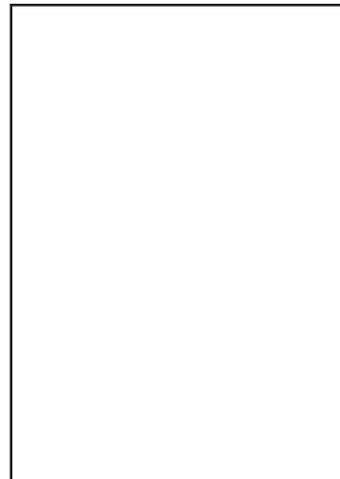


# **PRICING AND CHARGES IN CIVIL AVIATION**

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*Pricing and Charges in Civil Aviation*  
*By Tulsi Kesharwani*

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## FOREWORD

Pricing is a method of resource allocation; there is no such thing as the 'right' price but rather there are optimal pricing strategies to permit specified aims to be achieved. The optimal price, for example, to achieve profit maximisation may differ from that needed to maximise social welfare; facilitate sustainable development; or maximise passenger numbers. One of the major problems in discussing transport pricing policies is to decide exactly what the objective is. The pricing policies in the civil aviation sector have sought to achieve several objectives, some even conflicting.

Tulsi Kesharwani, in this paper, analytically discusses the various aspects of pricing and charges in the civil aviation sector, including the support services of airports and air navigation. To this analysis, he brings his rich experience in planning and financial areas of civil aviation as also his deep insight into the various dimensions of aviation pricing. It is hoped that the monograph would be useful to the policy-makers and researchers in understanding the intricacies of pricing and charges in the civil aviation sector and would also help in shaping the future pricing policy for the sector.

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*Director*

## INTRODUCTION

Civil Aviation is the most modern form of transport. Despite recent globalisation and liberalisation of the aviation industry, in a large number of countries, it is still owned and operated by governments or government-owned undertakings. Moreover, it happens to be one of the most regulated industries in the world.

Article 1 of Convention on International Civil Aviation signed in Chicago in December 1944 (hereinafter referred to as Chicago Convention), which established the International Civil Aviation Organisation (ICAO), stated : “the contracting States recognise that every State has complete and exclusive sovereignty over the airspace above its territory”. Due to this provision regarding sovereignty of States, every State must obtain agreement of other State or States to operate international air services, through either bilateral or multilateral agreements.

Presently, the international civil aviation is primarily regulated by bilateral air services agreements although there are several multilateral agreements as well. The bilateral agreements *inter alia* provide for reciprocity and equality of opportunity in sharing of traffic rights, procedure for approval of fares and rates, entry and exit from the routes, restrictions on route operations, limitations on development of capacity, designation of airlines, substantial ownership and effective control of the designated airlines by the government or citizens of the country, taxation, etc. The provisions of new bilateral agreements are more liberal. “Open skies” agreements providing for unrestricted traffic rights, capacity and tariff flexibility are slowly becoming popular. However, the process of liberalisation is slow. ICAO’s general approach is greater

liberalisation in the provision of international services. However, for domestic services every State is sovereign to decide its own policy.

The providers of airports and air navigation services are not completely free to fix the charges. International airports which are open to public use have to follow ICAO guidelines some of which are binding on the States which are signatories to the Chicago Convention. Presently, 185 States in the world are signatories to Chicago Convention, including India. Accordingly, India is bound to follow the provisions of the Chicago Convention in regard to fixation of airport charges. Moreover, in most cases, the providers of services must obtain the approval of the respective government or regulatory authority in regard to the revision of aeronautical charges. India is one of such countries.

Pricing of civil aviation services in India as in the rest of the world is a complex process. It is significantly different from normal industries and even different from other modes of transport, although the underlying fundamental principles may not be different. When considered that there may be more than fifty different fares between two cities in different countries, a measure is obtained of the magnitude of the work involved in establishing or revising fares on global basis.

## **GENERAL PRINCIPLES AND OBJECTIVES OF PRICING AND CHARGES**

Civil Aviation is a part of the transport network in India like any other country. The principal objective of a transportation policy should be to ensure an optimal development of the transport system of the country. This requires that development of transport moves in step with the overall economic growth to ensure proper balance between transport and other sectors of the economy and within the transport sector, there is a well coordinated and integrated development of the various modes to minimise transport costs to the economy. The pricing policy for civil aviation as for other modes of transport should strive to achieve these objectives.

Civil aviation like any other mode of transport basically serves the same general objective of moving people and goods from one place to the other. Therefore, the same principles of pricing and charges should apply to civil aviation as to other modes of transport, at least theoretically. However, every mode of transport has certain special characteristics and management system in each case is also different. The profile of people using different modes of transport, distances of travel and also the objectives of travel may not be the same in each case. Similarly, the nature of freight traffic and the distance of carriage may also not be similar for different modes of transport. Therefore, it is not unusual that differences in pricing strategies develop in actual practice. Sometimes this happens because of historical reasons also.

In earlier days, two basic principles were applied for pricing of transport services, namely, cost of service and value of service.

In India, the Air Transport Council, which examined the fare structure of Indian Airlines over four decades ago, considered only these parameters. Since then, public sector pricing structure has undergone intensive research and studies leading to various changes. Besides, entry of private sector in several areas and the resultant competition has given a new dimension to the pricing of transport services.

The Steering Committee on Perspective Planning for Transport Development, Planning Commission (1988), which also examined the issue of pricing, observed that for optimising of investments in the transport sector, it is important that transport pricing should reflect long run incremental costs. The Committee, however, felt that it was difficult to enforce this principle in practice. There was a great deal of ambiguity with respect to private marginal costs, which obviously varied as between different transport situations. Thus, the unit costs of services would differ depending upon the density of traffic and condition of haulage, etc. The Committee further observed that market forces cannot be relied upon to bring about equilibrium between supply and demand for transport services and, as such, regulatory measures will have to be employed.

The Air Tariff Committee set up by the Planning Commission, which submitted its report in December 1989 recommended the long run marginal cost based pricing regime for Indian Airlines domestic air services for the following reasons.

- It links investment planning and costing.
- The resulting fares are based on technically feasible norms and are independent of Indian Airlines' actual costs, making the resulting fares incentive compatible.
- The enterprise becomes financially viable as the required capital costs are provided for recovery.

Since the Committee submitted its report, the legal and organisational structure of Indian Airlines has undergone considerable change, and also the airline has lost its monopoly on domestic routes. Nevertheless, some of the theoretical aspects of pricing discussed in the report are still valid. The report classifies alternative theories of pricing of public utilities in four categories. An excerpt from the Report, which contains the conceptual framework of determination of airline fares, is appended to this study.

It is to be noted that when the Committees referred to above examined the pricing issues, the role of the private sector in the Indian transport system was limited, primarily in the field of road transport services. Since then, the role of the private sector in providing transport services, including civil aviation services in India, has been gradually increasing and competition among providers of these services has also been growing. As transport service is a perishable commodity, the role of short run marginal cost cannot be ruled out. International airlines all over the world are using short run marginal costs to maximise their revenues.

ICAO in its guidelines for airport and air navigation services charges mentions only the cost of providing the service and not the long run or short run marginal costs. Since charges are required to be non-discriminatory, cost should represent average cost. The guidelines also envisage intervention by governments and regulatory authorities established by governments, both in the case of airlines and airports and air navigation services in special circumstances. Airline prices need to be regulated to avoid cutthroat competition among the airline operators and regulation in the case of airports and air navigation services is required to avoid abuse of monopoly power.

Civil Aviation services, similar to other modes of transport, include two distinct services: (a) airline services which are provided by mobile equipment, namely, aircraft, and (b) airport and air navigation facilities and services which provide support to airline

services and are ground based. Worldwide, these two types of services are provided by different entities. Some of the principles and practices in regard to the pricing of these services are also different. Accordingly, pricing of these services has to be dealt with separately.

## AIRLINE SERVICES

### Global Financial Situation of Airline Services

Airlines fortunes in regard to their financial results on a global basis have been fluctuating. In general, they work on paper-thin margins. Even in the best years the operating results have shown only a limited surplus – a small proportion of the operating revenue. Table 1 sets out data in regard to operating and net results of airlines for the period beginning from 1989, two years before the Gulf war, which had devastating effect on the airline traffic and its finances.

**Table 1 : Operating and Net Results for Scheduled Airlines of ICAO Contracting States**

Year	Operating revenues (US\$ million)	Operating expenses (US\$ million)	Operating result (Percentage of operating revenue)	Net result (Percentage of operating revenue)
1989	1,77,800	1,70,200	4.3	2.0
1990	1,99,500	2,01,000	-0.8	-2.3
1991	2,05,500	2,06,000	-0.2	-1.7
1992	2,17,800	2,19,600	-0.8	-3.6
1993	2,26,000	2,23,700	1.0	-1.9
1994	2,44,700	2,37,000	3.1	-0.1
1995	2,67,000	2,53,500	5.1	1.7
1996	2,82,500	2,70,200	4.4	1.9
1997	2,91,000	2,74,700	5.6	2.9
1998	2,95,500	2,79,600	5.4	2.8
1999	3,06,600	2,94,050	4.1	Not available

Source : ICAO-The World of Civil Aviation-1999-2002.

1. Revenues and expenses are estimated for non-reporting airlines.
2. Up to and including 1997 it excludes operations within the Commonwealth of Independent States.
3. The net result is derived by adding non-operating items such as interest and direct subsidies and income tax.
4. Data for the year 1999 are preliminary.

Out of the eleven years for which data are presented in the above table, the airlines generated operating surplus for eight years. The net results were negative in five out of eleven years. The years, which saw losses, were just before and after the 1991 Gulf war.

Thus, slight ups and downs in traffic can easily upset the financial balance of the airlines. This situation is applicable to most of the airlines. Some of the smaller airlines in the world are operating at a loss for several years. A higher increase in capacity than the growth in traffic may bring down the financial results. On the other hand, increase in load factor may help the airlines in improving their financial performance.

In India, Air India has been incurring losses for the last several years due to various reasons, the most important among them being the poor quality of its product. Indian Airlines has also been incurring losses because of several reasons, including high wage bill. On the other hand, the private domestic operator, Jet Airways is able to generate a significant surplus.

In view of the rather precarious position of airline finances in the world, the fares and rates are frequently adjusted to take into account the increases in costs and also changes in the currency exchange rates.

### **Policies and Procedures for Pricing of Airline Services**

*Bilateral Air Services Agreements* : The present air transport regulatory regime has evolved from the Chicago Convention and the freedom it enshrines for the States to pursue their national policies in matters of airline pricing. However, in the case of international air transport services more than one State is involved, and, accordingly, the airline prices are settled through bilateral negotiations under bilateral air services agreements. The tariff clauses incorporated in bilateral agreements reflect the policies of individual States regarding international air transport. Such agreements commonly contain elements like definition of tariffs,

definition of routes for which the tariffs apply, the factors to be taken into account in establishing tariffs, and the arrangements for government approval of airlines tariff proposals. The bilateral agreements generally set out the circumstances under which the government concerned will intervene in the tariff development process. The most common forms of government action are: general policy directives to airlines, disapproval or modification of airline tariff-setting rules or tariff proposals, or issuance of specific government orders.

*ICAO's Role* : The ICAO has no direct regulatory role in airline tariff fixation but has developed guidelines on various aspects of tariff fixation and conditions associated with it. It has provided models of bilateral tariff clauses for guidance of the States. The texts concerned are for optional use and adaptation by the States to their particular situation. The model texts encompass basically three alternatives, namely, "double approval" approach (whereby tariffs proposed by airlines must be approved by both the parties to the bilateral agreement), "country of origin" approach (whereby each State regulates only those tariffs for carriage which commence in its own territory) and "double disapproval" approach (whereby tariffs come into force unless disapproved by both parties to the bilateral agreement within a specified period). Sometimes, "tariff zone" is specified (whereby tariffs falling within certain agreed parameters are automatically approved).

An important Recommendation (ATRP/9-1) of the ICAO Council in February 1997 was that "charging fares and rates at levels which are, in the aggregate, insufficient to cover the cost of providing the services to which they relate" should be treated as signals of possible unfair competitive behaviour meriting closer examination.

One of the recommendations made by the 1994 World-wide Air Transport Conference was that "each party would recognise that State aids/subsidies which confer financial benefits on a national carrier or carriers that are not available to competitors in

the same international markets can distort trade in international air services and can constitute or support unfair competitive practices; and accordingly agree to take transparent and effective measures to ensure that its aids/subsidies to certain air carriers do not adversely impact on other competing carriers”.

