time of use.

FACTORS AFFECTING THE USE OF DEMAND= MANAGEMENT ALTERNATIVES

The demand-management techniques enumerated above could, in theory, reduce delay. Some have actually been tried, with mixed results. However, there are factors that may affect the ability of airport operators or the Federal Government to implement them on a wide scale.

Some argue that regulations restricting airport access are unconstitutional because they interfere with interstate commerce and abridge the right of access for some users. Many industry observers shudder to think that the kinds of access restrictions in effect at National Airport might become common at major airports. Determination of whether they would be an undue burden is a delicate matter which must be decided on a case-by-case basis, depending on the parties involved, the location of the airport, and its importance to the national system. FAA itself does not appear to encourage the spread of quotas and other restrictions imposed by airports, operators, even though they are in use at federally owned Washington National Airport. For example, FM contested the imposition by John Wayne Airport of a perimeter rule forbidding the operation of long-range flights.

Deregulation has made the allocation of slots through negotiation a more difficult process, as the scheduling committees must constantly accommodate new entrants or changes in incumbent carriers' levels of service. The Civil Aeronautics Board's Task Force on Airport Access has noted that scheduling committees are capable of discriminating against new entrants and cautioned that the whole negotiation process might be anticompetitive.l"

Policies to encourage development of reliever airports or more balanced utilization of airports in metropolitan regions are unlikely to be implemented in locales where airports are competitors and not operated by the same sponsor. Congress has attempted to address the regional implications of airport development in its mandate for FAA to develop a National Plan of Integrated Airport Systems. It remains to be seen whether this planning document, or any other action at the Federal level, can improve regional coordination of airport facilities.

The basic theory of demand-related airport access fees and the general principle that fees should be proportional to marginal delay costs are well understood. It is also commonly acknowledged that the present scheme of pricing services, especially at congested airports, is far from economically efficient. However, market-related approaches, such as peak-hour pricing and congestion surcharges, may be difficult to implement, and they are likely to encounter stiff opposition from some classes of users, especially GA. Despite the theoretical attractiveness of marginal-cost pricing, it maybe difficult in practice to determine the true marginal cost of a landing or a takeoff. There are

[10] *Report and Recommendations of the Airport Access Task Force,* op. cit.

analytic problems and policy issues to be resolved, as well as the underlying question of whether economic efficiency should be a primary goal of airport management. Several years of experimentation might be needed to establish the most effective fee structure for controlling delay and covering airport costs.

There are some dangers inherent in these experiments. It is possible that, in a deregulated environment where carriers are frequently changing routes and levels of service, airports would be unable to determine the effects of their experiments or to guard against unpredictable (and undesirable) side effects on the airline industry or on other airports. The process of diverting air carrier operations to offpeak might be self-defeating for some airports. Rather than schedule operations in slack hours at airports that they perceive as marginal, carriers might prefer to move out of the airport altogether. While this might be a desirable effect from the system perspective, it would be the opposite for the airport operator, who would lose revenue.

Further, in order to be effective in shifting air carrier traffic to offpeak hours, landing fees during peak hours might have to be raised substantially. In many cases, use agreements between air carriers and airports would prevent such radical changes in fees. If it were determined to be in the national interest for airport operators to make such changes in their fee structures, the Federal Government might have to take action to abrogate or modify existing use agreements. On the other hand, some believe it is unwise for the Federal Government to become so directly involved in the pricing decisions of individual airports.

Economic policies or administrative actions to reduce GA traffic at congested major airports could have two effects. The intended effect would be diversion of some GA traffic to other nearby landing places. However, for some types of aircraft and for some GA users, there will be no other facility as suitable as the main air carrier airport; and they would have to pay the cost if they wish to continue using it. Alternatively, some users might find the monetary cost or inconvenience too high and choose to use commercial flights rather than continuing to operate their own aircraft.

The sale or auction of slots is controversial with regard to ownership and the right of sale. The confusion over slots following the Braniff bankruptcy is a case in point .11 At that time, FAA's post-strike cap on operations was in effect at 22 airports, and Braniff argued that their assigned slots were assets that had monetary value which should accrue to the airline. FAA's position was that the slots were under FAA control. (FAA did in fact reassign those slots to other carriers on an emergency basis after Braniff stopped flying.) From the airport operator's point of view, however, slots represent the essential attributes of the airport, namely runway time and space. If they are determined to be property at all, the airport operator would argue that they belong to neither FAA nor the carriers, but to the airport.

