

ECONOMIC AND FINANCIAL ASPECTS OF AIRPORT LANDSIDE DEVELOPMENT AND OPERATION

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The consideration of airport landside capacity and operations relies on 2 points: (a) the identification of the key economic and financial issues related to airport landside investment and operations and (b) the analysis of these issues as they concern both long-term and short-term decision making. Although the principles and issues identified and analyzed are broad and have general applicability, this discussion will be stated in terms that are most relevant for U.S. airport development. In the United States, almost all carrier-served facilities are operated by public authorities of one sort or another, and no single airport operator controls any great proportion of total national airport capacity. The economic and financial issues to be considered relate to both the establishment of new airport landside facilities and the expansion or modification of the capacity of existing airport landside installations.

ECONOMIC ISSUES

The economic issues are those that relate to the allocation, consumption, and management of resources that are devoted to the creation, expansion, and operation of airport landside capacity. Airports represent substantial public investments and private investments as well. Therefore, any and all issues relating to the establishment and expansion of airports are closely bound up in public policy determinations. For example, many of the resources required to provide and expand airport landside capacity are directed to the quality of the "product" being provided by the airport to its users, whoever they may be. The level or standard of service provided is determined through either the implicit or the explicit workings of the public policy and political mechanisms. Other studies in these proceedings deal specifically with the levels and standards of service found at airports; consequently, those are

not a primary issue here. Nevertheless, both the amount and the character of the resources as well as the timing of the commitment of those resources grow directly out of political and public policy decisions that may well fly in the face of economic considerations even though to do so is to waste some measure of those resources.

The 6 categories of issues to be considered in this discussion of the economic aspects of providing and expanding airport landside capacities are as follows: investment, demand, cost structure, opportunity costs, externalities, and pricing.

Investment

The overriding issues in the area of investment are the amount and character of the resources that are required to achieve any given objectives for airport landside quality and capacity. The timing of the commitment is also of importance, for the quantum of resources required is only meaningful when some factor, such as a discount rate, is used to introduce the concept of time into the calculus.

The size of the investment, its character, and the time pattern of investment are all related to a number of other issues, the most prominent of which may well be financing. Investment decisions are made with either an explicit or an implicit notion of the quantity and time pattern of demand that will face airport landside facilities and of the character and quantity of resources that will be required to operate the airport landside; these are in turn a function of the size and character of capital investment in landside capacity. For example, if aircraft are to be parked remotely from the central terminal buildings, then both the size and character of the investment necessary to provide any given throughput capacity in the landside will be different from that required if the aircraft are to be parked adjacent to the terminal structures. In addition, the stream of expenses incurred in these 2 techniques may be different, in part because of differences in capital intensity between the 2 configurations.

In investment decisions, inflation rates for construction must be traded off against expectations relative to wage rates. For any given level and time pattern, substantial trade-offs can be made between the quantity of capital to be invested and the amount of labor required. The outcome of such comparisons is influenced not only by inflation and wage expectations but also by public policy and the character and quality of the services that either capital-intensive or labor-intensive landside systems will produce.

The level and character of investment are also substantially affected by the peaking characteristics of the airport and by the extent to which high levels of service are to be maintained even under conditions of stress in the peak periods. The form of the landside and the amount of capital to be invested are substantially greater if the airport is characterized by substantial peaking, whether on a daily, weekly, seasonal, or annual basis, and if standards of service to airport users are to be maintained at a high level during the peaks than if compromises in service quality are made. Again, public policy and politics will play a part in determining the level and character of investment.

Demand

A substantial number of issues are associated with the demand for airport landside capacity. For example, peaking has just been cited in the context of investment, but peaking is obviously a function of the demand level associated with the airport and the landside. Certainly the demand is derived from the airline trip demand, which is subject to substantial peaking at most airports. To the extent airport management wishes to handle all traffic with a consistently high level of service, the airport will be far more expensive to operate, probably in terms both of the capital invested and the expenses incurred, unless compromises are permissible that allow some airport users to be handled in different manners during peak and off-peak periods. Consider a case in which during off-peak periods all aircraft are parked adjacent to buildings, and some sort of loading bridge system is used to move passengers between the aircraft and the

terminal complex. But during peak periods some aircraft are parked in positions remote from the terminal building, and some sort of a vehicle bridge is used between those aircraft and the terminal complex. Whether or not the standard of service afforded passengers is lowered, the capital invested at the airport is reduced. The stream of expenses may or may not be raised, depending on the trade-offs between servicing the additional debt and maintaining the larger terminal complex that would be required to handle all planes next to the buildings, and the labor, maintenance, and carrying charges associated with the vehicles that are used between the remotely parked aircraft and the terminal.

The most profound effects of demand-related issues on the economics of the airport landside flow from (a) the extent to which such demand is peaked or smooth, (b) the mix among the type of travelers using the facility, i.e., business or tourist, (c) the mix between domestic and international traffic at the airport, and (d) the split between regularly scheduled services by air carriers and casual or charter operations. For example, whether airport activities flow primarily from scheduled or from charter operations will determine the character of the demand for airport landside capacity, which must then influence the facilities provided. For a further example, if significant charter or casual traffic is involved, the airport will likely find it most attractive, from both an investment and ongoing expense standpoint, to place a premium on flexibility in design so as to be able to accommodate, on the shortest possible notice, both large and small quantities of traffic through the landside. Certainly such an airport will be more labor intensive than it would be were the anticipated demand to emanate primarily from scheduled carrier operations, which, though peaked, are substantially smooth and more predictable.

The investment in landside capacity will be different depending on whether the airport is strictly a domestic airline facility or primarily an international one. In the former case, the space requirement per unit of passenger throughput capacity, however measured, will be substantially less, if only because customs and immigration services will be unnecessary. Moreover, a domestic operation will likely have significantly fewer checked bags per passenger than will an international operation. The international facility also requires currency exchange services and multilingual signs. The point is that the character of the demand is an important determinant of the level and character of resources required to produce a satisfactory airport landside system.

One of the more interesting demand issues is the effect of technological change on the demand for capacity. Certainly the most profound of these technological changes relates to the aircraft that will serve the airport throughout the life of the investment. It is well established from the history of commercial aviation that the economic life of transport aircraft has generally been less than the physical life of most airport facilities. That is, the manner in which they have traditionally been supplied has led to a mismatch between the technologically dynamic aircraft, which must interface with the landside facilities, and the facilities themselves. The character of the demand for capacity is greatly affected by aircraft technology because such technology is changing more rapidly than is anticipated in virtually all cases in which structures, which comprise the bulk of airport landside investment, are planned and constructed. These mismatches should be reduced, and doing so probably requires that the scheme for providing capacity, especially as it relates to the interface between landside structures and aircraft, be as flexible as possible. Failure to provide for such "capital flexibility" cannot but lead to the periodic wholesale destruction of airport landside investment long before the time when it becomes economically obsolete. Such waste has been observed at many airports in the United States and abroad, especially since the introduction of high-capacity aircraft.

Forecasting is an extremely important activity in airport landside capacity planning and implementation. Forecasting is at least as much an art as a science, especially if the time horizons are in years, as is usually the case when capital investment decisions are being made. Therefore, the character of the investment should be as flexible as possible, consistent with providing for the peak demands that can reasonably be expected. These demands emanate from a combination of time-related and aircraft-related factors that cannot be predicted with accuracy through the long period of

depreciation and physical durability of the assets.

The demand for airport landside capacity can decrease as well as increase or level off; and, as the demand for air carrier services becomes more dependent on discretionary travel than on business travel, the likelihood of downturns increases. Flexibility in the landside configuration is, therefore, essential so that substantial reductions can be made in the resource commitment if the requirements for landside capacity should decrease either on a short-term or secular basis.

The observation that demand for landside capacity emanates increasingly from discretionary travel that, in turn, heightens the vulnerability of the airport and the air carriers to reduce demand (or at least slackened rates of growth of demand) stems from the higher price and income elasticity of the demand for discretionary travel than for business travel, which has been the mainstay of both airport and airline demand in most cases. These elasticities are important in determining the level and character of investment in airport landside capacity.

The elasticity concept must also apply to the various services provided as part of the airport landside. For example, the demand for products or services of airport concessions may be much more price elastic than the demand for air travel itself. On the one hand, high prices in the concessions might discourage patronage even if they did not significantly affect airport passenger throughput and the demand for basic capacity. On the other hand, to the extent that concessions have relatively inelastic demands, airport management might derive higher revenues from such services and thus provide the airport operator with excellent financial results in relation to capital invested and expenses incurred. (Only such inelastic demand can explain the extent to which restroom facilities produce so large an amount of revenue for airport operators!) The automobile parking facilities at many airports also command abnormally high prices, particularly if no alternative airport perimeter parking is available at significantly lower charges. Whether the airport operator wants to take advantage of these special cases of inelastic demand is often a matter of public policy, given the public involvement in financing, providing, and operating airport activities.

Cost Structure

The structure of costs associated with the landside of the airport is complex. The lack of knowledge about airport cost structures in general and landside service cost structures in particular is attributable not to the complexity of such cost functions but to the fact that they are rarely calculated for "public enterprises." The decisions on allocating resources to provide the services of such public enterprises are made more on the basis of public policy and politics than of economics. Despite a general lack of data about airport costs, airside capacity is typically provided with a high proportion of fixed costs and a relatively low proportion of variable costs. Such a cost structure has been adopted not because it represents the most efficient allocation of resources but rather because, by and large, those engaged in making investment and policy decisions about airport landside capacity have deliberately chosen capital-intensive means of providing such capacity.