ICAO also publishes every year a “Survey of International Air Transport Fares and Rates” which provides an overview of international fares and rates. Another document published by ICAO deals with regional differences in the level of scheduled passenger fares and corresponding airline costs.

*IATA's Role* : Most governments delegate responsibility to airlines to negotiate mutually acceptable tariffs for international scheduled services. Subsequently, the resultant proposal is filed with the government concerned for approval. In order to facilitate and coordinate international tariff negotiations, associations of airlines have been established. This system has relieved the governments of routine negotiation of tariffs with several governments for international scheduled services.

The worldwide tariff negotiating mechanism is the tariff coordination conference system evolved by the International Air Transport Association (IATA), through which a number of principles and procedures for agreeing, constructing and filing tariffs have been developed. IATA has established seven Passenger Tariff Coordinating Conferences, which develop passenger fares and related conditions for each of the three geographical areas in which the world has been divided for tariff purposes and four combinations of those areas. A similar number of Cargo Tariff Coordinating Conferences have also been established.

IATA's system of multilateral tariff coordination has evolved over the years into a more flexible, transparent and less compulsory means of determining international tariff. Most governments rely on IATA's mechanism as the primary means of determining

international tariffs because of perceived benefits for their national airlines and as a means of facilitating a worldwide system of interlining.

It would thus appear that although airline fares between different pairs of cities are to be determined in accordance with the provisions of bilateral air services agreements between the two countries, IATA has been playing a crucial role in setting the airline fares and freight rates through tariff coordination conferences.

### **Airline Tariff Structure**

*Passenger Fares* : In contrast to other modes of transport (such as rail and water), air transport has developed a wide variety of different types of tariffs. Air carriers fashion tariffs to respond to different markets as well as different segments of the same market. This variety also reflects, in part, an air carrier's efforts to maximise revenue by varying capacity and price. For example, by allocating more seats at discount fares to routes, flights or time periods with weak demand and fewer seats where there is a strong demand, airlines seek to have as many passengers as possible fly at normal economy or premium fares, while concurrently stimulating discretionary travel.

A normal economy fare is the lowest priced fare, which allows a passenger maximum flexibility in terms of fare combination, refund, changes in itinerary and routing, etc. Such fully flexible and unrestricted fares often serve as a reference point for determining the price levels of other types of fares, such as premium class fares and restricted economy fares. There are several types of restricted fares, depending on the type and extent of restrictions. Moreover, there are other types of special fares, such as excursion fares, standby fares, budget fares, incentive, affinity and non-affinity group fares, individual and group inclusive tour fares, youth, family, military, pilgrim, local resident, student, teacher fares, etc. Charter fares are different and generally lower than the fares on scheduled services.

Normal economy fares in terms of per passenger-kilometre vary considerably with distance. The worldwide average fare per passenger-kilometre for a distance of 16,000 km is only about 20 percent of the average fare for a distance of 250 km. This reflects the lower cost of operation on long-haul flights. However, the proportion differs from route to route and region to region. For the same distance, the fares also vary between the routes and the regions. For example, the average fare per passenger-km for a distance of 250 km in Europe is nearly three times the fares on Asia/Pacific routes. However, for long distances the differences are not very significant

*Cargo Rates* : Cargo rates have some of the same distinctions as in the case of passenger fares and are determined using similar pricing practices and concepts, but with a different terminology. The general cargo rate varies with weight by applying different prices per kilogram depending on whether the weight of the shipment falls above or below a break point, which is a specified weight level at which the price per kilogram changes. General cargo rates do not vary with the nature and value of the property transported and are used when the property being shipped does not qualify for any other cargo rate. As a reference for calculating other rates, the general cargo rate serves a similar purpose as normal economy class passenger fare.

A rate which combines the pricing features of both premium and special fares is called a class rate, determined by applying a discount or a surcharge to a general cargo rate for certain commodities (for example, a discount for newspaper and a surcharge for commodities requiring special treatment during shipment, such as live stock, gold and securities). A rate, which has a similar purpose to special or discount fares is a specific commodity rate, used for certain types of cargo, which is generally lower in price than the general cargo rate at comparable weights. Container rates are generally different from normal cargo rates. The rates for owner-packed containers are generally lower than the normal cargo rates.

It thus appears that airline fares and rates are not directly related to either average costs or long run marginal costs but mainly on what the traffic can bear taking into account the short run marginal cost. The overall objective is to cover total costs. In many cases, the level of fares is not based on normal reasoning. For example, the fare between Bangkok and London, which has a longer distance, can be lower than the fare between New Delhi and London for the same class. Similarly, fare from certain African cities to Delhi can be higher than the fare to Dacca.

### **Technological Developments and Their Impact on Pricing**

Technological improvements in the aircraft manufacturing industry almost on a sustained basis and other productivity improvements have led to continuous real reduction in airfares and rates over the years. Between 1960 and 1998, the average yield of the airlines on a global basis in real terms declined by as much as 55 percent. As the cost of air travel substantially influences the level of air travel, the growth in traffic worldwide in the past has been much higher than the growth in economic activity represented by the Gross National Product. The real reductions in airfares have been achieved despite manifold increase in the price of aviation fuel, which is an important input in the cost of operation of airlines.

### **Liberalisation and Globalisation**

In the emerging climate of liberalisation and globalisation, new government tariff policies characterised by an increased reliance on market forces and reduced interference by the government agencies on tariff fixation are coming up. This has led to greater competition among the airlines in regard to the quality of service and other fringe benefits and also in the fares. Often the airlines do undercutting by offering discounts on published fares to attract traffic and fill the seats. The governments and the regulatory

authorities do not take the violations involved in such discounts seriously with the result that during lean periods the fares and freight rates fall. Thus, the level of demand and supply often plays an important role in the real prices despite regulations. For example, in India, the international fares are regulated by bilateral agreements and approved by the Government of India. However, in actual practice airlines offer different levels of discounts on published fares from time to time depending upon supply and demand for their services. The regulatory authority overlooks the violations unless some carrier, especially the national carrier Air India, makes a complaint. However, carriers also generally overlook the violations by other carriers and do not complain. Thus price-cutting or discounting on published fares becomes an accepted practice.

In future, the international airline industry is likely to see increasing liberalisation in the grant of traffic rights and tariffs. This is likely to have both positive and negative impacts. Mega carriers and financially strong airlines are likely to benefit from increased liberalisation, while weaker airlines specially in the developing countries are likely to suffer financially because they may not be able to withstand competition. As a result, they may have to be subsidised or may face closure.

#### **Airline Mergers, Alliances, Privatisation and Transnational Ownership**

Airline mergers may make the carriers monopolistic in nature. They may also lead to cost reductions and strengthening of the airline, leading to its increased competitive strength. In the long run, the monopoly situation could lead to increase in fares. However, much will depend upon the vigil and action of the regulatory authorities. Many proposals of mergers of airlines and transnational ownership are being questioned by the regulatory authorities, especially in the USA, to avoid monopoly or near monopoly situations.

Airline alliances are growing in number and the existing alliances are becoming stronger. Presently, there are two major airline alliances, namely, Star Alliance and One World Alliance of which major world airlines are members. Airline alliances lead to increase in the scope of air services to different parts of the world, improved frequencies and better connectivity for the passengers.

It appears that airline alliances will grow in the future and ultimately there may emerge only a few airline alliances encompassing most of the international airlines in the world. This is likely to create duopoly or oligopoly conditions with either more intense competition or almost no competition. The chances are that there will be increase in competition and reduction in tariffs. However, it is difficult to forecast the future with any certainty.

Privatisation and transnational ownership are currently growing mainly because of financial problems faced by many governments and several airlines. These institutional changes may lead to improvement in management and operation of airlines. However, they may not have any major impact on the prices of the services provided by the airlines.

Codesharing is a practice whereby one carrier permits another carrier to use its airline designator code on a flight or where two carriers share the same designator code on a flight. This practice leads to better utilisation of the rights under the bilateral agreements and results in revenue increase, cost savings and economies of scale. Taking advantage of the economies generated by their agreements on the one hand, and of regulatory arrangements like antitrust immunity, when granted, on the other, airlines participating in a codesharing arrangement should be able to offer lower tariffs to passengers than other airlines, although in markets with tariff flexibility this advantage is less likely to accrue. According to an ICAO study, it remains to be seen how this benefit will evolve on a long-term basis, given the uncertainties arising from the potential impact of codesharing on competition.

**Frequent Flyer Programmes and Loyalty of Passengers**

The frequent flyer programmes introduced by various airlines and the airline alliances have brought about an important change in the attitude of passengers, especially those who travel frequently on company account. Such passengers tend to be tied with a particular airline alliance. The airlines try to retain the loyalty of passengers by giving additional mileage after reaching a limit. In the process, some airline alliances have gained traffic at the cost of the airlines alliances with poor partners. This has made the competition among the airlines more intense. The airlines with poorer alliances or no alliances are competing by offering lower fares. Some studies have concluded that alliances have led to a reduction in the cost of operations. However, it has been observed that airline alliances have had no perceptible impact on pricing of airline services which are members of strong alliances, though it might have led to improvement in occupancy or the load factor and consequently an overall increase in the yield. It is possible that in the long run alliances may not have an impact on the prices of airline services as the net impact of alliances may be neutralised.

**Computer Reservation System**

Recent developments in computer technology and the introduction of computer reservation system have helped the airlines in maximising their yield by attracting full fare paying passengers and also increasing their load factors. As a result, the passengers who decide to travel at the last moment are often required to pay high fares. The airlines are able to manipulate the availability of seats in several restricted economy classes to fill the same by higher category of economy class passengers and thereby improve their yield.

Although ICAO has laid down strict guidelines for the States to check the misuse of computer reservation system by the airlines,

the system is still being abused by many airlines. Through manipulation the airlines are able to attract more passengers, increase their load factors and improve their average yield.

### **Fifth Freedom Right**

In 1944, the Chicago Conference produced, inter alia, three major agreements, namely, Convention on International Civil Aviation (the Chicago Convention), International Air Services Transit Agreement and the International Air Transport Agreement. The Chicago Convention was signed on 7 December 1944. So far, 185 States have ratified it. International Air Services Transit Agreement, also known as Two Freedoms Agreement, provides for the multilateral exchange of rights of overflight and non-traffic stop for scheduled services among its contracting States. Most States (118 out of 185 ICAO contracting States) have ratified this agreement and this is in force from 1945. However, the International Air Transport Agreement, also known as the Five Freedoms Agreement, which established five freedoms of the air for scheduled international air services, came into force only for 19 States, several of which including the USA later denounced it. Thus, this agreement remains only on paper and is technically applicable to just 12 States.

The five freedoms of the air granted by the International Air Transport Agreement are given below.

*First Freedom* : The right or privilege, in respect of scheduled international air services, granted by one State to another State or States to fly across its territory without landing.

*Second Freedom* : The right or privilege, in respect of scheduled international air services, granted by one State to another State or States to land in its territory for non-traffic purposes.

*Third Freedom* : The right or privilege, in respect of scheduled international air services, granted by one State to

another State to put down, in the territory of the first State, traffic coming from the home State of the carrier.

*Fourth Freedom* : The right or privilege, in respect of scheduled international air services, granted by one State to another State to take on, in the territory of the first State, traffic destined for the home State of the carrier.

*Fifth Freedom* : The right or privilege, in respect of scheduled international air services, granted by one State to another State to put down and to take on, in the territory of the first State, traffic coming from or destined to a third State.

Whereas the first two freedoms of the air are almost universally applicable, the remaining three freedoms have to be negotiated under the bilateral air services agreement. In every bilateral agreement, the third and fourth freedoms of the air are exchanged with certain restrictions and safeguards but the fifth freedom right is not exchanged freely and sometimes requires hard bargaining between the governments. In recent years, the governments are becoming comparatively more liberal in granting fifth freedom right, especially to the airlines of regional economic groupings, such as those in Africa, European Union and ASEAN countries.

Liberal grant of the fifth freedom right will generally lead to better utilisation of the capacity of the airlines enjoying such a right. Accordingly, the prices of airline services may fall. However, indiscriminate grant of fifth freedom right by developing countries may have adverse repercussions on the traffic handled and finances of their national carriers. Therefore, liberalisation in the grant of the fifth freedom right is likely to be slow.