A 1981 FAA report illustrates the general benefits of demand management.'[2]The report examined projected demand and traffic mix at the **39** busiest air carrier airports to determine those with future capacity problems and to identify remedial measures that could be applied to alleviate delay. About half (19 of the ***39*** airports studied) were expected to face serious delay problems by 1991. Analysis of the traffic mix at these airports identified seven with a high proportion of GA traffic, and FAA concluded that demand-management techniques aimed at diverting GA to offpeak hours or to reliever airports could obviate the need for new construction to expand capacity.

At four other airports, a different form of demand management offered potential relief. Each of the four (San Francisco, Dallas-Fort Worth, Chicago O'Hare, and Washington National) has another nearby airport with underutilized capacity. By shifting some peak-period traffic (air carrier and GA) to these alternate airports, capital improvements at the overcrowded airport could be avoided. The results of this analysis, summarized in table 17, indicate that demand management could eliminate or substantially reduce capital expenditures for new capacity at 11 of the

[11]See, for example, *Aviation Week & Space Technology*, May 17, 1982; May 24, 1982; and June 14, 1982.

[12]*Airfield and Airspace Capacity/Delay Policy Analysis*, FAA-APO-81-14 (Washington, DC: Federal Aviation Administration, December 1981).

Table 17.—Application of Demand Management to Soiving Probiems of Capacity and Deiay

Airports where *diversion of GA could relieve congestion*

Airport	Operations forecast, 1991 (Xl,ooo) Air carrier	GA	PANCAP[a] (Xl,ooo)	Air-carrier/ PANCAP ratio	Percent operations in 3“ peak hours
Houston	316	185	300	1.05	24
Las Vegas	*254*	*296*	*330*	*0.77*	*28*
Memphis	288	287	355	0.81	30
Oakland	201	585	595	0.34	NA[b]
Phoenix	195	276	330	0.59	27
San Diego	137	98	180	0.76	
Santa Ana	353	565	385	0.92	I%’

Ahports when? dlverslon of traffic to another iocai airport couid relieve congestion

Airport	Operations forecast, 1991 **(Xl,000)** Air carrier	GA	PANCAP[a] (Xl,ooo)	Air-carried PANCAP ratio	Percent operations in 3 peak hours	Alternate airport
Chicago O’Hare	965	60	616	1.57	24	Chicago Midway
Dallas Fort Worth	620	20	340	1.82	26	Dallas Love Field
San Francisco	478	29	400	1.20	24	Oakland
Washington National	399	117	275	1.45	21	Dunes, Baltimore-Washington International

Airports requiring* additional capacity *by 1991

Airport	Operations forecast, 1991 (Xl,ooo) Air carrier	GA	PANCAP[a] (X1,000)	Air-carrier/ PANCAP ratio	Percent operations in 3 peak hours
Atlanta	725	57	472	1.54	27
Boston	441	75	303	1.46	25
Denver	611	90	355	1.72	28
Los Angeles	758	35	448	1.69	25
New York, JFK	329	46	272	1.21	32
New York, La Guardia	454	48	247	1.84	22
Philadelphia	528	43	295	1.79	24
St. Louis	448	40	280	1.60	27

[a]PANCAP—Practical Annual Capacity.
[b]Not available.

SOURCE: *Airfield and Airspace Capacity/Delay Policy Analysis,* FAA-APO-81-14 (Washington, DC: Federal Aviation Administration, December 1981).

19 major airports expected to have high levels of demand by 1991.

The FAA findings lend credence to the general notion that demand management, either by administrative or economic means, is worthy of consideration as an alternative to capital investment in new capacity and to technological approaches to reduce delay. The attractiveness of the concept stems in part from the fact that demand management can be implemented in far less time than it takes to construct new facilities or to install new technology. On the other hand, it must be recognized that demand management would be controversial. Administrative measures to redistribute demand would be viewed by many in the aviation community as an arbitrary and unwarranted exercise of government power, either Federal or local. Pricing schemes such as marginal-cost pricing or slot auctions would be scarcely more palatable to users accustomed to low-cost and unrestricted access to airports. Either approach would be such a sweeping departure from traditional policy that aircraft operators forced to shift their activities to other airports or times of day would be likely to resist on the grounds of discrimination or undue hardship. Airport operators, themselves, would also be reluctant to venture into an area where there is so little experience to guide them and where analysts and economic theoreticians cannot predict the benefits and risks except in general and carefully qualified terms. Still, from the standpoint of efficient use of existing resources and avoidance of large new capital investment, demand management is an option worthy of serious consideration and experimentation.