A further observation deals with the fact that, although the cost structures for U.S. airports of any given capacity and character have probably been similar, substantial possibilities exist for airports to produce any given level and quality of landside services with different cost structures. For example, the traditional U.S. airport concept that all or virtually all aircraft must be handled adjacent to the terminal complex guarantees capital intensity in the cost structure. In contrast, parking of aircraft away from the terminal complex ensures less capital and probably provides greater planning and operating flexibility as well.

If only one airport altered the cost structure in such a way as to produce landside services of a given quality in a more economic manner, the effect on the cost structure of the air carriers of the country would be slight. On the other hand, if a substantial proportion of major U.S. airports adopted such a cost structure, the cost structure of airlines would also be favorably altered, and that would have myriad implications for

economic regulation and public policy in air transport.

Opportunity Costs

A significant element of cost associated with providing and expanding airport capacity is the foregone income or returns because a quantity of resources is devoted to one activity rather than another. For example, if the land on which some facility is being established could produce a higher return if used in some alternative way, then one cost element associated with committing it to the lower return use is the difference between that lower return and the higher return that could alternatively be realized. More specifically, if terminal space that could be devoted to revenue-producing concession activities is required for passenger-security purposes, then one element of the cost of providing such security services in the terminal relates to the income that cannot be realized. All too often, opportunity costs are not calculated and factored into the decision-making mechanism when decisions are made, and a misallocation of resources necessarily results. In many cases opportunity costs are substantial, and to ignore them is to ensure an uneconomical result in the planning or revision of a land-side facility.

Externalities

The concept embodied in the word "externality" has taken on more practical significance in the last several decades. The concept describes the manner in which parties or institutions external to an investment or operating decision are affected by such a decision, either positively or negatively. For example, the decision to establish an airport at a given location provides external benefits to persons gaining employment at the airport, to individuals whose travel demands are better accommodated thereby, and to the holders of real property in the vicinity of the airport to the extent that the property value is enhanced as a result of the establishment of the airport. External costs will also be generated for some members of the community. For instance, there will be noise from aircraft and other vehicles using the airport, and increased highway congestion in the surrounding areas.

Welfare economics theory indicates that external costs and benefits, although indirectly incurred or received, are nonetheless real costs and benefits and should be taken into account in calculations in support of investment and pricing decisions. On the one hand, to the extent that an airport generates external benefits that are enjoyed by the community at large, a community can properly be "taxed" up to the point that it transfers to the airport funds that are commensurate with such external benefits. On the other hand, to the extent that it is adversely affected by the airport creation and operation, the community is entitled to compensation in an amount consistent with the cost burden that it bears. Of course, the notion of externalities has led directly to the justification both of public funds being devoted to the development and expansion of airports and of an assessment of special taxes on airport operations to cover the external costs that the airport generates.

Both in public-sector and private-sector economic activities, it is generally considered sound public policy to try to internalize any external costs that are generated. Under economic theory, a charge can be imposed on the airport and on the airport users that adversely affect a community, for example, by highway congestion directly associated with airport activity, and the proceeds can be distributed to the community as compensation for the costs it bears. Such internalization of external costs is entirely rational and has the virtue of forcefully bringing to the attention of private decision makers the impact of their actions on parties external to the decision-making process. In this manner, internalizing external costs induces private decision makers to allocate resources in a more efficient manner. In any event, not only is the concept of the externality a valid one in relation to both investment and operating decisions, but certainly political pressures are mounting to ensure that external factors, particularly

costs, be taken into account in reaching decisions, particularly if high-visibility, public-sector facilities such as airports are involved.

Pricing

Most of the economic issues associated with any resource-consuming activity come together most pointedly in the pricing of the services (or products) that such an activity generates. Literally all the factors that have previously been presented converge as policies are established and detailed prices are set for the multitude of services provided on the landside of the airport.

Certainly pricing policies and pricing decisions of public facilities are related to the overall objectives of the managements of such facilities. This is then reflected in the relation between net revenues and net costs. Where a complex of services are to be "marketed," as is the case in the airport landside, a general revenue objective for the facility is usually first established. Is the facility to be self-sustaining? Is it to cover only investment costs or fixed costs or all costs, including those that vary with the output of services? Is the facility to generate a profit, i.e., produce revenues in excess of both short-run and long-run costs? Once the revenue, profit, or rate-of-return objectives have been established as a matter of policy, then it is necessary to establish a structure of prices designed to produce revenue at the prescribed level.

Creating a pricing structure at an airport is far from a simple matter. A great many services are produced, and each has its own cost characteristics and is marketed in the face of different demand functions and different elasticities of demand. The demand for high-quality restaurant food at an airport is substantially more price elastic than is the demand, say, for a daily newspaper. The proportion of the food demand that would be eliminated by increasing its price will likely be greater than the proportion of the newspaper demand were its price increased. For this reason, space rentals for the concessions that face the least elastic demand can be raised more than those for concessions that face greater price elasticity. The differing elasticities give rise to the possibility of charging different rates for the rental of spaces to be used for different landside purposes. In the situation just described, for example, the newsstand can pay more per square foot of space occupied than can the restaurant without suffering decreased demand when the higher rate is passed on in the form of higher prices. The implications are clear: The pricing of airport services, whether space rentals or otherwise, can reflect only the costs associated with producing those services or the value of such services and the elasticity of demand for the ultimate output of the concessionaire. The choice is largely one of policy.

It is particularly interesting to contemplate the nature of the demand for airport services emanating from the air carriers. Clearly, the airline that wishes to serve a given community has a relatively inelastic price demand with regard to airport services. Landing fees may influence the quantity of service a carrier offers at a given airport, but can unlikely be charged at such a level as to discourage service by such a carrier completely. Similarly, all or most of the space that the carrier rents from the airport operator is acquired under conditions of low price elasticity. Again, the inelasticity gives rise to the possibility that airport management can charge abnormally high fees to airlines given that they have few alternatives to serving the airport. To the extent that an airline has an alternative (and this is a very rare case indeed), then the airline can shift its service from one facility to another.

Since the demand of air carriers for space and services at airports is inelastic, air carriers in the aggregate might be expected to pay a substantial proportion of total revenues that the airports generate. But such is not the case for most airports in the United States. Eckert points out in a recent study (1) that only some 2 percent of total airline costs are incurred through the landing fees paid by such airlines, and landing fees represent only 22 percent of total airport revenues, notwithstanding the fact that the *raison d'etre* of an airport is the aircraft that interface with the market of air transport services only through the airport. Among other things, this implies that airport managers take advantage of the inelastic demand for airport concession services that

are displayed by airport users other than airlines. These users are at the airport only because of the airline activity taking place there and are usually subject to substantial prices for concession services, in part because the concessionaires themselves are charged high fees by airport management. This income is often, though not always, used to cross subsidize the air carriers. This is something of a paradox for several reasons. First, the cross subsidy runs in the direction of the airline "customer" with the least elastic demand function of all. Second, air services are the basic reasons for the airport, not the services or products marketed by the concessionaires. The latter are strictly by-products of the airport's operation, yet they are charged as though their services were the primary products of the airport.

It is not difficult to understand why airport managements generally choose to charge concessionaires high fees even though elasticity of demand for the services they provide is often greater than the elasticity of demand of the airport's air-carrier tenants. First, the air-carrier tenants are much better organized than the body of concessionaires and certainly better organized than the customers of the concessions. Moreover, the position of the concessionaires in bargaining with the airport is more competitive than that of the airlines. This is because the air carriers are certificated by federal (or state) authority to serve the community, but the concessionaires must compete with each other for space at the airport. There is a substantially greater community of interest between the airport management and the air carriers than between the airport management and the concessionaires. Concessionaires can be replaced if they fail to perform. To replace an air carrier is virtually impossible, given the basis on which they provide service at the airport, i.e., pursuant to some sort of licensing action by a governmental authority. In addition, and of substantial importance, air carriers and airport managements need to get along well in both a personal and commercial sense if the airport is to be operated harmoniously.

Both the airline community, which is typically organized through the mechanism of airline operations or finance committees, and airport management bargain to achieve results acceptable to both parties. Of course, compromises and accommodations are made, but in most cases, differences are composed and an airport landside complex substantially meets the "requirements" of both sides.

Airline needs and expectations must be taken into account early in the planning process for providing or expanding landside capacity. In part, this grows out of the fact that for most U.S. airports the long-term financing device employed is the revenue bond, by which the debt is guaranteed jointly and severally by the airlines serving the facility. This once more gives a far greater bargaining lever at all stages of negotiations to the air carrier than to the concessionaire or other customer of the airport.

One result of the relation between airport and air carrier is that in many cases the airline tenants pay gross rentals, which are consonant with the investment necessary to accommodate their needs. The rental rate for space may well be the same for both air carriers and concessionaires, but, in fact, these rates are applied only to those spaces that the air carriers use directly and exclusively, such as ticket counter areas, administrative offices, and gate hold rooms. The vast amounts of concourse space, waiting rooms, and other common areas of the airport are not charged directly to the airline tenants even though most space of this sort is required only because of airline operations and most often only because of the method by which the airside-landside interface is achieved. This means that concessionaires, who usually do not create the need for such vast amounts of space, in fact pay substantially more for what they get than does the airline community at the airport.