### **Cumulative Effect of Changes in Aviation Industry**

It appears that recent changes in aviation industry, taken individually, (apart from technological changes in the manufacture of aircraft) have made little direct impact on the pricing of airline

services. However, these changes taken together are helping in improving the overall productivity of the airlines and reducing their costs, though impact is not the same on all the airlines. Due to increasing competition the benefits of overall improved productivity are being generally passed on to the users in the shape of lower tariffs (real). However, the airlines, which are unable to move with the times and are unable to compete suffer and incur losses.

### **World Trade Organisation and Airline Services**

The Final Act of the eighth round of trade negotiations sponsored by the General Agreement on Tariffs and Trade (GATT), known as Uruguay Round, signed in April 1994, contained, inter alia, the General Agreement on Trade in Services (GATS) which included air services as well. The focus of GATS is on liberalisation. Three core liberalisation principles are: (a) market access or specification of the levels of access to be granted to other parties, (b) national treatment, that is, treatment to foreign services and suppliers of services no less favourable than that accorded to a party's own services, and service suppliers; and (c) Most Favoured Nations treatment, that is, non-discrimination, the provision of treatment to all parties no less favourable than that accorded to any party.

Contrary to the general provisions in Chicago Convention and bilateral and multilateral agreements, in GATS reciprocity is not required. The application of GATS to civil aviation is, however, limited to only three relatively minor items: (a) repair and maintenance of aircraft, (b) selling and marketing of air transport, and (c) Computer Reservation System. It does not include basic items in air transport regulation, like traffic rights and airline tariffs and, consequently, the impact of GATS on the aviation industry is of limited significance.

According to the President of the ICAO Council, "the liberalisation of air transport is progressing on the basis of specific needs, interests and circumstances of States and a wholesome

application of the GATS is not required". In this situation, it is difficult to imagine what role the World Trade Organisation will play in future in bringing about further relaxation in the operations of international airlines, especially in regard to the traffic rights and tariffs. Nevertheless, in the long run, the possibility of the international airlines coming under the full purview of the World Trade Organisation in an increasing measure cannot be ruled out. Such a development, however, may possibly have an adverse impact on the national carriers of developing countries, including India, as they would find it difficult to compete with mega carriers of the developed world.

### **Pricing of Domestic Airline Services**

As in the case of international airline services, domestic services in the past have also been regulated. The regulation covered, inter alia, the tariffs charged by these airlines for various services, which required government approval. This was in keeping with the general environment of regulation of industries at that time.

The first major initiative towards deregulation of the domestic aviation industry was taken by the USA in early seventies. Several events led to this step. The advent of wide-body aircraft, which significantly boosted airline capacity on many routes, was one of the important factors. The effect of oil embargo in 1973, which led to skyrocketing fuel prices started crippling the aviation industry. These factors coincided with the economic downturn in the country that put severe strain on the domestic airlines.

The Airline Deregulation Act, 1978 in the USA provided for the complete elimination of restrictions on routes and introduction of new services by December 1981 and the end of all rate regulation by January 1983. The Government thus gave a little over 4 years to the industry for complete changeover from regulation to deregulation.

Such deregulation had significant impact on the domestic airline industry in the USA. Numerous new airlines came up and the established ones expanded in many new markets. Deregulation led to severe competition on several routes, leading to cost cutting, generally lower fares and better services for most air travellers. However, many new airlines could not withstand the competitive forces and had to be closed down, as happened in India a few years later.

The developments related to deregulation of the domestic airline industry in the USA along with general global trends in deregulation and privatisation of other industries had their impact on the regulation of domestic airline industry in other parts of the world, including developed and developing countries. This resulted in the opening of the domestic routes to private carriers. However, such opening was limited only to the carriers, either wholly or substantially owned by the citizens of the country. Nevertheless, the monopoly of national carriers owned by governments has been gradually abolished or considerably diluted in most countries. Control on fares and rates have been relaxed or abolished. Competition is being encouraged. However, this change in the outlook of governments has been gradual. The general impact of deregulation has been decrease in real fares and a surge in the demand for air services.

Despite liberalisation, airlines are not completely free to determine the fares as they consider appropriate on commercial considerations, especially in developing countries. Often, they have to subsidise certain services on social and political considerations. Since airlines are commercial bodies, such subsidies should be provided by the States and not by the airlines.

#### **Airline Pricing in India for International Services**

Airline pricing for scheduled international services in India is decided, as in most countries, through bilateral agreements in which the IATA plays an important role. The two national carriers,

Air India and Indian Airlines, which are the designated Indian carriers in the bilateral air services agreements, also play a major role in discussions and in advising the Government of India in the matter of approval of fares from and to India.

The fares are determined taking into account costs, changes in the currency exchange rates, competition on the routes, etc. The fares on certain routes are not the same in both directions. On certain routes, the fares from India are lower than the fares in the return direction. On certain international routes the fares from/to India are higher than on certain routes with longer distances. Such differences in the fare structure encourage tourists and other travellers from India to destinations in other countries rather than passenger traffic to India.

Although fares are negotiated as per IATA mechanism and filed and also approved by the government, discounting on published fares is not uncommon. The proportion of discounts is not the same for all the international airlines. Besides, it varies from season to season and route to route. Demand and supply for an airline service play an important role in the determination of discount. The government overlooks discounting unless a complaint is received.

In the case of international cargo traffic, India follows an 'open sky' policy with no controls either on the entry of foreign airlines or the capacity offered or the rates charged. This was necessitated by a serious imbalance between the demand for carriage of outbound cargo and the demand for carriage of inbound cargo, which the country faced a few years ago. The imbalance still continues. For example, during the year 1999-2000 the total international export cargo was 347,207 tonnes as against 184,637 tonnes of import cargo. Seasonal imbalances were still higher. Often it was difficult to meet the demand for outbound cargo thereby affecting exports. Thus, market forces, including supply and demand, from time to time determine the actual freight rates from and to India.

**Airline Pricing in India for Domestic Services**

Indian Airlines, which till recently had a monopoly on domestic routes, had historically developed a fare structure under which the long haul routes cross-subsidised the short-haul routes. Over the years, the fare structure got further distorted and disparity between the costs and fares on short-haul routes increased. In the northeast region, which has substantial short-haul operations, the initial approved fares were 10 percent below the level of fares in the rest of the country. Gradually, this differential has widened to an average of around 30 percent.

Liberalisation of domestic air transport industry in India commenced in the year 1986, but, unlike USA, it was not properly planned. It progressed gradually in a rather haphazard manner. Scheduled services were opened to private operators only in March 1994 after the repeal of the Air Corporations Act, 1953, which gave monopoly power to Air India and Indian Airlines. However, a number of restrictions are still imposed on the operations of private airlines, including minimum fleet, size of aircraft, minimum equity capital, compulsory operation of scheduled services in remote and backward areas, etc. Issue of permits to new operators is not automatic. While granting new permits, various aspects including the need for the services in the proposed area keeping in view the existing services, are considered by the government. Limitations are also put on foreign equity participation and management by foreign airlines. This policy has limited the induction of new operators and the consequent competition among the airlines in the area of fare structure.

As a result of the losses suffered by the Indian Airlines and also the abnormal rise in wages of the staff and certain other costs, which might have been triggered to an extent by liberalisation, the fares have been increasing almost every year. Such increases in fares have been higher than the rate of inflation, which means that the fares are increasing in real terms. This has been rather unfortunate for the aviation industry in India, as it seems to have

adversely affected the demand for air transportation in the country. As against the US experience, where liberalisation brought about a general reduction in fares and an increase in air travel, in India the liberalisation has led to increases in fares.

Taxation of airline services and of major inputs in the operation of these services has created further distortions. Fuel costs account for over 20 percent of the total expenses of domestic airlines. The price of Aviation Turbine Fuel (ATF) for domestic operations in India is high as compared to such prices in other parts of the world because the price in India is an administered one. Apart from a tax element, the current price has an element which is utilised to subsidise kerosene and cooking gas. A high rate of sales tax (in many cases 20 to 30 percent) imposed by the state governments is an additional reason for the high price. Recently, the Government of India has decided to standardise the rates of sales tax on aviation fuel which will provide relief to the domestic aviation industry.

Inland Air Travel Tax imposed by the government at the rate of 15 percent of the basic fare is a major addition to the total fare paid by the passengers. Since such a high levy is not imposed on surface modes of travel, this tax places air transportation at a disadvantage vis-à-vis surface modes.

It may be noted that the air transport industry pays the user charges for the terminal facilities utilised by it at the airports, unlike the road transport industry in which case the taxes represent to a large extent the user charges. The levies on air transport are in the nature of pure taxes, without any quid pro quo.

High taxes, compulsory operation in backward areas, restrictions on the entry of new airlines and the consequent limited competition, high cost of operation by the lead domestic carrier (Indian Airlines), primarily due to inefficiency and high wage bill, have led to higher fares on domestic routes than justified on economic grounds. This has adversely affected the role this modern

mode of transport should play. Accordingly, it is not surprising that the domestic air transport industry in India is growing at a rate much lower than the average growth rate in the Asia-Pacific countries and also in the rest of the world. Despite longer distances, the per capita demand for domestic air services in India is almost at the minimum level among the Asian countries.

Airline services play an important role in the economic development of a country. It is especially important for India, which has long distances. It is, therefore, necessary that the present distortions in the domestic airline services are removed as early as possible and the domestic airline industry is allowed to grow and compete to enable it to play its normal role.

#### **Future Outlook and Major Issues**

Airline industry will continue to grow in the future as more technological developments can be expected. There may be relaxation in the ownership of domestic airlines. The fares in real terms are likely to decrease. Liberalisation and globalisation of the industry will continue in all parts of the world but it will be gradual and at different levels in different countries.

It appears the international air tariff will continue to be regulated by bilateral agreements keeping in view the cost of operation, currency conversion rates and the fares charged by other carriers operating on international routes.

In India, the government cannot make any major thrust in the present fare and rate structure of international airlines. It has, however, to be noted that the growth of foreign tourist traffic to India is low. Within the limited powers available with the government, Air India and Indian Airlines, the effort should be to keep the fares to India as low as possible from major tourist destinations.

As regards domestic services, it will be necessary to relieve the domestic airline industry in India from the shackles of high taxation, compulsory operation in backward areas and restrictions on the entry of new airlines, so that it grows in a normal way.

It would also be desirable to plan the capacities for export of international cargo so that the rates for exports during peak periods remain within reasonable limits. To the extent possible, the shippers should disperse the shipments throughout the year with a view to evening out the peaks.

## AIRPORTS AND AIR NAVIGATION SERVICES

### Facilities and Services Provided and Charges Levied

The facilities provided at the airports include landing, parking, lighting, navigational services, aerobridges, cargo facilities, office space for airlines, counters for the use of airlines for check-in, duty-free and other shops, restaurants, foreign currency exchange and variety of other facilities for the use of passengers, airlines, shippers, visitors, regulatory agencies, etc. Apart from certain basic facilities for the airlines, the type and level of facilities differ from airport to airport depending upon the level of traffic and the approach of the airport administration.

Presently, all the airports, irrespective of the ownership, levy charges for the facilities provided. However, the level of charges differs from airport to airport. Airport charges are broadly divided into aeronautical charges and non-aeronautical charges. These are sometimes called traffic related charges and non-traffic charges. Aeronautical charges directly affect the airline operations while non-aeronautical charges do not have a direct impact on airline operations.

The aeronautical charges include the following.

- *Landing charges:* (including lighting and terminal air navigation services charges). These include charges collected for the use of runways, taxiways and apron areas, including associated lighting, as well as for the provision of approach and aerodrome control.
- *Hangar and apron parking charges:* These include charges collected from aircraft operators for the

parking of aircraft and their housing in airport-owned hangars, including any charges for leasing of such hangars to aircraft operators.

- *Passenger service charges:* These include passenger service charges and other charges and fees collected for the use of terminal and other passenger processing facilities.
- *Security charges:* These include charges and fees collected for the protection of passengers and other persons at the airport, the aircraft and other property.
- *Noise charges:* Charges collected to cover the costs incurred on alleviation of noise produced by the aircraft when using the airport.
- *Cargo handling charges:* To cover the cost of providing cargo handling facilities, its storage and processing.
- *Other charges on air traffic operations:* These include all other charges and fees collected from aircraft operators for various other facilities and services provided at the airport for the operation of the aircraft, such as aerobridge or surface transportation facilities for the use of passengers for travelling between aircraft and the terminal building.

Charges for non-aeronautical services generally include the following:

- *Ground handling charges:* These include charges and fees collected from aircraft operators for the use of facilities and services provided by the airport for the handling of aircraft and/or the concession fees collected from the concessionaires of ground handling services.
- *Aviation fuel and oil concession fees including throughput charges:* These cover concession fees,

including any throughput charges, payable by oil companies or any other entities for the use of airport facilities and the right to sell or distribute aviation fuel and lubricants at the airport.

- *Charges for in-flight catering services:* These include charges for the use of facilities provided by the airport to the in-flight caterers and also the concession fee.
- *Charges for operating restaurants, bars, cafeterias and providing catering services:* This covers fees and charges payable by commercial enterprises or other entities for the right to operate restaurants, bars, cafeterias and providing catering services at the airport.
- *Charges payable by duty-free and other shops:* These include the fees and charges payable by commercial enterprises or any other entity for the right to operate duty-free and other shops at the airport.
- Charges collected from:
  - Travel agencies and hotel reservation counter
  - Banks and exchange bureau
  - Automobile parking
  - Automobile rental agencies
  - Automobile service stations
  - Public admission fees or fees for guided tours to the airport
  - Concession fees for establishing hotels at the airport
  - Charges for the rights of advertising
  - Rentals for space from airlines, cargo agents, etc.
  - Other commercial activities

While aeronautical charges are generally determined after taking into account the cost of providing facilities, the charges for non-aeronautical facilities are maximised according to demand except for certain essential facilities.

### **Global Financial Situation of Airports and Air Navigation Services**

Globally, the airports were initially owned and operated by the governments and local bodies as public utility services without any definite consideration of the recovery of costs. Moreover, several agencies in the government provided different types of services. In the government system of accounting, interest and depreciation were not included. Costing of services was difficult and, accordingly, pricing was not based on any rational consideration.

Changes in the ownership and management structure in the provision of airport services commenced in the late sixties. Initially, comprehensive government involvement was reduced through the establishment of autonomous authorities. These authorities, however, continued to be owned by the government. For example, India established a corporate authority to manage its four international airports at Bombay, Delhi, Calcutta and Madras in the year 1972. Other airports and air navigation services were corporatised in the year 1985. However, in the recent past, private participation in and privatisation of airports are gaining momentum in many parts of the world.

Globally, a large number of the 1,178 international airports open to public use do not recover all their expenses, principally owing to low traffic volumes, inadequate financial control, faulty accounting procedures and skewed organisational structure. However, over the years, the overall financial situation of international airports has been improving. More and more airports worldwide are gradually recovering their expenses through charges on air traffic and income from concessions, rentals and other non-aeronautical activities.

The proportion of income from non-aeronautical sources has continued to increase and is now the main source of income (more than 50 percent) for many airports in Europe and North America

and also for major airports in Asia, Middle East and the Pacific regions. Airports with high volume of traffic generally show higher share of non-aeronautical revenues and the share tends to increase as traffic increases. This should be considered as a welcome trend as the burden of aeronautical charges on the airlines would decrease.

The overall financial situation of air navigation services, which are managed by different entities in many countries, has also not been very satisfactory. However, as in the case of airports, the financial situation of air navigation services is also gradually improving in all the regions of the world. This is primarily explained by the growing emphasis being placed by various States on recovering their air navigation services costs, the continued growth in traffic, and increase in the number of States levying approach and aerodrome control charges.

Landing and associated charge, which is the most important charge on the airlines, as a proportion of total airline expenses constitutes around four percent. This percentage has stabilised and in fact in the recent years it has been falling. It fell from 4.5 percent in 1995 to 4.3 percent in 1996, to 4.1 percent in 1997 and further to 3.9 percent in 1998. The share of air navigation services charges in the total airline operating expenses has been fluctuating between 2.6 and 2.8 percent, being 2.6 percent in the year 1998. Thus the total impact of airports and air navigation services charges on the airlines operating expenses was about 6.5 percent in the year 1998. This cannot be considered as very significant.

### **Special Characteristics of Airports and Air Navigation Services**

Airports have certain special characteristics. First and foremost, they require large land areas at one location closer to a metropolitan town, irrespective of the volume of traffic. Availability of land for expansion and development of the existing airports is becoming difficult throughout the world. Land for construction of

new airports is even more difficult to acquire. Besides, the cost of acquisition is becoming prohibitive. Environment considerations are also becoming increasingly important.

The investment in airports is lumpy. A runway along with associated facilities has in any case to be provided. An international airport must maintain certain standard services even if the volume of traffic is low. This is the reason why many international airports with low volume of traffic are incurring losses.

Most of the investments in the airports are sunk in the ground and cannot be retrieved, if it is later found that it was a wrong location or in case the traffic forecasts do not materialise. This is unlike the airline operators who can change the routes or sell the aircraft.

The airports are in the nature of a monopoly on which the users – passengers, airlines and shippers – are highly dependent and, therefore, there is need for their regulation. Competition among the airports is minimal. Indian international airports neither compete among themselves nor do they compete with international airports in the neighbouring countries.

#### **ICAO Principles and Guidelines on Charges for Use of Airports and Air Navigation Services**

Article 15 of the Chicago Convention sets out three basic principles relating to the use of airports and air navigation facilities and services at international airports and the charges for their use. These are: (a) uniform condition for all the operators in facility usage; (b) non-discrimination in charging aircraft operators; and (c) no charges to be levied solely for the right of aircraft transit over entry into or exit from the territory of a Contracting State. These principles mainly reflect the concern of the Contracting States to avoid the possible abuse of monopoly power of the providers of airports and air navigation services. It is to be noted that since

Article 15 is a component of the Chicago Convention, an ICAO Contracting State cannot exempt itself from applying any of the principles contained in it.

Additional and more detailed policy guidelines in the area of charges for airports and air navigation services are presented in the *Statements of the Council to Contracting States on Charges for Airports and Air Navigation Services*. The basic principles enunciated in the Statements are fairness and equity in the determination and sharing of airport and air navigation services costs.

The major recommendations included in the Statements are as follows:

- As a general principle, it is desirable, that where an airport is provided for international use, the users should ultimately bear their full and fair share of the cost of providing the airport. The cost to be shared is the full cost of providing the airport and its ancillary services, including appropriate amounts for cost of capital and depreciation of assets, as well as the cost of maintenance and operation and management and administration expenses, but allowing for all revenues, aeronautical or non-aeronautical, accruing from the operation of the airport to its operators.
- In general, aircraft operators and other airport users should not be charged for facilities they do not use, other than those provided for and implemented under the Regional Plan.
- The charges should be non-discriminatory both between foreign users and those having the nationality of the State of the airport and engaged in similar international operations, and between two or more foreign users.

- Where any preferential charges, special rebates or other kinds of reduction in the charges normally payable in respect of airport facilities, are extended to particular categories of users, governments should ensure, so far as practicable, that any resultant under-recovery of costs properly allocable to the users concerned is not passed on to other users.
- Airports may produce sufficient revenues to exceed all direct and indirect operating costs (including general administration, etc.) and so provide for a reasonable return on assets (before tax and cost of capital) to contribute towards necessary capital improvements.
- Consultation with users should be held before any significant changes are made in charging systems or before higher charges are introduced.
- Similar principles have been recommended in regard to air navigation services charges.

Two general observations need to be made before a critical appraisal is made of the ICAO guidelines. First, the ICAO guidelines relate to the international airports and services utilised by international airlines. The States are free to decide the charges for domestic operations. However, in actual practice, similar principles are generally applied to domestic services as well. Second, unlike the provisions of the Chicago Convention, which are binding on the States, the Council Statements differ in status from the Chicago Convention in that an ICAO Contracting State is not bound to adhere to the provisions and recommendations contained in the Statements. However, another ICAO document (Airport Economics Manual) observes that because of widespread endorsement of the policies laid down therein by worldwide conferences and their practical value in avoiding discrimination and potential disputes, there is a strong moral obligation for the States to ensure that their cost recovery practices conform to the policies and philosophy set out in the Council Statements.

The Airport Economics Manual (Doc 9653) gives guidelines for calculation of costs of providing various aeronautical services at the airports. It also provides guidelines for developing non-aeronautical sources of revenue.

### **Critical Appraisal of ICAO Principles and Guidelines on Charges**

The ICAO guidelines place a number of restrictions on the contracting States in regard to fixation of airport and air navigation services charges. These are discussed in the succeeding paragraphs.

*Motivation for economising in costs:* Charges based on costs without any consideration as to how the expenses are incurred, could lead to wastage of resources. This does not provide any motivation to the airport administration to economise on the cost of providing the services. Moreover, if the airports have to strictly recover only the costs, there will be little motivation for generating additional revenues.

*Non-discrimination between users:* It means an airport service provider cannot give any preferential treatment to its national carrier or any other carrier in the matter of facilities or charges with a view to attracting new carriers. To follow this principle is very essential; otherwise there can be retaliatory and other actions from other States, which will not be in the best interest of the sustained growth of the international aviation industry in the world as also in individual countries.

*'Single Till' approach:* As per ICAO guidelines, while determining the costs and revenues, all the revenues, both aeronautical and non-aeronautical, should be taken into account. As the overall cost of providing the services is the primary basis for setting the airport charges, this principle means that the benefit of larger generation of non-aeronautical revenues should go to reduce aeronautical charges. In other words, the extra revenue generated from non-aeronautical charges should be passed on to

the airlines in the shape of lower charges. Thus, non-aeronautical revenues are supposed to cross-subsidise aeronautical activities. In modern parlance, this is called 'Single Till' approach.

Such an approach might have been justified when aviation was less developed and non-aeronautical revenues were limited. The situation has now significantly changed and presently non-aeronautical revenues make a substantial contribution to airport revenues. This contribution is generally increasing at all the international airports.

There is considerable difference of opinion on the utilisation of non-aeronautical revenues generated at the airports between the airlines represented by International Air Transport Association (IATA) and the airports represented by Airports Council International (ACI). IATA feels that as the airlines bring the passengers to the airport they should be benefited by the higher generation of non-aeronautical revenues. On the other hand, ACI is of the view that while the "single till" approach helps to reduce airline operating costs in the short-term through lower airport charges, it takes away commercial revenues, which could be used to finance capital investment and develop new and better commercial facilities for the benefit of passengers. ACI advocates that airports should be allowed to allocate a part or all commercial operating surpluses for investment in airport facilities and services, rather than used for reduction in aeronautical charges.

There is some force in the arguments of ACI. Several airports in the world in actual practice do not follow the ICAO guidelines fully. For example, the Airports Authority of India does not follow the ICAO guidelines strictly. It would, therefore, be desirable to consider dilution of the principles established by ICAO.

*Networking of airports:* ICAO principle is that airport providers should charge the airlines only for the facilities they use. In other words, they should not be charged for the cost of services

at airports other than the international airports they use. Thus, costing has to be done for each airport and location-specific charges are to be levied. Costing of a network of airports and charges based on such costs is not permitted. In other words, cross-subsidisation between loss-making and profit-making airports is not to be undertaken.

Presently, in many countries including India, networks of airports are managed by one organisation and economics of airports is considered for the system as a whole. This system leads to cross-subsidisation among the airports, as the financial situation of all the airports is not the same. In India, most airports, especially smaller domestic airports, do not generate sufficient revenues to cover their costs. Cross-subsidisation between loss-making and profit-making transport services is an established practice in India for a long time. However, such a practice does create distortion in the market and leads to uneconomic utilisation of facilities and services. It may be desirable to remove or minimise the distortions. On strict economic considerations, the loss-making airports should be subsidised by the General Exchequer, as they are required to be maintained due to social and political considerations.

*Pre-funding of airport capital expenditure:* A fundamental principle of ICAO in international cost recovery policy for airports and air navigation services is that charges should not be levied for any facilities or services until they have been implemented, that is, they become operational. The objective of this principle is to protect the users from being charged for the facilities and services that are not provided. Concern has been expressed that users may be charged for twice, once through the pre-funding charge and then by recovery of the full cost of the new facility through depreciation and cost of capital included in the cost basis for post-implementation charges.

In recent years, a few airports, especially in Canada, have introduced specific charges, usually on passengers, that are not to

be applied against defraying the cost of facilities or services in operation but instead are to be used to pre-finance facilities that do not exist, such as new or expanded terminals. This practice is against ICAO principles on airport charges and has given rise to protests from the users.