Although this may not be either a conventional or a popular view of the economics of the airport, it is nonetheless an accurate one and points out many implications for airport decision making. For example, to the extent that the air-carrier activities at airports are cross subsidized by revenues from other sources (such as concessions), there is relatively little economic pressure to cause airlines to calculate more carefully the true economic costs of reaching one type of decision for handling aircraft and passengers as opposed to another. It is also true that, as long as the concessionaires face demand functions that are sufficiently inelastic to keep them in business even if they incur abnormally high costs, the most powerful of all incentives is providing any given

quantum of landside capacity while maintaining an acceptable level of service.

Given that (a) airports have represented a significant and reliable public works program in the community, with all that this implies in terms of politics and patronage, (b) the likelihood that the psychic income of both airport managements and city officials is bound up in the size and physical character of the empires over which they preside, and (c) for the most part, the airline executive who deals with airport landside matters is also oriented toward capital-intensive, highly visible landside facilities, then the stage is thus set for reaching decisions that produce airport landside facilities on the grandest of scales. And supporting this solution to providing airport landside capacity is the ability of airport operators to price landside services in such a way as to cross subsidize such facilities and their operations in favor of the air carriers and at the expense of other users and tenants.

Several remaining aspects of airport pricing need to be considered explicitly. Nearly every airport that has a substantial amount of airline traffic also has periods of high peak demand. The cost of providing peak-load capacity is substantially more than the cost of providing service and capacity at other times. This gives rise to the concept of peak-load pricing of airport services to induce airport users, airlines, and others to reorient their demand for airport services in such a way as to reduce the resources required. The theory of peak-load pricing is extremely persuasive, but the concept has neither been easily placed into practice nor met with much success when it has been attempted.

The necessary principal "target" of peak-load pricing schemes is the air-carrier tenant whose activities clearly regulate the ebb and flow of traffic to and through the landside of the airport. If peak-load pricing of airport services can influence air-carrier scheduling, then the peak demand for airport services can be smoothed; but if peak-load pricing has little or no effect on air-carrier demand for airport services, then the pattern of demand will not change. It is doubtful that even a substantial increase in charges during peak periods can have any measurable influence on what airlines do with respect to flight schedules given the level of charges levied against airlines by airport authorities at present.

The reason air-carrier services are peaked in the first place relates to air-carrier perceptions about when people want to fly. The peaking results from each airline's being responsive to the nature of the market demand. To ask carriers to change their pattern of supply dramatically is to ask them to ignore reality. This is particularly so given the fact that, in most city-pair markets, the airlines are competitive and that no single carrier in such a market is going to jeopardize its market share by scheduling capacity at a time when the demand is less than in the peak periods. Therefore, short of the existence of capacity-limiting agreements and pooling arrangements between competitive air carriers, which are matters of federal policy, peak-load pricing will not likely result in much shifting or smoothing of the demand.

Another reason for advancing the above hypothesis is that the airlines already incur substantial cost penalties when operating during periods of congestion: Aircraft ground times are greater, fuel consumption is greater both on the ground and in the air, and labor costs are higher because labor productivity declines and because the manning of airport-related functions by airlines is geared to meet the peak demand, which means substantial excess capacity of both labor and capital exists during off-peak periods. Consequently, there are already substantial inducements for air carriers to try to spread their activities throughout the day. Once again, in view of this, it is doubtful that any peak-load pricing scheme applied by airports can have any measurable influence on how airlines schedule their operations.

Peak-load pricing of airport services as applied to general aviation is successful in several locations in the United States. Specific airports have raised their landing fees as much as 10 times for general aviation operations in peak periods, and this has served to discourage quite dramatically the operation of general aviation aircraft at such airports during such periods. To the extent that such practices reduce airway, approach, departure, and airside congestion, they may represent a valid use of peak-load pricing techniques. But, once more, the airlines still incur higher costs, given the peaked nature of their operations; and it is doubtful that any increase in fees

associated with peak-hour operations will influence airline managers as far as their scheduling is concerned.

Another area related directly to pricing that needs to be considered concerns the internalization of external costs associated with airport operations. External costs are those imposed on individuals not party to the transaction that generates the costs. Street congestion in areas adjacent to the airport that results from the peaking of demand for airport services is an excellent case in point. If airport operations are the source of cost-producing congestion for residents or industrial activities located near the airport, airport managements can reasonably consider imposing some time-related charges on vehicles that enter or leave the airport during such peak periods of highway congestion. The proceeds of such extra charges should be somehow returned to compensate the parties who bear the indirect cost associated with the nature and level of airport activity. Although in no situations today are such transfer payments being made, recognition of externalities in the form of public policy is relatively new, and transfer payments for such external costs may well be required before many more years have passed. Many airport operators are already under legal constraints to compensate surrounding neighborhoods as a result of aircraft landing or takeoff noise generated in excess of that which the courts have held to be reasonable. Such concepts will certainly spread to other matters that affect airport activities including, perhaps, the area of highway congestion. Airport operators and others concerned with the aviation system in the United States would do well to recognize the drift toward forcing even public enterprises to internalize external costs and to distribute the revenues derived to the affected external parties. Only by recognizing such trends well in advance can decision makers allocate the proper resources and apply them in a manner consistent with the nature and pattern of the demands to be anticipated. This is certainly true if capacity is being created or expanded.

FINANCIAL ISSUES

Financial issues are those related to raising or generating capital to support any given quantitative and qualitative changes in airport landside capacity. Although many economic issues previously considered are also important in the context of financing airport landside capacity, several financial issues will be considered: financial instruments, future requirements, management, and implications for airport users.

Financial Instruments

One of the basic decisions faced by the managers of airport facilities concerns the means to be employed in raising the capital necessary to provide the capacity called for in the airport plan. For the most part, until the proposed ADAP legislation is passed, airport landside capacity in the United States must be financed without the direct aid of the federal government. However, Washington (Dulles and National) airports are obvious exceptions.

Debt instruments are usually employed to raise the substantial capital required to implement any airport project whether it be building a wholly new facility or expanding an existing one. Since such projects are usually carried out under the sponsorship of a state, regional, or local governmental entity, long-term bonds of some sort are the basic instruments of finance. Such bonds are generally issued in such a manner as to take advantage of the federal income tax exemption for municipal securities. These tax-free municipals generally fall into 1 of 3 categories: revenue bonds, general obligation bonds, or development corporation bonds. The tax-free, special-purpose revenue bond is by far the most popular debt instrument for creation and expansion of either the airside or the landside of the airport.

Revenue bonds are specifically related to one or more airport projects such as paving taxiways, providing parking facilities, or expanding terminal buildings. Such detailed specification of the purpose to which the funds being raised will be put is

necessary because they are revenue bonds that are to be retired out of the income stream generated by operation of the specific facility being financed. With such securities, the investor also receives the assurance that either the operator of the airport or certain tenants of the airport place their general credit behind the issue such that, if the revenues are insufficient to meet the indenture obligations, either the airport authority or the guarantor tenants, almost always airlines, are looked to for payment of interest and repayment of capital. The more secure the investor can be made to feel, the lower the rate of interest associated with raising capital can be, and this simple relation underlies the creation of the revenue bond in its present form.

Airport revenue bonds have been exceptionally well received in financial markets. This in part stems from the fact that airports have been growing continually and have become an indispensable part of both the business and the cultural life of the United States. In short, airports have come to be treated much like public utilities by purchasers of their securities. Because the airport, more than any other facility or institution in almost every community, is a growing enterprise, the means of raising capital for airport expansion has generally been the revenue bond rather than the general obligation bond, which is more widely used for most other governmental purposes.

General obligation bonds are debt issues of municipalities or regional authorities and look to the general credit of the issuing entity. For example, the Philadelphia International Airport is one of the few that is financed primarily through general obligation bonds; and these debt instruments are guaranteed by the city and are not specifically tied to any given project on the airport. Neither is their repayment guaranteed by the air carriers or other tenants of the airport. Since the credit standing of Philadelphia is reasonably good, these bonds have been sold at relatively low rates of interest, but there is much politics involved in issuing such bonds. Far more time is generally spent in raising capital in this fashion than is the case if special-purpose revenue bonds are used.

A variation of the general obligation bond is the debt that can be issued by public development corporations, which are generally created to supply debt capital for businesses interested in locating or expanding within the political jurisdictions that created them. The corporation's capital is raised by relying on the creditworthiness of the sponsoring city, county, or state. The tax-exempt feature is usually retained by having the government float the bond and by making the proceeds available to the development corporation, which then constructs buildings or acquires other facilities and leases them to the ultimate user. In the case of an airport, development corporations might well construct all or part of the airport landside building complex and lease the space provided directly to the airlines and airport concessionaires. Under such an arrangement, the lease obligations of airport tenants are used to secure the bonds. One significant advantage of employing development corporation capital rather than general obligation bonds is that the authorization to issue debt is often less complicated if the development corporation does it than if a governmental entity does it directly. Although development corporation financing is not commonly used for expanding airport landside capacity, it is an alternative that should be considered.

In addition to the 3 classes of debt instruments just discussed, general tax revenues can also be used to finance landside development. In Philadelphia, some capital improvements are financed in this fashion while others are financed by general obligation bonds. In any event, the use of general tax revenues is an expensive way to provide funds, especially for capital investments in a facility having a service life as long as 25 or 30 years. Certainly, for most governmental entities, the financing of long-term investments from cash on hand is too expensive a proposition for it to be considered a major source of financing.