In India, the general policy of the government for public sector undertakings like the Airports Authority of India is that they should generate internal resources, consisting of depreciation and retained profits to finance at least a part of the future capital development programmes. While financing capital projects from depreciation provision is not pre-financing, making large profits and using such profits for future capital projects is pre-financing. Thus, pre-funding or pre-financing by the public sector undertakings is an accepted practice and is encouraged by the Planning Commission. For the undertakings in the civil aviation sector the Planning Commission does not agree to provide any budgetary support for financing capital development projects and expects the undertakings to be self-sufficient. The Airports Authority of India has been generating profits to finance its capital development programmes. However, this is done in a general way and there are no specific charges for financing future capital development programmes. Thus the Airports Authority of India follows the national policy but not necessarily the ICAO policy.

At an international conference on airport economics in Montreal, Canada in June 2000 organised by ICAO the question of pre-funding of capital projects was discussed at length and ultimately it was agreed that pre-funding might be accepted in special circumstances with necessary safeguards.

It is important to note that while pre-funding by public sector undertakings may not be seriously objected to, pre-funding by private sector undertakings managing essential services like airports having monopoly power needs to be carefully regulated.

**Recent Move Towards Privatisation of Airport Services and its Impact on Pricing**

In the recent past, private participation and privatisation in the provision of airport services is gaining momentum, especially in Asia, Europe and Latin America. However, in the case of air navigation services, changes in ownership and management have been limited. As in many countries, in India also it has been decided to have private participation by leasing major airports to the private sector and the process has already begun.

Presently, in most countries, the air navigation services continue to be provided by the government. In a limited number of countries where changes in this regard have taken place, it is through the establishment of autonomous authorities while ownership continues remain with the government. In India, there is no proposal, for the time being, to privatise air navigation services.

As per a recent study conducted by ICAO, in almost all the States where private participation or privatisation in the provision of airport services has taken place, there are regulatory authorities to ensure that monopoly power is not abused, especially in the case of aeronautical charges. These authorities are generally independent but have to work within the guidelines provided by the government. For regulating the landing charge, which is the most important aeronautical charge, generally the formula is Retail Price Index minus X. Thus, the aeronautical charges are expected to increase less than the rate of inflation. The rationale behind this provision is that airport costs generally increase at a rate less than that of inflation.

The ICAO study recommends that if airport services are privatised or private participation is permitted, it must be ensured that the monopoly power is not misused. It observes that an unregulated private monopoly can be more harmful than a

relatively inefficient public monopoly. Accordingly, it is necessary to ensure that regulations provide for price controls or capping in regard to at least aeronautical charges. ICAO further recommends that the government should retain its authority to inspect airport company's accounts to prevent potential abuse of monopoly power.

### **Social Costs – Externalities**

Airlines and airports produce certain environmental impacts which involve social costs. Fortunately, the level of adverse environmental impacts of civil aviation is limited and also the industry is more conscious of adverse environmental impacts than other modes of transport. Noise pollution is the most important adverse social impact of the industry, although aircraft also generate air pollution through emission of gases, especially in upper atmosphere. Presently, the aircraft manufacturers are trying their best to reduce the noise impact of the new aircraft. Considerable technological developments have already taken place in this area and present-day aircraft are less noisy than those in the past.

ICAO has decided to phase out the operation of noisier aircraft. It also recognises levy of a special charge to mitigate the problems emanating from noise pollution. Moreover, it has also banned smoking during flight.

Certain airports, especially in Europe, have levied extra charges on noisier aircraft. Several airports have banned landings and take-offs during night. Some of them are developing new runways with a configuration that will avoid flying over residential areas. In Japan, the expansion of international airport at Narita was held up for several years because of the apprehension of increased pollution level.

Despite several steps taken to reduce the adverse environmental impacts, the pollution is still there. Increase in the

number of aircraft movements, to an extent, is neutralising the positive steps. Accordingly, in future pricing system for the airports, the external social cost will need to be internalised and separately recovered.

### **Financial Situation of Airports and Air Navigation Services In India**

In India, the financial situation of the Airports Authority of India, which is responsible for the management and development of all civil airports in the country (including civil enclaves at defence-owned airports and the air navigation services for the entire country and certain areas outside it), is considered satisfactory.

The International Airports Authority of India established in 1972 for managing four international airports, the National Airports Authority established in 1985 to manage the remaining airports and air navigation services, and the combined Airports Authority of India (AAI) established in 1995 have been able to meet all their costs. After the initial few years, the International Airports Authority of India was able to generate sufficient surplus to finance all the development works from its own internal resources. AAI is presently self-reliant and has developed a sizeable reserve for financing expansion programmes. During the year 1999-2000, the Airports Authority is reported to have made a net profit of over Rs. 200 crore after meeting all its expenses and the corporate and other taxes liability. It has also proposed a modest dividend on the capital invested by the government.

Although the overall performance of AAI is satisfactory, smaller airports in its network are incurring losses and are able to contribute only a small proportion of their operating expenses. The smaller airports are, therefore, being cross-subsidised by the surpluses generated by the larger airports, such as Mumbai and Delhi.

**Pricing of Airport and Air Navigation Services in India**

In principle, India follows ICAO guidelines in fixation of airport and air navigation services charges. However, in actual practice, the charges are not based on financial cost of providing the services but on present-day costs of providing these services and also the need to generate resources to finance the capital development programmes. AAI reviews almost every year the aeronautical charges, mainly landing and parking charges and air navigation services charges, which contribute about 60 percent of the total revenue. Such a review is made in consultation with the international airlines through IATA and charges are revised after obtaining the approval of the government. For other charges, consultation is not held with the users but for some of the other aeronautical charges approval of the Board as also of the government is taken.

The airport charges structure of AAI is broadly the same for the entire network of airports in the country, irrespective of the size of the airport, facilities available, volume of traffic, utilisation of capacity, cost of providing the facilities and services and the amount of revenues. As per the recommendation of ICAO, the landing and parking charges are determined according to the maximum permissible take-off weight of the aircraft. Length of the sector operated, which may represent capacity to pay, is not a consideration for determining the charges. However, the landing and parking charges for domestic operations are lower than the charges for international landing and parking operations by about 25 percent, although the cost of handling an international flight is almost the same as a domestic flight with the same weight. The practice of charging a concessional rate for domestic operations is based on historical reasons and is also prevalent in several other countries. Although it is not acknowledged specifically, capacity to pay is the basic element in fixing lower charges for domestic operations. However, for air navigation services charges there is no distinction between international flights and domestic flights.

Presently, the route navigation services charges in India are based solely on the weight of aircraft. They are also applied for landing only and departing aircraft, which also use the facilities and services, do not pay any such charge. ICAO recommends the charges should be based on 'per flight' taking into account weight and distance, as distance represents, to a very large extent, the cost of providing the services. Almost all the countries levy the charges on the basis of per flight. Many countries in the world levy the charges on the basis of weight and distance. Due to the existing 'only weight' criteria, the domestic carriers in India operating hopping flights pay the same charges for every sector of the flight. Moreover, as domestic airlines land at Indian airports, they pay for every flight as against international carriers, which pay only when they land. The current practice places undue burden on domestic operators, which is neither justified on the basis of cost of providing the services nor is in keeping with the ICAO guidelines. It is necessary that the route navigation services charges are reviewed as early as possible to fix them in accordance with the ICAO guidelines.

In the present situation of airport charging system in India cross-subsidisation is well established. Presently, only 5 major airports at Mumbai, Delhi, Calcutta, Chennai and Bangalore, which have high volumes of traffic, are profitable. All other airports incur losses. Thus, a few profitable airports subsidise several loss-making airports. Financial data in regard to the extent of cross-subsidisation is not available but the amount should be running into several crores of rupees. Thus, the charging system at the Indian airports cannot be considered scientific and satisfactory on strict economic considerations. The only advantage of the system is that it is simple to understand and easier to administer.

#### **Airport Charges in India and their Comparison with Charges in Asian and certain other Countries**

The current rate of landing charges in India for international flights is Rs. 207 per tonne for aircraft having maximum take-off

weight of less than 100 tonnes. For aircraft of higher weights, the charge for additional weight over 100 tonnes is Rs. 278.2 per tonne. As regards parking charges, the rate per hour per tonne is Rs. 6.70 for aircraft upto 100 tonnes. For aircraft of higher weights, the charge for additional weight over 100 tonnes is Rs.8.90 per hour per tonne. The passenger service charge, including foreign travel tax for an international departing passenger, is Rs.500. The route navigation charges are based on nine slabs of weights – the charge varies from Rs. 162 to Rs. 17,405. The terminal navigation charge also varies with weight : Rs. 620 for aircraft with a weight of less than 10 tonnes and Rs. 3,735 for aircraft weighing more than 10 tonnes. For domestic flights, most of the rates are lower than those for the international flights (for further details regarding airport charges at the Indian airports, see Appendix I).

Presently, there is the common notion that airport charges in India are high as compared to most other countries. This notion is not based on actual facts. Although AAI is financially sound and makes a significant amount of profit every year, it may appear surprising that the level of airport charges in India is generally lower than that in most of the other countries. However, as the pattern of airport charges differs from country to country, their comparison is not easy. As such, ICAO's practice is to make comparison of airport charges for a few selected popular aircraft. Table 2 compares the total airport charges in India with the total airport charges in some of the Asian and other countries for MD 10, Airbus 310 and Boeing 747 aircraft.

It is evident from the comparison of charges in the above table that there is potential for further increase in airport charges in India. However, this has to be justified on the basis of costs. At present, the costs in India are less because of lower level of investment in the facilities. It is interesting to note that as against the total gross investment of about US\$ 650 million and net investment of about US\$ 300 million in all the airports and air navigation services in India, the investment in new Hong Kong Airport alone is about US\$ 20 billion.

**Table 2 : Comparison of Airport Charges in India with Those in Some of the Asian and Other Countries**

(In US Dollars)

Country	Daytime landing charges			Charges related to passengers carried			Total		
	MD 80	A 310	B 747	MD 80	A 310	B 747	MD 80	A 310	B 747
India	369	821	2265	224	306	613	593	1127	2878
Pakistan	522	1233	3244	2778	3741	7333	3300	4974	10577
Bangladesh	516	1320	3693	588	804	1608	1104	2124	5301
Nepal	148	603	1997	842	1153	2305	990	1756	4302
Sri Lanka	254	600	1578	684	936	1872	938	1536	3450
Maldives	222	525	1381	950	1300	2600	1172	1825	3981
Thailand	998	1282	2128	632	865	1729	1630	2147	3857
Malaysia	138	374	1108	500	684	1368	638	1058	2476
Indonesia	286	750	2134	333	498	986	619	1248	3120
Vietnam	195	735	1405	980	1330	2670	1175	2065	4075
Lao PDR	544	940	2163	475	650	1300	1019	1590	3463
Singapore	307	808	2291	872	1221	2436	1179	2029	4727
New Tokyo	1266	2990	7866	2220	2813	5016	3486	5803	12882
Frankfurt	1838	4091	10292	1362	1864	3727	3200	5955	14019

Source : ICAO Manual of Airport and Air Navigation Facility Tariffs (DOC 7100 (1999)).

As compared to several countries in Asia, the quality of services at Indian airports is poor. This is the common notion and is supported by ratings given by IATA to world airports of comparable size. AAI is neither spending money to provide quality services, nor exploiting the full potential of the airports to raise revenues. The budgetary allocations for improvement and development are surrendered year after year.

It is often argued that if airport charges are raised, Indian airports may become non-competitive and the traffic may get diverted to airports in other neighbouring countries. This argument is not based on facts. Firstly, the charges at other Asian airports are generally higher than those at Indian airports. Secondly, airlines will go where passengers wish to go and a small increase in airport charges will not alter their choice. And lastly, airport charges on a worldwide basis constitute, on an average, only about 4 percent of the total airline costs and, therefore, small increases in airport charges will have little impact on the decision of the airlines regarding their operations in India.

**Impact of Privatisation of Airports in India on Airport Pricing**

The present airport services charging system in India can be expected to undergo a significant change once the leasing of airports at Mumbai, Delhi, Calcutta, and Chennai is finalised. The charges may become location-specific if different airports are leased to different agencies as in Australia. However, if all the airports are leased to one agency, charges may or may not remain the same at all the airports. The amount of lease money offered and accepted may become an important factor in this case, as this will become a cost element for the private operator.