To the extent that bonds of one sort or another are employed to finance airport landside capacity, 3 basic methods of repayment can be employed. Term bonds of a single issue are those that mature at a single point in time. Such bonds usually require the establishment of a sinking fund that grows and ensures the repayment of the bonds at the maturity date. Serial bonds are issued in groups, but each bond matures at a different time during the period over which the financing is being undertaken. For the most part, serial bonds are preferred by borrowers to term bonds since the former

take advantage of lower interest rates that generally prevail for shorter term maturities. The third type of repayment schedule involves placing an equal annual burden obligation on the issuer of the debt in order to maintain a constant cash flow in each year in which the debt is outstanding. The equal annual burden arrangement operates precisely as a mortgage in terms of its repayment.

Most expansions in the United States have for some years involved the use of special-purpose revenue bonds guaranteed as to principal and interest by the airlines serving the airport; the airlines are obligated both jointly and severally. Most of these bonds are to be paid on a serial basis, which reduces the cost of the issuing organization and also serves the needs of the large institutional investors that are the principal market for such securities. Since there has never been a default on an obligation of this sort, these bonds are well received in the marketplace; and, as long as air transportation continues to grow and airports continue to be established or expanded, the airport revenue bond represents an attractive means of raising the capital required.

With the passage of the ADAP bill by Congress, it will be possible, for the first time, to raise capital from federal sources to create or expand airport landside facilities. To the extent that such capital is received in the form of an unrestricted grant, its cost to the airport operator is effectively zero. On the other hand, there is a real question as to whether the federal government will allow ADAP funds to be applied to terminal projects without requiring that at least some calculations be made to demonstrate that the capital is being put to use in an efficient manner. Moreover, many hidden costs are associated with the acceptance of federal grants, including substantial delays between the application for such funds and the receipt of them, the probability that federal standards of one sort or another will have to be met to qualify for the funds, and the adherence to other federal requirements such as environmental standards. It remains to be seen what the true cost of such federal funds will be.

Nevertheless, the availability of federal funds for terminal and other landside improvements will take some of the pressure off both airport operators and air carriers to provide capital or guarantee debt for the same purposes. Certainly it is to be hoped that the availability of federal funds for landside development will minimize the likelihood that significant imbalances in capacity will arise between the airside and the landside and reduce the relocations and inconvenience that inevitably arise under such conditions.

Future Requirements

Planning the establishment or the expansion of airport landside capacity requires forecasting either implicitly or explicitly the level and character of the demand for the services of the facility for which financing is to be arranged. The terms in which such future conditions must be couched include changes in both the level and character of the demand for airport landside capacity, the effect that inflation of prices and wages will have, and the manner in which technological change will influence future landside requirements.

With respect to the level and character of demand for landside capacity, certainly in the last 30 years air transportation has developed from an infant industry into a major and mature, though still expanding, component of the American economic system. Because it has enjoyed dramatic growth rates and gone through impressive changes of all sorts, the general tendency has been for those who are considering airport facilities to think only in terms of more and bigger. But this is no assurance that "more and bigger" must continue to characterize forever the demand for landside capacity. Certainly future requirements should be projected with recognition of the possibility that leveling off and even downturns may become common in areas of economic activity associated with aviation.

Changes in the level of demand can certainly have a profound effect on the financial requirements for providing capacity. Obviously, other things being equal, the greater the capacity required and the higher the level of service which is to be provided, as a matter of policy, the greater will be the financing necessary to support the requirement.

But the amount of capacity to be provided must be expressed in terms relevant for planning and financing airport landside capacity. For example, financial requirements will be far lower if the demand for landside capacity is spread evenly throughout the day and year than if the capacity is highly peaked. Again, the type of facility and the financing requirements should be different if the landside capacity is geared to serving many batches of relatively small numbers of people moving through the airport than if it serves fewer, but larger, batches of people. Also, the effect of increases in charter activities or of the introduction of significant numbers of international operations, where none previously was found, changes the configuration and capital requirements alike. All these projections are required if the landside capacity is to match the needs of both quantity and quality of service.

In all financial planning, the extent to which inflation is anticipated must be considered. Widespread inflation not only affects the cost of future construction and wages but also can determine the extent to which airport landside excess capacity should be inventoried in the near term to avoid higher costs in future periods. The trade-off analysis required is a special one, and the outcome depends on many factors, including the operational flexibility of landside facilities and the capital and labor intensity associated with providing additional increments of capacity. It is true that, if inflation is anticipated, the dollar investment required to provide capacity will be lower the sooner the investment can be made. On the other hand, the cost of carrying excess capacity is extremely great, particularly when both the capital and interest charges are calculated as well as the maintenance and operating costs associated with such excess capacity. Rarely is building warranted very much ahead of demand. In fact, there is reason to expect that inflationary cost increases will be met by airline fare increases, which, in turn, give the possibility of raising airport charges to the airlines and other users. Such possibilities for increasing revenues would indicate that it is more rational to match capacity with needs in the typical airport situation in which revenues are designed to cover costs rather than to generate maximum returns or profits.

One of the most difficult areas to forecast is that related to technology and technological change. The configuration and extent of the airport landside are largely determined by the technology embodied in the aircraft used by the air carriers. Indeed, except for requirements to meet growing secular demand for air travel, no other factor has been more important in requiring continued investment in airport landside capacity than that associated with technological change in the transport aircraft field. Although it is expected that technological change in such aircraft will not be so dramatic in the next several decades as it has been in the past several, new and larger aircraft will likely be introduced during this period, and some of them will have features that will make provision of new and different landside facilities necessary, especially if there are to be direct physical connections between the airport landside and the aircraft as at present. Specifically, the double-decking of passenger air transports would create significant problems at many landside facilities just as did the transition from the relatively low-level operations associated with the 707, DC-8, DC-9, and 737 aircraft to the higher and wider 747, DC-10, and L-1011 aircraft.

Of course, where airport landside facilities are concerned, the effects from both growth and technological change are most pronounced for those assets with long service lives. In the post-World War II period, the mix of aircraft has changed radically every 8 to 12 years. In contrast, the primary outlets for airport landside investment have been bricks and mortar and other durable assets with physical and depreciable lives well in excess of 25 years. Many landside structures, however, do not "fit" successive generations of aircraft, and the result is that serious economic and financial problems of facilities grow out of the mismatch between the useful and depreciable life of these facilities.

Much airport capacity needs dramatic revision at great expense faster than the facilities being replaced can be written off or become physically uneconomic or unsound. Two potentially critical problems arise out of this situation. First, the cost of replacing still useful assets is a much greater burden on airport management and tenants in an era anticipated to be characterized by inflation than in an era without such inflationary pressures. This places a premium on planning and constructing facilities in such a

way that they remain useful for periods at least matching the length of debt financing that provided for their construction. The second implication leads in another way to the same conclusion. To the extent that asset lives are significantly less than the life of the financing underlying them, the new financing required to provide the replacement or expanded capacity will be forced to carry in one form or another the financial burden that still remains from the continued depreciation of the earlier asset that no longer exists.

A recent study indicated that many airport landside facilities have physical lives on the order of one-half the length of the financing that supported their creation. In the typical airport being analyzed, the length of the revenue bond financing was 25 years, and the average physical life of the structures was about 13 years. For these assets this necessarily means that, from the fourteenth year onward, the debt that needed to be serviced included that associated with the original investment as well as that related to the replacement investment. If the relation between life of the indebtedness and life of the assets were to continue at a ratio of 2 to 1, the financial burden would grow precipitously and reach a point at which the burden on airlines and, in turn, on their passengers and the burden on concessionaires would become so great as to discourage both the use of air transportation and of airport services. This analysis leads to the same conclusion as before: Facilities must be planned and developed with physical flexibility in mind so as to minimize the probability that the life of the investment will be less than that of its financing.

Dramatic rates of growth will tend to mask the problems associated with both inflation and technological mismatches, but the ability of growth to cover such difficulties is limited. Rates of growth for air transportation demand will probably decline substantially during the next several decades, not because air transportation fails to perform satisfactorily, but because the airlines have already captured a substantial proportion of the intercity passenger transportation market and the demand that remains to be tapped is highly price sensitive.

If the mismatch continues between the physical character of airport landside facilities and the technology associated with airside or off-airport interfaces with the landside, airport operators will have little choice but to surcharge one or more classes of lessees of landside space or facilities to cover the unretired principal associated with the replaced asset. The unacceptable alternative is to require one or more classes of lessees to meet such capital losses through a capital levy. In any case, increasing the charges to lessees is the logical technique for dealing with an incorrect estimate of asset life. But to avoid too sudden increases in use charges or space rental fees, airport managements have typically chosen to recapitalize the unretired principal and pass the increased depreciation and interest charges through to the lessees as part of their rental charges or fees. This leads to a more gradual increase of the burden on such airport customers. The important point is that, without growth and with a consistent failure to match asset life and length of its debt financing, airport costs will rise precipitously with unhappy consequences for all landside tenants and users, including the air carriers.

Management

The management side of the financial question is an important one. In fact, the quality of the management applied to the airport landside, from conception to operation, is probably the most important single determinant of the financial performance of the system.

Management of an airport, as management of any complex activity, covers a broad range of issues. Among the more important are those related to structuring airport landside in such a way as to retain its flexibility and economic viability over the longest possible period of time. As noted, every effort should be made to ensure that asset life at least equals the term of the debt that typically underlies the provision of airport landside capacity. Management must recognize the relation between factors such as inflation and the cost of capital in both financial and operating decisions. Management

that produces satisfactory financial and operating results must be sensitive to all cause-and-effect relations. If one airport user's policies or activities cause the airport to incur exceptional investment or operating costs in order to accommodate them, then the user should bear all those costs. A well-managed facility should have a minimum of cross subsidy.

The procurement side of airport activities should also be of continuing concern to airport management. Skilled purchasing of materials and services that go into landside capacity development and maintenance can substantially reduce the financing required to support any given landside program. Reliable and efficient consultants and contractors should be employed with as little concern for local political factors as possible. New institutional arrangements for acquiring services and materials should be explored. For example, there remain few reasons why architectural services should be paid for on the basis of the cost of the overall project. This can logically lead only to landside facilities that are larger than they need to be. Putting architects on airport projects on a different compensation basis might be one of the most effective means of economizing on the resources required and of reducing the financing necessary to support development. Airport managers should be fully aware of their obligations to meet the debt service and interest payments and should recognize that the historic record of undiminished growth in demand and extensive landside development may not continue. They should make contingency plans to reduce the financial burdens when downturns occur, but should also plan and execute facilities and capacity in such a way as to retain maximum flexibility.

At still another level, management issues have significant implications for financing airport landside capacity. Institutions that supply capital for the creation and expansion of airport capacity have the ability to influence all aspects of the management of such facilities, particularly if they do so prior to making the financing available. Specifically, all who furnish capital for airport expansion and development are obligated to ensure that the capital provided is efficiently used and that the airport remains responsive to the needs of present and potential users so that the financial obligations can be met. Such behavior on the part of those who supply financing is entirely rational, particularly where private sector capital is concerned, because it provides the greatest assurance that payback schedules will be met.

Where public financing is concerned, such as through the revised ADAP legislation, the federal government ought to ensure that the capital is used efficiently and that proper accounting is kept, even though there is no payback issue. Neither interest nor capital recovery is a condition of making such funds available. As part of any federal program designed to provide capacity, standards of economic performance should be adopted that must be met before such facilities are eligible to receive funds.

Under the most common method of financing landside capacity now employed, the special-purpose revenue bond, the airlines using the facility are jointly and severally liable for the repayment of the debt capital and interest. Heretofore, except in special cases, the airlines have not been required to show such contingent liabilities on their balance sheets, and airline managements have been tolerant of a substantial measure of "gold-plating" in such facilities. Air-carrier managements will soon be looking with a critical eye at airport facility projects that are more expensive than absolutely necessary because of 3 important considerations. The first is the less-than-certain future facing the airline industry. The second is the contingent liability that is rapidly mounting as further airport development takes place. The third is the increasing concern among the accounting profession regarding the lack of recognition of the potential liability represented by such debt guarantees.

Implications for Landside Users

Myriad implications for the various users of airport landside capacity flow from every possible decision relating to financing. Many of these implications have been noted in the course of the preceding discussion. The method of financing, as well as the size of the financial commitment associated with providing airport capacity, has the most

profound effect on the most significant users. First among these are the airlines themselves. The implications for airlines grow out of the fact that they are being increasingly subjected to ever larger contingent liabilities at precisely the point in their history when they require all the financial strength they can muster to support their own operations. The day has passed when the airlines can anticipate continued growth at the high rates. As growth slackens and perhaps disappears entirely, the airlines will no longer be able to tolerate mistakes such as inappropriate financing decisions. Particularly dangerous will be cases where the life of the landside assets being financed does not match or exceed the life of the debt associated with them. As noted earlier, the carriers' financial positions, both individually and collectively, can be seriously undermined if inappropriate decisions are made in financing airport landside capacity.

Concessionaires are also influenced by financial considerations. Certainly it is important that they not be asked to shoulder undue burdens as a result of financial decisions that are not appropriate to the task at hand. If the air carriers become less able to bear the financial burden of the growth of airport landside capacity, concessionaires may well have to provide greater revenues than ever before. This would require concessionaires to raise prices with the possible effect of decreasing demand to the point at which many concession activities become uneconomic. In such circumstances the financing burden would be shifted back to other tenants and airport users.

Among such users, of course, are airline passengers and visitors, who may be called upon to shoulder such burdens to an increasing extent, especially if the ADAP legislation proposed by the present administration is passed in its present form. Indeed, it is certain that many airports will impose head taxes on passengers immediately after such legislation makes it possible to do so. There are many reasons to believe that such a method of financing is not appropriate if only because airline passengers represent a highly disaggregated market with quite inelastic demand and therefore cannot possibly ensure that the resources devoted to airport developments are put to the best possible use. To the extent that the responsibility for providing or supporting the financing associated with airport capacity creation and expansion falls directly on the passenger, the decisions associated with the planning and creation of capacity will probably not be optimal. An obvious result is that the financing required to provide any given level and quantity of landside throughput capacity will be substantially greater than is necessary. Once more, whatever method is employed to raise revenues sufficiently to cover the financial obligations of the airport operator, checks and balances must ensure that the resources employed to provide landside capacity are the least required to do so.

RECOMMENDATIONS

In light of the foregoing considerations, several recommendations would seem to be in order. These recommendations fall into several categories. Some relate to the development of means for anticipating landside capacity requirements with greater precision than before; others are concerned with creating tools to support the more effective and efficient use of the resources devoted to meeting landside capacity needs; still others go to the problem of determining how efficiently resources are being employed to provide landside capacity and to develop it in such a way as to promote efficiency in all other areas of air transportation. Taken together, these recommendations constitute a modest program of economic research designed to increase the knowledge available to those responsible for planning, financing, providing, and managing airport landside capacity.

With respect to the development of means for anticipating airport landside capacity requirements, it is recommended that

1. To support airport landside development a forecasting format be developed that incorporates all relevant parameters including those associated with social and technological change, inflation rates, and air-travel and shipment demand; and
2. A monitoring system be devised that will provide early warning of an impending

mismatch between airport airside and landside capacity either on a national scale or at the level of a single airport and that will likely be based on identifying and tracking leading indicators from among the myriad statistics on air traffic and air transport activity that can be gathered.

Analytical tools are required to support the more effective and efficient use of the resources devoted to meeting landside capacity needs. To meet this requirement, it is recommended that

1. Measures be developed for expressing the capacity of the airport airside and landside in such a manner as to facilitate comparison between the two in order to minimize the chance that capacity imbalance will develop between them;
2. Precise measures be developed for the cost of capital available from alternative sources and for landside capacity development;
3. Criteria be established concerning airport landside economic and financial performance that must be met prior to the receipt of ADAP funds or to the imposition of airport head taxes to support landside expansion or revision;
4. A uniform code of accounts be developed for airport financial and managerial accounting and that its use be required as a condition precedent to the receipt of additional federal aid for airport development or expansion; and
5. A cash-flow model of the airport be developed to permit the financial effects of any policy, investment, or operating decision to be analyzed before the decision is implemented.

To determine the efficiency with which resources are being used to provide airport landside capacity and to ensure that the efficient operation of other components of the U.S. air transportation system are not jeopardized, it is recommended that

1. A study be made of all significant input markets related to airport landside development to determine the degree to which competition sets input prices and to ensure that such input prices are kept to a minimum through appropriate purchasing practices on the part of airport operators;
2. All barriers to the efficient allocation of resources to landside development be identified and the most effective means of dismantling or overcoming these barriers be developed (this should be accomplished in such a way as not to impair unduly the ability of carriers and concessionaires to compete effectively in their respective markets); and
3. A study be undertaken to quantify as precisely as possible the burden on interstate commerce imposed through the misallocation of resources to airport landside development and operation.

REFERENCE

1. R. Eckert. *Airports and Congestion: A Problem of Misplaced Subsidies*. American Enterprise Institute for Public Policy Research, Washington, D.C., 1972.

DISCUSSION

Leo F. Duggan, Airport Operators Council International, Inc.

Although Gellman's presentation is most useful in illuminating important theoretical issues, airport operators disagree with some of the recommendations he makes. The

following comments provide other viewpoints on some of the specific issues related to the management of airport landside development and operation. For ease of analysis and comparison, the issues are discussed in the general framework of the categories presented in Gellman's paper.

INVESTMENT

There is little doubt that public policy and politics will play an important part in determining the level and character of investment in airport landside capacity. Capital and labor trade-offs, the extent to which inflation and wage rate expectations are taken into the calculus, the quality of service to be provided, and the extent to which peaks are accommodated are all matters that not only require rigid quantitative analysis but also are ultimately determined in the forums where public policy is decided. Furthermore, public policy should be determined primarily by the communities served by the local or regional airports. It is at this level that the community needs, concerns, and objectives must be defined and satisfied. This is not to denigrate the role of the federal government in setting standards for air traffic control, environmental impact, and air route and air fare regulations. However, matters such as location and size, land use, and operating and financial management should be left to the local decision-making process. In this manner, airports can best meet the needs and objectives of the communities which they serve.

DEMAND

We do not believe that any prudent airport operator could disagree with Gellman's contentions that the character of airport demand is an important determinant of the character of the resources that are required to provide the airport landside system or that it has become increasingly important to minimize the extent to which mismatches occur between aircraft and landside capabilities. A prime objective in providing the interface between landside and aircraft should certainly be physical and operational flexibility.