For the remaining airports and air navigation services with AAI, pricing policy will need to be reconsidered as the scope for direct cross-subsidy from profit-making airports would not exist. The future of such airports will depend upon the actual transfer of lease money from the larger airports made available to meet any recurring deficits and the future capital improvements of remaining airports and services.

In India, as in other countries, establishment of a regulatory authority along with privatisation of airports is envisaged. This is an essential step. The jurisdiction of the regulatory authority should, however, cover not only the privatised airports but also other airports and air navigation services managed by the AAI. It will be necessary to define the scope of work of the regulatory authority and develop guidelines for its work as the type and scope of regulation will have an important bearing on the finances of the leased airports. It would be desirable to settle the scope and guidelines of the regulatory authority before the bids for the leasing of the airports are invited so that the bidders offer their bids with full knowledge of the situation.

It is difficult to foresee exactly what changes may be made in future in the pricing of airport services. It will actually depend

upon several factors including the government policy. The present draft aviation policy proposes to leave the matter open and envisages that the charges be decided on the basis of ICAO guidelines. However, it needs to be pointed out that the ICAO guidelines may not be sufficient for the regulatory authority to determine the prices, especially because the costs can be interpreted in more than one way. Even in developed countries where privatisation in the provision of airport services has taken place, such an open general policy has not been prescribed. As such, the government will have to establish definite guidelines.

### **Case Studies**

Although from a broader angle all the airports have similar types of charges, there is considerable variation in the detailed charging system. ICAO publishes every year a Manual of Airport and Air Navigation Facility Tariffs, which lists various aeronautical charges at international airports in all the countries of the world. Whereas in the western world, the charges are generally complicated and take several factors into account, in the developing countries, the charges are a few and simple in nature. This is in accordance with the ICAO guidelines. It may also be mentioned that the economics of international airports also differs widely – some make large profits, while others incur huge losses.

Three case studies of airports, including air navigation services in developing countries are presented in Appendixes I to III. The countries selected are India, Lao PDR in Southeast Asia and Lesotho in Southern Africa. India has been selected because, unlike most countries, the entire network of airports and air navigation services is managed by one entity, which makes a reasonable amount of profit. Lao PDR has been selected as in terms of proportion of revenues it is perhaps the most profitable airport system in the world and for the Lao PDR Government it is one of the most important sources of revenue. Le Sotho has been selected, as it is one of the few airport systems where the cost recovery is less than 5 percent. Some of the data presented in the

case studies may be old but the overall situation is reported to have not changed materially.

### **Future Outlook and Major Issues**

It appears that international landing charges will decrease in real terms because of increase in traffic and improvement in productivity unless there is abnormal rise in wages as has happened in aviation undertakings in India. The revenues from non-aeronautical activities will increase with the increase in traffic. The management system will also undergo changes in favour of corporate authorities and privatisation. However, changes in the management of air navigation services will be very slow.

The airport charges will be more location specific rather than based on network operation and closer to cost of providing the services. With privatisation, independent regulatory authority may be established in India as in other countries. However, the system of charging will considerably depend upon the guidelines provided to the regulatory authority. On an overall basis, however, cost of providing the services will be the most important criterion in this regard.

An important issue related to prices which the airports and air navigation services will face in the future will be cross-subsidisation of loss-making airports by profitable airports through the system of networking. Another issue will be pre-funding or utilising profits to finance future development projects, especially in developing countries. In most countries, the modern concept of pricing may not be applicable.

In India, significant organisational changes are envisaged in the provision of airport services. The proposed leasing of major airports may be the initial change. More changes in future could be expected based on the experience of this change. These changes will have a major impact on the prices of airport and air navigation

services as the present pricing regime is based on networking for the entire system and the related cross-subsidies.

An important issue in the case of airports and air navigation services in India will be how to improve the quality of service at Indian airports by making additional investment and improving management, not only at major airports being considered for long-term leasing but also at other airports.

Yet another important issue in India is the revision of route navigation services charges on per flight basis taking into account the distance travelled by an aircraft, as recommended by ICAO and in vogue in many countries. Such revision needs to be introduced as early as possible to remove distortions in pricing.

## CONCLUSIONS AND RECOMMENDATIONS

Major conclusions and recommendations are summarised below:

- (a) Presently, the civil aviation industry is highly regulated. The international airline tariffs are determined according to bilateral air services agreements with the help of IATA Tariff Coordination Conference System. The major objective in determining the tariffs is to recover the total costs rather than the cost of individual services. The role of the government in determination of tariffs is limited.
- (b) Presently, certain fares from India to foreign tourist destinations are lower than from those destinations to Indian cities. Accordingly, there is higher incentive for tourists from India to visit other countries as compared to the tourists from abroad to India. Such a fare structure is not in the best interests of the country, especially from the point of view of earning foreign exchange from foreign tourists. It will thus be desirable for the government to see that the fares from major tourist generating countries to India remain within reasonable limits.
- (c) With the 'open sky' policy for freight traffic in India, the rates are deregulated. Due to heavy demand in certain peak periods, there is a tendency among the airlines to hike their rates abnormally during such periods. The government should see to it that the shipments are distributed evenly throughout the year, to the extent possible, with a view to evening out the peaks.

- (d) A number of developments are taking place in the airlines industry, such as technological developments, liberalisation in tariff policy, mergers, alliances, privatisation, transnational ownership, etc. These developments apart from the general increase in productivity have led to a real reduction in tariffs over the years. In future, there may be further reduction in real tariffs. However, the recent developments are leading towards monopolistic tendencies which, unless checked, may lead to increase in tariffs. Recent increase in oil prices is another signal, which may adversely affect the airline traffic growth. The governments will have to keep a close watch on these developments.
- (e) In the recent past, domestic airline prices in India have risen faster than the rate of inflation. This has happened mainly because of losses suffered by the Indian Airlines. Increase in fuel prices, heavy taxation of airline services, compulsory operation in backward areas, and certain restrictions on the entry of new airlines and the consequent limited competition have created further distortions. It is necessary that present distortions in the pricing of domestic airline services, which are mainly due to government policies, should be removed or at least minimised as early as possible and the industry is allowed to play its normal role.
- (f) For the provision of airports and air navigation services at international airports open for public use, ICAO has laid down detailed guidelines. These guidelines are, however, not applicable to domestic operations. Nevertheless, in actual practice, the governments broadly follow the ICAO recommendations applicable to international operations. With substantial growth in non-aeronautical revenues, greater pressure on airports to provide improved services and general shortage of resources, there is need to liberalise the guidelines. Some breakthrough has been made in this regard in the recent Conference on Airport Economics in June 2000

organised by ICAO at Montreal. However, more will need to be done in the future.

- (g) In India, the financial position of the Airports Authority of India, which is responsible for the management of all the airports in the country as well as the air navigation services, is presently sound. It will be necessary to keep a close watch on the situation as increases in salaries and staff strength may eat up the surpluses.
- (h) In India, if the services at the major international airports have to be improved, major investments would be required.
- (i) Historically, the route air navigation services charges in India are based on landings. The charges are also based solely on the maximum take-off weight of the aircraft; the distance factor is ignored. The present charging system is not justified either on the basis of cost of providing the services or ICAO guidelines or the existing practice throughout the world. The present system places undue burden on domestic short-haul operations and distorts the burden on other operators. The system of charging for air navigation services needs to be reviewed urgently.
- (j) With the proposed privatisation of major airports in India, it will be necessary to review the entire system of airport charges. The nature of change will depend upon whether all the major airports will be in one basket or different baskets. It will be desirable to establish an independent regulatory authority and to provide definite guidelines to such an authority.

# APPENDIX I

## CASE STUDY OF PRICING AND CHARGES AT INDIAN AIRPORTS

### Ownership and Management

The airports and air navigation services in India are managed by the Airports Authority of India (AAI). These include international airports, domestic airports and civil enclaves at defence airfields. AAI was established in the year 1995 under a special Act of Indian Parliament.

AAI is a legal entity with financial and operational autonomy. It can charge for the facilities provided by it. However, for landing and parking charges, passenger service fee and public admission fee it has to seek government approval before the charges can be revised. It can use the revenues generated by it for defraying the cost of operation and maintenance. Moreover, it can take up capital works up to the limits prescribed by the government from time to time. The Authority has powers to create posts and employ personnel and also determine the salary structure. The Authority has a Board of Directors which lays down policies and takes major decisions. The Board has a full-time Chairman who is also the Chief Executive of the Authority. The Board delegates powers to the Chairman and other senior officials.

### Level of Annual Traffic

The level of annual traffic at the Indian airports is given in the table alongside.

Level of Annual Traffic			
	International	Domestic	Total
Aircraft movements	99,563	325,392	424,955
Passengers ('000)	12,917	24,072	36,989
Cargo (tonnes)	4,74,660	2,24,490	6,99,150

## Airport Charges

The following table presents the present level of aeronautical charges in India. These charges are applicable to the entire network of airports in the country.

**Current Tariff for Major Aeronautical Charges in India**

Item	Rate in Indian Rupees		
	Weight in MT	International	Domestic
Landing charge	Up to 100 Above 100	207 per MT 20700+278.20 per MT in excess of 100 MT	155.30 per MT 15530+208.60 per MT in excess of 100 MT
Housing charge	Up to 100 Above 100	6.70 per hour per MT 670 +8.90 per hour per MT in excess of 100 MT	Same as for international flights
Passenger services charge including foreign travel tax	Per passenger	500	150
Route air navigation services charge	9 weight slabs 2-165 & above	162 to 17,405 depending upon weight	Same as for international flights
Terminal air navigation charges	Under 10 Above 10	620 3,735	Same as for international flights

Source: Airports Authority of India and ICAO Doc 7100 (1999)

Notes:

1. Charges shall be calculated on the basis of nearest MT (i.e. 1000 kg)
2. A minimum fee of Rs. 1000 shall be charged per single landing.
3. A surcharge of 25 percent will be levied on landing charge for supersonic aircraft.
4. 5% peak hour surcharge on international landing between 2301 to 2400 hrs at Mumbai and Delhi airports.
5. 5% discount in landing charges on international landing between 1301 hrs to 1600 hrs at Mumbai and Delhi airports.
6. A special discount of Rs. 1000 per landing in case of Boeing 737 aircraft operating domestic sectors at international airports.
7. While calculating free parking period, standard time of 15 minutes shall be added on account of time taken between touchdown and actual parking time on the parking stand. Another standard time of 15 minutes shall be added on account of taxiing time of aircraft from parking stand to take-off point. These periods shall be applicable irrespective of the actual time taken in the movement of aircraft after landing and before take-off.
8. For calculating chargeable parking time, part of an hour shall be rounded off to the nearest hour.
9. Charges for each period of parking shall be rounded off to the nearest rupee.
10. At the in-contact stands, after free parking period, for the next two hours normal parking charges shall be levied. After this period, the charges shall be double the normal parking charges.

The landing and parking charges are based on maximum take-off weight as recommended by ICAO. The air navigation charges also take into account the weight of aircraft but not the distance as recommended by ICAO. Regular consultation is held with the IATA before the charges are revised.

The passenger related charge has two elements – Foreign Travel Tax and Passenger Service Charge. The major element consists of foreign travel tax, which is deposited in the government treasury. The passenger service charge component is retained by the Authority.

### Financial Viability of Operations

The revenues of AAI exceed the costs and generate profits. The total revenues during 1998-99 were estimated at Rs. 1591 crore against the total expenses of Rs. 1383 crore. Broad details are as follows.

(Rs. crore)

Income		Expenses	
Route navigation facility charge	446	Pay and allowances, other staff costs, stores, repair and maintenance and insurance	517
Landing charge	322	General administration	502
Housing and parking	20	Depreciation	213
Terminal navigation	64	Others	24
Passenger service charge	139	Taxes	127
Rents and concessions	170	Total	1,383
Cargo fees	267		
Others	163		
Total	1,591		
<b>Profit : 208</b>			

## APPENDIX II

### CASE STUDY OF PRICING AND CHARGES AT LAO PDR AIRPORTS

#### Ownership and Management

Lao People's Democratic Republic is a land-locked country in Southeast Asia. In the early nineties, the Government of LAO PDR decided to establish an autonomous authority to manage Vientiane International Airport but later reverted back to the direct government management because of administrative reasons, although the name Lao Airport Authority still continues. Presently, the Lao Airport Authority is responsible for Vientiane International Airport and Luangprabhang, Pakse, Savannakhet, and Luangnamtha airports and also air traffic services in the country. The remaining minor airports are the responsibility of the provincial governments, although the Central Government provides annual grants to meet their capital expenditure. The revenues and expenses of Lao Airport Authority are part of the national budget. Also, the employees of the Lao Airport Authority are government employees and governed by the terms and conditions applicable to other government employees.