However, with respect to Gellman's discussion of elasticity in concession pricing, we would argue with the statement that automobile parking facilities can command abnormally high prices. We are not aware that current rates are abnormal by comparison with rates charged, for example, in the central business districts of the cities served by the respective airports. Even if prices were higher, airports that are congested are faced with the need to allocate their available land and capital resources in the most efficient manner. This is why some airports have relatively high short-term parking rates so that the areas in front of the terminal can be most efficiently used by the most people. Many congested airports are also limited with regard to the amount of long-term storage they can provide. Most travelers, we believe, have the option of being driven to the airport or of using taxis or public transportation. The available resources, both land and capital, have to be determined by local needs and local policy objectives. Airport operators do not, as Gellman puts it, "take advantage" of special cases of inelastic demand. They must, however, understand these elasticities and take them into consideration to provide landside capacity efficiently.

COST STRUCTURE

Gellman makes several statements that detailed cost functions are calculated for few public enterprises and that decisions are "made more on the basis of public policy and politics than of economics." This, he notes, has resulted in a deliberate selection of capital-intensive means for providing additional capacity.

These are general contentions that could probably only be supported by a most detailed, case history review of an adequate sample of past decisions, and hindsight can inevitably put things into sharper focus than foresight. Given air travel forecasts that

have been followed (for better or worse), given the inadequate projections for aircraft equipment, given, indeed, the euphoria of the late 1960s, one can understand why many capital-intensive approaches were taken. This is not to say that less capital-intensive programs were not evaluated and considered. In some cases, such as cargo handling, decisions on large capital expenditures for automated equipment were made in the hope of lowering unit costs. This was certainly in the interest of "classical economic efficiency." But automation in this area did not prove to be the panacea for the great cargo breakthrough for which we were all looking.

OPPORTUNITY COSTS

Gellman states, "All too often opportunity costs are not calculated and factored into the decision-making mechanism. . . ." We would generally disagree. Although opportunity costs as specific, quantifiable factors are frequently not used in formal economic evaluations, there is an awareness of their pertinence in most important decisions. The airport operator is quite aware of the differentials in return that can be received from various sectors of the terminal and land resources; and, more often than not, these differentials are considered in making the final decisions as to which revenue or nonrevenue generating activities are to take place in a particular area.

EXTERNALITIES

It is far easier to generalize about externalities than it is to do something about them. We can all probably agree that injured parties are entitled to compensation in an amount consistent with the cost burden that they bear. The problem comes in justly determining the cost burden and the allocation of the compensation. If we look at New York (Kennedy) Airport, for example, there is no question that airport activity contributes substantially to local highway congestion during peak periods, but so does Aqueduct Racetrack, so does the air cargo industry off the airport, and so do the people who go to and from Jones Beach and the Rockaways. The sum total of all of these uses impacts the local community in terms of highway and street congestion, air pollution, and so forth. The same can be said for most major airport areas. From a practical standpoint, these costs cannot easily be disaggregated; and, in the identification of benefits, the community becomes larger and larger geographically as the usage of each highway is considered.

The quantification of external costs, we believe, was properly and comprehensively followed in the site comparisons made by the Commission on the Third London Airport. Such comparisons are most useful for the planners and decision makers in helping to arrive at a rational selection for a major capital undertaking such as a new airport, and the commission was able to identify some external costs that should actually be paid. However, as Gellman points out in his discussion of pricing, it is probably not feasible, for example, for airport management to internalize the costs of airside congestion through peak load pricing: "It is doubtful that even a substantial increase in charges during peak periods can have any measurable influence on what airlines do with respect to flight schedules. . . ."

PRICING

We are in complete agreement that "pricing policies and pricing decisions for public facilities are related to the overall objectives of the managements of such facilities. . . ." Once the revenue, profit, or rate-of-return objectives have been established as a matter of policy, then it is necessary to establish a structure of prices designed to produce revenue at the prescribed level. The managements of airports are, in fact, the operating units of government or authorities mandated by local government to operate within the framework of broad policies established by these same

governments. In other words, there can be no national, uniform objective on producing revenues or covering costs. The needs of one region are usually substantially different from the needs of another. These differences are, more often than not, reflected in differences in the institutional and organizational framework of the operating entity.

In Gellman's discussion of pricing he refers to the inelasticities of the demand for concession services and indicates that the income from concessionaires is often, though not always, used to cross subsidize the air carriers. Reference is made to Eckert's study (1) that indicates that airline fees represent only 22 percent of total airport revenues, this being an indication that the airlines somehow are not paying their way. We cannot substantiate Eckert's figures. Airport data show that landing fees account for about 33 percent of total revenues and airline leased areas account for another 9 percent so that the airlines are, in fact, contributing more than 40 percent of total revenues. Eckert does make the case that "larger facilities are more impressive to airlines, concessionaires, colleagues in the industry, and the general public alike." "This," he says, "may partially explain the subsidization of airfield activities by concession rentals. . . . Airlines gain from paying below-cost fees for the single airport activity that is essential to their operation: the right to land and take off." Airline and general aviation groups have sought to retain these fees and shunt most airfield costs onto concessionaires, customers, and the general taxpayer. No justification can be found in Eckert's study or in any other material to support these contentions.

The large hub airports in the United States are generally structured so that the airlines pay their costs for the airfield and terminal facilities that they use. This is not to say that concessionaires, in some cases, do not pay a higher rental on a square foot basis than do airline users. We do not believe that this is necessarily cross subsidization. The airline terminal represents a mix of enterprises, and the argument over whether the airline operation is the primary or secondary product is beside the point. Passengers, apart from their need for airline service, require a range of terminal services, and they are free to select or reject a variety of consumer goods and services. To the extent that there is inelasticity of concession demand, we do not believe that this inelasticity necessarily means that the prices charged are abnormal. Neither do we believe that a prudent operator should allow price gouging, and the operators are most concerned about this issue and enforce appropriate controls. If, as Gellman contends, airport revenue bonds have been exceptionally well received in financial markets, it is partially because of the demand that exists and has grown for goods and services in the terminal complex. If a community or authority operating for that community elects to provide its basic transportation areas at a lower rent level than for concessionaire areas and that community or authority believes that this is in the interest of providing essential intercity transportation, then there should be no theoretical objections. Even though there is little cross subsidization, we do not see that cross subsidy is necessarily objectionable or not economically justified. In a similar manner, we have a present concern with the increasing short-haul rates of the Civil Aeronautics Board, an attempt presumably to do away with cross subsidy from the long-haul routes. If some amount of cross subsidy can maintain a viable short-haul intercity system in the United States, that amount of cross subsidy should be permitted.

Gellman points out that "there is substantially greater community of interest between the airport management and the carriers than between the airport management and the concessionaires." We are uncertain what the real point is. There is a public utility consciousness on the part of the airport operator to provide the best transportation facilities possible and to cover total costs. The concessionaires are not victims of monopoly. If anything, they are the beneficiaries. If there is inelasticity for their goods and services, they also benefit in terms of profitability. It seems that the only real measurement of whether the concessionaires are in fact paying substantially more for what they are getting is the demand for concessionaire space and the profitability of concessions in the use of that space.

Operators support Gellman's contention that "the theory of peak load pricing is extremely persuasive, but the concept has neither been easily placed into practice nor met with much success when it has been attempted." It again raises the issue of public

policy with regard to keeping the doors open to the smaller communities and their carriers, which cannot compete on a fully allocated marginal (delay) cost basis with the service from large communities. Again, we have the practical and political problems of internalizing congestion costs. The questions are, How do you measure? How do you desegregate the delays caused by different users? How do you distribute the revenues that would be derived to the affected external parties assuming they can also be properly identified? The theory, like the theory of peak load pricing, is extremely persuasive, but it lacks utility and may even break down conceptually in an attempt to identify all costs and benefits to the community at large.

FINANCIAL INSTRUMENTS

Gellman's review of the present financial instruments is found to be comprehensive and authoritative. However, we disagree with his contention that "there is a real question as to whether the federal government will allow ADAP funds to be applied to terminal projects without requiring that at least some calculations be made to demonstrate that the capital is being used in an efficient manner." In his recommendations, he further suggests that "criteria be established concerning airport landside economic and financial performance that must be met prior to the receipt of ADAP funds or to the imposition of airport head taxes to support landside expansion or revision," and that "a uniform code of accounts be developed for airport financial and managerial accounting and that its use be required as a condition precedent to the receipt of additional federal aid for airport development or expansion."

These proposals seem to be in opposition to the intent of the proposed administration legislation that would give ADAP funds back to the municipalities and authorities to use at their discretion for airport development. The proposed law, therefore, recognizes the desirability of local control and conversely the undesirability of too much control at the federal level.

These recommendations would also seem to be in opposition to his own contention that "pricing policies and pricing decisions of public facilities are related to the overall objectives of the managements of such facilities." If communities and their airport authorities have different needs and different objectives in meeting their responsibilities to serve the public and if the institutional makeup of these authorities and operating units can vary widely, then standard economic criteria and uniform accounting practices are probably impossible to achieve. In addition, the benefits would not be worth the colossal effort that it would take to try to approach conformity. And, in the final analysis, to what purpose?

FUTURE REQUIREMENTS

Support is given to Gellman's general conclusion that airport landside "facilities must be planned and developed with physical flexibility in mind so as to minimize the probability that the life of the investment will be less than that of its financing." His words of caution on the uncertainty of future levels of growth are also well taken. Full cognizance should be given to "the possibility that leveling off and even downturns may become common in areas of economic activity associated with aviation."