#### Level of Annual Traffic

The level of annual traffic at Lao PDR airports is given in the table alongside.

	Level of Annual Traffic		
	International	Domestic	Total
Aircraft movements	2,853	8,425	11,278
Passengers	1,59,680	2,73,366	4,33,046
Cargo (tonnes)	551	806	1,357

#### Charges for Facilities and Services

The Lao Airport Authority levies landing charges, parking charges, passenger service charges, and air navigation facilities charges. The charges are historically fixed in US Dollars (US\$).

The rates of the various charges and their basis are given below.

### **Landing Charges**

*Basis:* Maximum Take-off weight in the Certificate of Airworthiness.

#### *Day hours* (Sunrise to sunset)

<i>Average weight (tonnes)</i>	<i>Charge (US \$)</i>
Up to 20	3.00 per tonne or part thereof
21 to 40	60.00 plus 3.5 per tonne or part thereof above 20 tonnes
41 to 100	130.00 plus 4.00 per tonne or part thereof above 40 tonnes
above 100	370.00 plus 5.00 per tonne or part thereof above 100 tonnes

#### *Night hours*

Up to 100 tonnes	Day hour charges plus US \$50.00
Over 100 tonnes	Day hour charges plus 10percent of that value

### **Parking Charges**

First hour free, thereafter

Each period of 24 hours or part thereof, which exceeds the first hour, is charged 10 percent of the landing charges.

*Note :* Period of 24 hours is counted from 0001 to 2400 hours.

### **Passenger Service Charge**

Payable by the passenger

US\$ 10.00 per international passenger 2 years of age and over

Kip 1000 per domestic passenger 2 years of age and over

### **Air Navigation Facility Charges**

#### A. *Radio Facility Charges*

<i>Aircraft landing at Vientiane International Airport</i>	<i>Charges (US \$)</i>
Piston engine aircraft	160.00
Turboprop engine aircraft	240.00
Jet engine aircraft	320.00

B. <i>Enroute Navigation Charges</i>	
<i>Routes</i>	<i>Charges (US \$)</i>
B65 or R74	160.00
A1	300.00

### Financial Situation

Table below sets out the data regarding financial performance of the Lao Airport Authority.

It will be noted that Lao Airport Authority generates significant surpluses mainly from overflight charges. The expenditure constitutes as low as 2.5 percent of revenues and the balance is profit.

#### Profit and Loss account of Lao Airport Authority for 1997,1998 and 1999

(US\$ '000)

Description	1997	1998	1999
<b>Revenues</b>			
Landing and air navigation fees	351	526	803
Overflight fees	10,936	11,578	11,901
Passenger Service fee	108	222	332
Rental and concessions	8	7	8
<b>Total</b>	<b>11,403</b>	<b>12,334</b>	<b>13,045</b>
<b>Operating expenses</b>			
Personnel	86	44	64
Utility	126	126	22
Vehicle	19	13	16
Maintenance	49	28	64
Supplies and materials	183	143	9
Other external services	19	5	3
Communications	52	44	18
Education and travel expenses	16	11	30
Rental	—	—	32
Depreciation and amortisation	96	54	67
<b>Total- Operating expenses</b>	<b>646</b>	<b>470</b>	<b>325</b>
Operating profit	10,757	11,864	12,720

## APPENDIX III

### CASE STUDY OF PRICING AND CHARGES AT LE SOTHO AIRPORTS

#### Ownership and Management

Le Sotho is a land-locked country surrounded by South Africa. The Government of Le Sotho (Department of Civil Aviation) is responsible for the management of Moshoeshoe 1 International Airport, two regional airports at Quacha's Nek and Mokhotlong and 22 rural airports. The airports are maintained as a department of the Government. The government does not provide air navigation services. These are provided by South Africa, as the country is small and surrounded by South Africa.

#### Level of Annual Traffic

The level of annual traffic at Le Sotho airports is given in the table alongside.

	Level of Annual Traffic		
	International	Domestic	Total
Aircraft movements	3,564	25,780	29,344
Passengers	17,897	61,387	79,224
Cargo (tonnes)	101	1,362	1,464

#### Facilities and Charges

Le Sotho Department of Civil Aviation levies landing charges, parking charges and passenger service charges. These charges are as follows.

#### Landing Charges

*Basis* : Maximum certified weight in the Certificate of Airworthiness

*Surcharge* : 50% for landing and take-offs, which take place after published working hours.

Landing Charges at Le Sotho Airports		
Aircraft Weight (Kg.)	Domestic Flights (Maloti)	International Flights (Maloti)
Up to and including 1000	8.00	12.00
1001-1500	10.00	14.00
1501-2000	12.00	18.00
2001-2500	14.00	20.00
2501-3000	16.00	24.00
3001-4000	20.00	28.00
4001-5000	24.00	32.00
5001-6000	30.00	40.00
6000-7000	36.00	46.00
7001-8000	42.00	52.00
8001-9000	50.00	60.00
9001-10000	56.00	68.00
10001-12000	64.00	76.00
12001-14000	72.00	84.00
14001-15000	84.00	96.00
15001-20000	92.00	108.00
20001-25000	104.00	120.00
25001-30000	114.00	130.00
for each additional 5000 kg or part thereof	26.00	30.00

### Parking Charges

*Basis* : Same as landing charges.

First six hours free.

### Hangar Charges

Twice the parking charges.

### Passenger Service Charges

Payable by passenger

Maloti 20.00 per embarking passenger 5 years of age and over on an international flight.

Maloti 5.00 per embarking passenger 5 years of age and over on a domestic flight.

Parking Charges at Le Sotho Airports	
Aircraft weight (Kg.)	Charge up to 24 hours (or part thereof) (Maloti)
Up to and including 2000	2.00
3000	3.00
4000	5.00
5000	7.00
10000	10.00
20000	15.00
30000	19.00
70000	30.00
100000	40.00
150000	50.00
200000	60.00
400000	80.00
For each additional 100,000 or part thereof	20.00

### Financial Situation

The financial situation of Le Sotho Department of Civil Aviation is very poor as will be seen from the data presented in the following table for the year 1994.

(in '000 Maloti)

<b>Revenues</b>		<b>Expenses</b>	
Landing fees	170.2	Personnel Emoluments	1743.0
Passenger Service Fee	139.0	Travel and transport	186.7
Concession fee and Rental	26.8	Power and communications	562.5
Licence fees	23.0	Office Administration	107.8
Residential houses	38.2	Other operating expenses	1678.1
Electric charges	50.2	Equipment	108.2
Others	1.6	Contribution to international organisations	177.1
Total	449.0	Others	112.2
		Total	4675.6
<b>Deficit : 4226.6</b>		<b>Cost recovery : 9.6%</b>	

Note : On the expense side depreciation and interest have not been provided. If these were included in the costs, the percentage of cost recovery would decrease to less than 5 percent.

## APPENDIX IV

### CONCEPTUAL FRAMEWORK FOR DETERMINATION OF AIRLINE FARES

(Excerpt from the Air Tariff Committee Report  
(Planning Commission, India), December 1989)

#### Alternative Theories of Pricing

Alternative theories of pricing of public utility services can be classified under four broad categories (a) profit maximising prices; (b) average/fully distributed cost prices; (c) welfare maximising prices; and (d) second best prices. Profit maximising pricing rules are relevant for a private monopolist facing no threat of entry. Different versions of average cost pricing rules have been used by regulatory agencies in fixing administered prices. Welfare maximising prices are relevant for public firms facing no budgetary constraints. Second best pricing rules are appropriate for a public firm which is required to satisfy a budget constraint in the form of earning a fixed amount of profit (which could be negative, zero or positive) or earn a fair return on the capital invested. The first two sets of rules are based on analysis at the firm/industry level while the last two sets of rules can be derived from an industry model or a general equilibrium model. Even in the regulatory context, profit maximising prices are of some interest because they provide upper bounds for the prices.

#### Profit Maximising Prices

Consider the simple case of a private monopoly producing a single product,  $q$ , at a constant unit cost of Rs.  $c$ . It faces a downward sloping linear demand curve,  $P(q)$  with  $dp/dq < 0$ . The total profit is given by

$$\pi = p(q) q - cq \quad (1)$$

and the profit-maximising output is given by

$$MR = MC \quad (2)$$

In Figure 3.1 the profit maximising monopoly output is at the point  $q_m$ , where the revenue realised from the sale of last unit (marginal revenue) is equal to the cost of producing the last unit (marginal cost). The profit maximising price is  $p_m$  and the monopoly profit is the area  $cbp_m$ . At the monopoly equilibrium, consumers' valuation of the marginal unit, in term of their willingness to pay, is  $p_m$  which is greater than the cost of producing the marginal unit. Since

$$MR = P + P (1/e) = MC \quad (3)$$

Where  $e$  is the price elasticity of demand, which is equal to  $(dq/dp) (p/q)$ .  $e$  measures the responsiveness of quantity demanded to the change in price.  $e$  is generally negative and if its value is less than  $-1$ , demand is said to be elastic and if it is more than  $-1$ , demand is said to be inelastic. Equation (3) can be written as:

$$\frac{P - MC}{P} = -\left(\frac{1}{e}\right) > 0$$

The left-hand side gives the mark-up. The mark-up factor is lower when demand is elastic and higher when the demand is inelastic.

The point 's' on the average revenue curve is of particular interest. At this level of output  $q_c$  price equals marginal (and also average) cost and profit is zero. Consumers' marginal valuation of the good is exactly equal to its marginal cost of supplying the good. We denote  $q_c$  and  $p_c$  as competitive output and competitive price respectively.

If the monopolist sells  $n$  goods  $q_1, \dots, q_n$  and his revenue and cost functions are  $R(q_1, q_2, \dots, q_n)$  and  $c(q_1, q_2, \dots, q_n)$  the profit maximising conditions are given by

$$MR_i = MC_i \quad i = 1, 2, \dots, n \quad (5)$$

Equation (5) states that the monopolist must equate marginal revenue and marginal cost in each market. The above condition implies that

$$\frac{(P_i - MC_i)/P_i}{(P_j - MC_j)/P_j} = \frac{e_j}{e_i} \quad (6)$$

i.e. the mark-up has to be higher in a market where the demand is less elastic. If a monopolist can separate the markets (prevent resale), he can practice price discrimination and thereby achieve a higher level of profits. In the transportation literature this price discrimination rule is known as the value of service (what the traffic can bear) principle.

#### **Average Cost/Fully Distributed Cost Pricing**

It was noted that private monopoly restricts output and makes large profits. One possible way of extracting larger output from a monopolist is to set a price equal to average cost (including a fair return on capital). In the special case of constant returns to scale, average cost is equal to marginal cost at all levels of output, and market demand determines the volume of output (point s in Figure 3.1).

If economies of scale are significant in production, marginal cost curve will be below average cost curve at all positive levels of output. In Figure 3.2 a profit maximising monopoly would choose the price output combination (pm, qm).

By setting a price  $p_c = AC$ , regulatory agency can expect the monopoly to sell  $q_c$  units of output, because at any other output level, except  $q=0$ , total cost will exceed total revenue.

Until recently, some version of average cost pricing rule was adopted by regulatory bodies in many countries. Revenue

requirements are estimated by either adding a fixed amount to operating cost or allowing a fair return on rate base (allowed capital). In the case of multi-product firm the rate making exercise is done in two steps (*a*) determination of level of prices (average price or an index of prices); and (*b*) structure of prices. As noted by the ATC, difficulties arise in the allocation of joint and common costs among the products. All the three allocation procedures – relative output method, relative revenue method and attributable cost method – are arbitrary in nature.

It is possible that more than one set of tariff is compatible with the requirement that total revenue equals total cost. The problem of choice, therefore, arises. For example, if a firm produces two products  $q_1$  and  $q_2$  and the revenue and variable cost functions are  $R(q_1, q_2)$  and  $c(q_1, q_2)$  respectively and the required profit is  $A$ , this rule requires that

$$R(q_1, q_2) - c(q_1, q_2) - A = 0 \quad (7)$$

Equation (7) defines an iso-profit locus in the price space. It might happen that a tariff based on this procedure lies in an inefficient region (a segment with a positive slope). Hence, it is possible to reduce the prices of both commodities and increase the quantities sold of both commodities.