MANAGEMENT

Gellman states that "a well-managed facility should have a minimum of cross subsidy." Perhaps, but local needs and objectives should, in the final analysis, determine the need and desirability of cross subsidy.

He continues, "All who furnish capital for airport expansion and development are obligated to ensure that the capital provided is used in a most efficient manner and that the airport remains responsive to the needs of present and potential users. . . ." Agreed,

but local government, in the final analysis, has to determine what is most efficient, what can be afforded, and what is responsive to the needs of the user.

AUTHOR'S CLOSURE

I am pleased to have the opportunity to respond to Duggan's cogent and well-expressed commentary.

Before considering his points in turn, I believe a brief introductory statement is warranted to set the stage. The paper I prepared was deliberately couched in theoretical terms to assist in establishing a common intellectual base for the discussions to be held during the conference (the paper was presented at the plenary session before the workshop sessions began). Nevertheless, I tried to use as many practical examples as possible in order to give life to the theory. Apparently this met with some measure of success given the general reaction to the paper and the ease with which Duggan is able to identify areas to which he objects on behalf of the Airport Operators Council International.

It should be understood at the outset that, although the paper was designed to lay a theoretical basis for ensuing discussions, the conference convened with the knowledge that the federal government would likely soon make funds available for the first time to support the development of airport landside capacity. This would mark a sharp break with past practice and in some respects underlay sponsorship of the conference in the first place.

A basic thesis advanced in the paper is that the entity providing funds for airport landside facilities should reasonably have something to say about how those funds are employed in creating or expanding airport landside capacity. Organizations, whether they are public or private, that furnish capital for any purpose should, and virtually always do, exercise some oversight concerning the applications of the funds provided. Why should the situation be different for the federal government, which is about to embark on a substantial program to provide capital to airport operators throughout the country explicitly to be used in the creation or expansion of airport landside capabilities? Indeed, it is only good economics and good public policy that the federal government should become involved in the investment and operating decisions if only to ensure that the marginal utility of the last dollar it provides to each project is, within the limits of practicality, the same. If this observation implies criticism of the present administration-sponsored ADAP legislation, then so be it. But it is neither good economics nor good public policy either to provide the same number of dollars or to provide dollars on a formula basis to all airports regardless of the extent to which their present operations meet or fail to meet market demand or to achieve given level-of-service criteria, whether they be implicit or explicit.

To place it in the context of the Tampa Airport or the new Dallas-Fort Worth Airport, it is ludicrous to provide federal dollars for landside development while there are such great needs manifest relative to the landsides of so many other airports in the United States. Of course, if additional capital were to be furnished to Tampa or Dallas-Fort Worth for landside development by local or airport user sources, within some constraints discussed in the paper and to be discussed further below, that is a different matter. But if federal money is involved, the entire spectrum of airport facilities in the United States should be surveyed to ensure that the resources of the federal government for landside development are efficiently and economically allocated and used.

There is yet one other general point to be made, one considered neither in my paper nor in the course of any of the workshop sessions. Specifically, I suggest we begin to keep in mind that the Constitution of the United States prohibits any unreasonable burdens being placed on interstate commerce. Such a prohibition, it seems to me, is

violated whenever the expenditures made to provide any given amount of landside capacity produce facilities more elaborate or more expensive either to acquire or to operate than they need to be. Just as the economist's basic tenet that "there ain't no such thing as free lunch" is an accurate reflection of the real world, so it is clear that airport facilities are going to have to be paid for by someone. For the most part, that "someone" is either the airlines or other users of the airport (i.e., passengers, shippers, visitors, employees) and, in most instances, the parties who have to pay for any excesses are certainly "in" interstate commerce. Therefore, simply in terms of the Constitution, the federal government has not only a duty but an obligation to ensure that the burdens placed on those so engaged are minimized.

INVESTMENT

My disagreement with Duggan relative to the "investment" section of his comments concerns the notion that "public policy should be determined primarily by the communities served by the local or regional airports." Were it not for my two introductory points, I might agree with Duggan; but since we are now facing a situation in which massive federal funds are to be made available for airport landside development and since excessive investment and inappropriate and expensive operating policies serve as major burdens on interstate commerce, then I believe the federal government should have considerable say about what public policy ought to be toward airport landside development and has an obligation to ensure that landside development is reasonable in concept and quantity and economical in execution and operation. Again I would say that the federal government should be concerned if only because the Constitution mandates that it be. But it is even more imperative, and reasonable, that the federal government be involved in establishing public policy in this regard as we enter an era when federal funds are to be used to provide capital for airport landside facilities, if not operations.

For reasons already given, it is not clear that all matters related to location and size of airports should be left to "the local decision-making process" as Duggan suggests. I am certain that, in the interests of the efficient allocation of resources, the operating and financial management of airports should not entirely be left in the hands of local entities—perhaps not even if all the funds generated to establish and operate these facilities come from other than federal sources. Once more I cite the constitutional prohibition referred to above.

DEMAND

It is difficult to believe that Duggan does not accept per se that "automobile parking facilities can command abnormally high prices" at airports. Surely the comparison with the parking rates in the central business district of cities is a red herring. If he insists on making a comparison, it might better be with a point of land located equidistant from the CBD as the airport is but in some other direction; but this, too, would be essentially meaningless in the present context. As a matter of fact, Duggan undercuts his own argument when he notes, correctly, that "some airports have relatively high short-term parking rates." Certainly many people find it necessary to park their automobiles when they visit an airport for one reason or another, and this necessity, of course, gives rise to the relative inelasticity of the demand for parking facilities at airports.

Let it be clear that I did not suggest that the demand for automobile parking space at airports (or for any other product or service) is perfectly inelastic over all possible price ranges. Obviously the demand curve has some downward-to-the-right slope to it and, moreover, the slope changes. (That is, the demand function is not likely to be a straight line.) Indeed, for some ranges of price, the curve may even be price elastic as I believe was demonstrated in the case of the Port Authority of New York and New Jersey, which changed the parking lot pricing structure to go to very high rates for

short-term close-in parking. (It is my understanding that the Port Authority realized less revenue after the pricing structure change than before but the service to the public was judged substantially better. The Port Authority, in such an instance, was apparently defining its mission not only in terms of revenues or return on investment but also in terms of the level of service provided to the public. Would that all airport managements took this enlightened view of their mandate!)

In general, I believe that, with regard to concessions, including parking, airport operators do in fact "take advantage" of special cases of inelastic demand with the principal exception possibly being, in numerous but not all instances, the space rentals and other charges levied by airports on air carriers. To a limited extent such practices are reasonable, but the bounds of reasonableness must be defined in terms of resources consumed in providing the services of the airport. The simplest way to see the extent to which airport operators do take advantage of the relatively inelastic demand for goods and services sold at the airport is to look at the prices attached to services or products sold at airports and compare them with the same services and products offered elsewhere in the community. For example, it is well documented that automobiles can be rented in most large metropolitan areas at far lower rates off the airport than on the airport, even from the same company. This is a reflection of the high concession fees, commissions, or space rental charges that automobile rental concessionaires are willing to pay to have an airport location since the demand emanating from the airport is far less elastic in terms of price than is the case elsewhere in the community. Again, in what is probably a substantial majority of airports, all but local newspapers command a price in excess of that charged for an identical paper in most other places in the community. A recent comparison of the price of the New York Times at airport newsstands and hotels in the same communities (outside New York) showed this clearly. Once more, the price increases are a reflection of the relatively inelastic demand faced by the news dealers on the airport which, in turn, accounts not only for their ability to charge a premium for some of their wares but also for the ability of the airport management to obtain substantial revenues for granting such concessions. Once more, I certainly do not object that these revenues are substantial. What is unreasonable is that these revenues should be used to finance inefficient airport landside configurations and operating practices on the one hand and be used, in some cases, to charge certain tenants less than even the marginal cost associated with the use of the facilities provided at the airport.

COST STRUCTURE

Once more I am surprised that Duggan would challenge the notion that under certain conditions capital-intensive solutions are (politically) more attractive to public enterprise managers than are alternative means of providing the same quantity and quality of service. Let us note in passing that to suggest that a facility is capital-intensive does not necessarily mean that it cannot be operated with relatively great use of labor if such a practice serves the political interests of the public enterprise managers as well. Unfortunately, the labor and capital intensities are not mutually exclusive as has been demonstrated at numerous airports, more in Europe even than in the United States.

With respect to the value of case histories, I agree with Duggan. Fortunately, there are enough informally produced case studies to support the hypothesis advanced in my paper relative to capital intensity, overinvestment, and inflexibility of airport terminal complexes. But what is most galling, perhaps, is that those who ought to be aware of such mistakes in judgment all too often seem oblivious to them. This is reflected in some airport planning, investment, and operating decisions being made currently in a period in which the past excesses Duggan admits are being totally ignored. One of the points that ought to be made here is that all too often the managers of public enterprises (such as airports) and of regulated industries that are protected from competition (such as most air carriers) generally do not have to pay the price directly when they use inappropriate demand forecasts, when they act through "euphoria" to commit massive

resources, public and private, to projects such as airports.

Certainly Duggan is correct that one can "understand why many capital-intensive approaches were taken" during the last 20 years or so. But he cannot excuse the extent to which such practices continue unabated with, perhaps, the present construction program at Philadelphia International Airport being the most obvious single case in point in North America at the moment. (I cannot forbear observing that the Dallas-Fort Worth Airport probably represents the worst single case of misallocation of resources with respect to airports, and it was completed—to its present state—in the face of clear evidence that the forecasts of the past were far too optimistic, that the relevant physical characteristics of aircraft were changing and would continue to change, and that the likelihood of establishing direct intercontinental routes based on the Dallas-Fort Worth region was far less than had been anticipated earlier.) In any case, it is reasonably clear that the projects that create or expand airports all too frequently proceed without sufficient regard for the cost levels and cost structures associated with the airport concept and design ultimately chosen.

I regret to say that I would treat Duggan's comments concerning cargo handling as an attempt to draw attention away from my central points. No one can make perfect judgments, and certainly the decisions relative to the acquisition of automated cargo-handling equipment proved to be wrong-headed ones. For the most part, by the way, these decisions were taken in the private sector and not by airport management, and the financial "baths" that resulted were taken by air carriers and not by airports. In a sense, then, the comments about air cargo, tied as they are to the automated-handling equipment, are outside the context of my paper.

OPPORTUNITY COSTS

It is difficult to reconcile Duggan's position that airport management considers opportunity costs when it reaches investment and operating decisions with his remark in the next sentence that "opportunity costs . . . are frequently not used in formal economic evaluations." Either opportunity costs are entered into the calendars or they are not. It cannot be both ways, and since the opportunity costs can only be considered through the medium of a monetary value, such considerations need to be explicit in order to be considered. Opportunity costs are probably most ignored when they relate to perhaps the scarcest airport resource of all: the land on which they are situated. Indeed, if opportunity costs were given their proper consideration relative to land values and land use, the configuration of the landside at a considerable number of hub airports in the United States would undoubtedly be substantially different from what it is.

EXTERNALITIES

Duggan seems to endorse my comments concerning externalities, and no response is required.

PRICING

Duggan and I start out together with respect to pricing policies and pricing decisions, but our views soon diverge. Specifically, I do not agree that, because "pricing policies and pricing decisions for public facilities are related to the overall objectives of the managements of such facilities," there can be "no national, uniform objective on producing revenues or covering costs." The two are not mutually exclusive. Once more I would point out that, especially where federally supplied funds are to be used, it is essential for the sake of good resource allocation that what economists call the "marginal efficiency of capital" be as nearly identical as possible across the entire national airport spectrum. This can only be achieved through the promulgation of some uniform, even if general, objectives on such things as rates of return on investment and levels

of service. This is true whether or not one grants Duggan's point to the effect that "the needs of one region are usually substantially different from the needs of another" because the needs that ought to be of concern are those related to transportation rather than those relating to political and other extraneous needs in the community. Certainly federal funding should not be used to support monument-building to the greater glory of a political organization in a given community (whether or not some other community is deprived of such funds to elevate the quality of transportation service provided at another location). Again, a poorly conceived airport plan should not gain federal support to the same extent as the better conceived, efficiently executed plan.

With respect to the study by Eckert as it relates to airline landing fees, I am concerned about Duggan's inability to "substantiate Eckert's figures"; but, from experience, I know Eckert to be a careful workman and suggest that the problem of statistical reconciliation can best be solved through communications between Duggan and Eckert. In any event, it seems to me that Duggan's comments ignore the principal point I was attempting to make through Eckert's data and that is that, since landing fees tend to fluctuate from airport to airport and from year to year at the same airport, this would seem to constitute prima facie evidence that landing fees, if not space rental charges, are something of a residual in this airport pricing structure and are scaled deliberately to bring airport income up to the mark and ensure coverage of the debt and expenses of the airport. Such treatment of the airlines cannot but make them proponents of pricing schemes and pricing structures that result in cross subsidization in their favor, and Eckert (and others) hold this is precisely what has happened in many cases. Eckert's general contention, as reflected in the quote from his report (1), is well supported by data developed concerning the construction and operation of airports throughout the United States. Certainly Duggan cannot support his contention that "the large hub airports of the United States are generally structured so that the airlines pay their costs for the airfield and terminal facilities that they use." Even if Duggan's estimate is accurate that airlines as a whole provide some 40 percent of the total revenues generated at airports, it is difficult to support the contention that airlines, in the general case, do pay their full costs. In fact, if Duggan does not believe that it is not cross subsidization when concessionaires "pay a higher rental on a square foot basis than do airline users," where the "value" of the space is identical as determined by opportunity costs, then, of course, his contention that airlines pay their fair share of costs is probably supportable. But that system of economics is clearly not one that most of us would accept. I must also remark, in passing, that his comment that "the argument over whether the airline operation is the primary or secondary product (of an airport) is beside the point" entirely loses the point. To determine primary and secondary products in many fields is difficult but not in the case of an airport. If you take away the airline-related activities of an airport, you have the sound of one hand clapping. Therefore, it should be clear what the primary "product" is in terms of airports and the facilities related to them.

I agree with Duggan that "a prudent (airport) operator should (not) allow price gouging," but it is not enough to advance this notion as a wish; there must be some enforcement of the principle, especially where public funds are employed to create the conditions under which price gouging becomes a realistic possibility as can clearly be observed at many airports through analysis of the prices charged for products and services dispensed by concessionaires located in airport terminal buildings or adjacent to them. Incidentally, Duggan makes an excellent point to the effect that airport revenue bonds have been well received in financial markets precisely because investors know full well that there is sufficient demand inelasticity to ensure that prices can be established at levels that ensure the necessary generation of funds to meet the bond obligations. The object of public policy should be, in part, to ensure that airport operators exercise restraint in establishing price levels and price structures, and this in turn requires that their investment and operating decisions be taken with the efficient use of resources now and in the future as the primary objective. All too often this is the consideration with which public policy, particularly at the local level, has not been much concerned. In this connection, by the way, I think Duggan does little to advance his cause when he states that "we do not see that cross subsidy is necessarily

objectionable or not economically justified." Particularly where cross subsidy is perpetual, as in the case of airports employing cross subsidy to any significant extent, such a policy of cross subsidy is per se objectionable, for it ensures uneconomic use of resources certainly within the context of the airport and probably on a much broader basis within the entire air transportation system. The objections are not only theoretical, they are practical as, it is to be hoped, the airport user community and the taxpayers may some day come to realize.

Once more Duggan is correct in pointing out that the concessionaires at airports are not necessarily the "victims of monopoly." Though on occasion the concessionaires may be, the real victims of monopoly are the more-or-less captive customers of such concessionaires. Where price levels are high and demand is quite inelastic, the concessionaires can very well benefit substantially by being located on an airport. To be located in such circumstances is, of course, the reason they are willing to pay high fees. What is desired is some balance, which all too often is lacking with the result that, as mentioned in my paper and acknowledged in Duggan's comments, substantial cross subsidy comes into play. Let me put it this way: The demand for the products and services offered by concessionaires at airports is largely derived from the demand of persons for air travel. In turn, the demand for concessionaire space at airports is derived from the demand of persons for the goods and services they provide. We have a chain of derived demands, and what is critical is to assume the ultimate beneficiaries of the inelasticities to be the public, which, at base, provides the greatest proportion of the resources associated with the provision of airport facilities.

FINANCIAL INSTRUMENTS

It should be clearly understood that at the time my paper was written it was not entirely clear that the federal government would allow ADAP funds to be used in landside projects without requiring that at least some calculations be made to demonstrate that the capital would be deployed in an efficient manner and to promote efficient allocation of resources. Given the ADAP legislation now emerging, Duggan is entirely correct in observing that my suggestions that "criteria be established concerning airport landside economic and financial performance that must be met prior to the receipt of ADAP funds or to the imposition of airport head taxes to support landside expansion or revision (and) a uniform code of accounts . . . for airport financial and managerial accounting . . . be required as a condition precedent to the receipt of additional federal aid for airport development or expansion" are not consonant with the present ADAP bill. This does not make the Administration's proposal "right" or consistent with good economics and good public policy, which I believe should support optimum allocation of resources in the economy. But then, there was never any intention that either my paper (or the conference itself) should strive to support any given legislation or legislative proposal. In fact, this could not possibly have been the case when the terms of neither were known when the conference was being planned and the papers related to it were in preparation.

The notion that my strong recommendations relative to the creation of a uniform code of accounts and to the establishment of criteria concerning airport landside economic and financial performance are inconsistent with my contention that "pricing policies and pricing decisions for public facilities (should be) related to the overall objectives of the managements of such facilities" misses the critical point that the latter is true only where the overall objectives are, in fact, consonant with effective and efficient resource allocation and good public policy. Where the overall objectives are not consistent with the efficient use of resources and sound public policy, then pricing policies and pricing decisions should not be employed to support them, especially where public funds are involved in providing facilities.

I do not agree with Duggan that, simply because the "institutional makeup of (airport) authorities and operating units can vary widely," generalized and uniform economic or efficiency criteria are impossible to establish and a uniform code for financial and managerial accounting is difficult to develop and introduce. Many businesses and industries, both public and private, have much more complex production functions than

airports; not only do many of them have standards of performance that are recognized widely as having validity for comparison purposes, but also a significant proportion of them have more or less uniform accounting systems that enable investors and the public in general to make general comparisons among enterprises in terms of their efficiency even if the units are of disparate size and even if they have somewhat different product mixes. The establishment of efficiency criteria and the development of uniform codes for financial and managerial accounts for airports, therefore, would be neither a costly nor a difficult undertaking and would support the development of public policies and both public and private decisions that lead to making the most of the resources devoted to the establishment and operation of airport landside facilities. Therefore, I would hope that the Airport Operators Council International would soon come to support such activities.