One problem with average cost pricing is that it ignores demand considerations. This type of regulation, based on actual costs does not provide any incentive for the regulated firm to minimise its cost of production. Under the fair rate of return method of regulation the revenue requirements for a test period are estimated by adding a fair return on the capital base to the operating cost. When the fair rate of return,  $s$ , is higher than the cost of capital,  $r$ , then the profit becomes  $(s - r)K$  where  $K$  is capital. Since the allowed profit varies with  $K$  and not with other inputs, the firm has an incentive to choose a capital intensive method of production.

### Welfare Maximising Prices

The case for marginal cost pricing of products of public enterprises was articulated by the French Engineer Jules Dupuit as early as 1844. He suggested a criterion for measuring social benefit of an activity. A consumer's willingness to pay for a product can be measured by the maximum price he would pay for the purchase of the commodity rather than go without it. Hence, the total benefit to all consumers is the aggregate of maximum possible price at which individual units can be sold. Geometrically the total benefit is given by the area below the demand curve. Algebraically the total benefit is

$$\int_0^q p(q) dq$$

According to Dupuit the welfare maximising output and price can be obtained by maximising the net social welfare i.e.

$$\text{The solution is } P(q) = dc/dq = \text{marginal cost} \quad (8)$$

In Figure 3.1, the welfare maximising price quantity combination is  $(p_c, q_c)$ . At the level of output  $q_c$

$$\begin{aligned} \text{total benefit} &= \text{area } oqcsf \\ \text{total cost} &= \text{total revenue} = \text{area } oqcsc \\ \text{consumer's surplus} &= \text{area } csf \end{aligned}$$

It is worth measuring the welfare loss due to monopoly pricing. At the level of monopoly output  $q_m$

$$\begin{aligned} \text{total benefit} &= \text{area } oqmaf \\ \text{total cost} &= \text{area } oqmbc \\ \text{profit} &= \text{area } cbapm \\ \text{consumers' surplus} &= \text{area } pmaf \end{aligned}$$

Comparing the two solutions it is obvious that the welfare loss due to monopoly pricing is measured by the area  $bda$ .

Difficulty arises in implementing the marginal cost-pricing rule in the case of a decreasing cost industry. In figure 3.2, Dupuit's solution is at the point W where  $AC > MC$  and hence the firm will incur loss. Social benefit is maximised but the firm's revenue is not sufficient to cover the total cost. The deficit has to be financed by Government subsidy.

Consider a multi-product firm with a total cost function  $C(q_1, \dots, q_m)$ . If the demand for each product in a market depends only on the price prevailing in the market, the total benefit is given by

Maximisation of the difference between total benefit and total cost (sum of consumers' and producers' surpluses) yields the following conditions for welfare maximisation:

$$P_j = mC_j \quad j = 1, 2, \dots, m \quad \int_0^{q_j} p_j(q_j) dq_j \quad (9)$$

Equation (9) states that, for maximisation of social welfare, equality of price and marginal cost must hold for each product.

Dupuit's solution is based on many restrictive assumptions such as cardinal utility, interpersonal comparisons of utility, independent demands and other products priced at their marginal costs.

Hotelling formulated a general equilibrium model, relaxing all the assumptions of Dupuit. Using the Pareto criterion he found that the ideal pricing rule is the one which equates price of each good to its marginal cost. The intuitive rationale for the rule is that, at the margin, the cost of producing an additional unit of a good is equal to the value consumer attaches to the good. Later, economists such as Lange and Lerner have advocated the marginal cost pricing rule for state enterprises in socialist countries. The rule found its practical application in the nationalised French enterprises

for a long time and it is being recommended by many Governments. In India, the Government's White Paper in 1985 advocated long run marginal cost (LRMC) pricing for public enterprises and in the determination of administered prices for the products of regulated industries.

The main advantages of LRMC pricing are that this cost (a) reflects the current social cost; (b) is external to the regulated firm and, therefore, is incentive compatible; and (c) provides the right signals for producers and consumers in their choices. One major drawback of this rule is that its application in the case of decreasing cost industries will result in deficits. Hotelling argues that any departure from MC pricing will mean loss of welfare. He interprets AC pricing as  $AC = MC + (AC - MC) = MC + t$  where  $t$  is a per unit tax. This tax will distort consumer's choices. He pleads that the deficit could be covered by lumpsum taxes, taxes on items, which are inelastic in supply, etc. The difficulty is that Governments may not be in a position to cover the deficits of all decreasing cost industries. In such a situation, the very existence of the firm requires that total revenue must equal total cost.

### **Second Best Pricing Rules**

When a budget constraint is imposed on a regulated public utility, it becomes necessary to depart from the marginal cost-pricing rule, which results in loss of social welfare. The question then is what is the optimal way to depart from the MC pricing rule in order to minimise the welfare loss.

We will consider here three types of second-best pricing rules. Two part/multi part tariff involves non-uniform prices for different blocks, with the price in the last block equal to marginal cost. By charging higher rates for inframarginal blocks, parts of consumers' surpluses are recovered to cover the deficits. In Ramsey and Boiteux pricing rules, the proportional deviation between prices and LRMC's depend on the price elasticities of

demand and the tightness of the budget constraint. Peak load pricing method sets different rates for peak and off peak periods.

### **Two Part/Multi Part Tariff**

One way to meet both the conditions, price = MC and TR = TC is to adopt a two-part tariff. Under a two-part tariff a consumer has to pay a lumpsum fee as well as a per unit charge. The per unit charge must equal long-run marginal cost (Paretian rule) and the lumpsum fee must be fixed in such a way that the total revenue collected i.e. quantity sold X the unit charge) plus (lumpsum fee X the number of consumers) is equal to the total cost. Figure 3.3 illustrates the determination of the lumpsum fee and unit price. The problem with this tariff is that if the fixed cost is large relative to the total cost the lumpsum fee will be large and this will limit the number of consumers. One way to solve this problem is to adopt a multi part or declining block tariff. Still the average price decreases with the quantity bought. This type of tariff is recommended for decreasing cost industries. In the case of air traffic, if output is measured as passenger kilometres/tonne kilometres, then the cost structure is such that the unit cost per kilometre declines with the distance. A tapering fare/freight design is an application of multi part tariff to the airline industry.

### **Ramsey Pricing**

In a seminar paper Frank Ramsey developed a pricing rule in the context of optimal taxation. The Ramsey pricing rule takes the following simple form if we neglect all cross-price elasticities of demand.

$$\frac{P_i - MC_i}{P_i} = k(-1/e_i), \quad i = 1 \dots\dots n$$

Where  $MC_i$  is the marginal cost of producing  $i$ th good,  $e_i$  is the own price elasticity of demand for  $i$ th good and  $k$  is a constant, associated with the budget constraint. This rule states that the price cost margin for any good must be proportional to its inverse price

elasticity. The price cost margin is larger, the smaller the absolute value of its price elasticity.

Thus Ramsey rule can be interpreted as a second best rule. This rule provides rationale for the value of service or “what the traffic can bear” principle applied in transportation. It may be noticed that Ramsey pricing can stand for low pricing as well as high pricing policies, for deficit enterprises, cost covering enterprises and profit making enterprises. Ramsey pricing converges to monopoly pricing if  $k = 1$  and if the monopolist takes account of compensated demand functions.

If the cross-price elasticities of demand are taken into account, Ramsey pricing rule takes the form

$$\text{a constant } \sum m_i e_{ij} \quad i, j = 1, 2, \dots, n$$

Where  $m_j = (P_j - MC_j)/P_j$  is the price cost margin for good,  $j$  and  $e_{ij}$ , is the compensated price elasticity for  $i$ th good with respect to  $j$ th price. In the case of two products eliminating the constant, we can write

$$\frac{m_1}{P_2} = \frac{e_{22} - e_{12}}{e_{11} - e_{22}}$$

Ramsey pricing involves a trade-off between the level of price and the structure of price.

Ramsey pricing has an intuitive appeal. When the revenue-cost constraint is binding, prices will deviate from their marginal costs. These distortions involve welfare loss. One way to minimise the welfare loss is to keep the percentage change (from the unconstrained situation to the second best situation) for each good constant. This requires that the mark-up must be higher for the good with less elastic demand and lower for the good with more elastic demand.

Ramsey pricing rule possesses some attractive properties. The pricing solution always lies in the efficient region of the iso-profit locus. Under certain conditions the prices are also sustainable—they can deter entry.

### **Boiteux Pricing**

Boiteux's classic paper deals with the pricing policies of public monopolies operating under budget constraints. Boiteux uses the Pareto criterion and obtains a second-best solution in a general equilibrium framework. In his model the economic agents consist of consumers, private producers and public firms. Consumers take prices as given and make their decisions by maximising their ordinal utility functions. Private firms maximise their profits taking prices as given, subject to technology constraints. The public firms are subject to fixed profit constraints. Given the behaviour of private producers and consumers and technology, Boiteux's problem is to find optimal pricing rules for the public firms. One generality of his formulation is that he considers both intermediate and final goods. The model allows for interaction between public and private sectors. Boiteux's solution generalises some of the earlier results and Ramsey pricing emerges as a special case. In the case of independent demands and only one public firm Boiteux's solution is similar to the "inverse price elasticity rule" of Ramsey, but in Boiteux model marginal costs are based on shadow prices and not on market prices. Boiteux model has been extended to consider (a) a general form of budget constraint which includes fixed profit (could be zero or even negative) and rate of return regulation as special case; (b) equity aspects of pricing; and (c) non-competitive behaviour on the part of private producers.

### **Peak-Load Pricing**

In many public utilities, capacities are fixed in short run - a year, a week or a day, but demand varies in known ways from season to season in a year or different days in a week or different

time periods in a day. When a uniform price is charged throughout the relevant period, idle capacity in some periods and pressures on capacity in other periods are observed. During peak seasons or peak hours consumers are rationed or they face delays. In the airline industry the problem of seat management in air carriers and utilisation of airport facilities are receiving greater attention.

To illustrate the gains to society from differential pricing for different subperiods, consider an enterprise with a simple cost structure-constant per unit capacity cost  $c$  and a constant per unit operating cost  $b$ , for the relevant time horizon. If the demand is uniform throughout the period, the optimal level of capacity is determined by the intersection of the demand curve  $DD$  and the long run marginal (average) cost line  $b+c$  at the point  $e$ . See Figure 3.4. In this situation the firm achieves a break-even level at full capacity utilisation. It may be noted that the short-run marginal cost curve becomes vertical line once the capacity is reached. The interesting point here is that

$$P = LRMC = LRAC = SRMC$$

Now suppose the capacity is fixed at  $q$   $k$ . During the off peak period the demand curve shifts to the left (to  $D_o$ ,  $D_o$ ) and during the peak-period the demand curve shifts to the right (to  $D_p$ ,  $D_p$ ). With the uniform price equal to  $b+c$  demand is less than capacity during the off peak period and greater than capacity during the peak period. During the off peak period capacity is lying idle while during the peak period there is unfilled demand. By offering a price lower than  $b+c$  but at least equal to  $b$ , demand can be increased during the off-peak period. Rationing by price mechanism during the peak period means setting a price equal to the peak short run marginal cost, which is higher than  $b+c$ . The important point here is that the prices in both periods are demand determined. In other words, under uniform pricing excess demand during peak period is curbed by some physical mechanism (e.g. queue) while under peakload pricing the excess demand is cleared by price mechanism, which is in a sense voluntary.

Adoption of peak load pricing policies for airline services and airport facilities will not only result in better utilisation of the capacities but also lead to savings in creation of capacity costs.

### **LRMC Based Pricing for Airline Services**

*Case for Second Best Pricing* : Indian Airlines is a public monopoly. Decisions regarding the number and type of aircraft, route pattern and tariff are being regulated by the Central Government. Public monopoly enables the Government to achieve social goals and make it act in the public interest. However, the main problem with a monopoly is that it has little incentive to achieve cost minimisation. The existing tariff is actual cost based. The actual costs do not reflect the current social costs partly because the capital costs are based on book value and partly because these costs are affected by various distortions mentioned earlier in this chapter.

One method of introducing competitive pressure, in the present institutional setup, is to develop a tariff based on long run marginal cost. Long run marginal cost for a service reflects the current social cost of delivering the service using the most efficient plant/equipment available. LRMC's can be based on technical norms, suitable to Indian operating conditions. Since the LRMC computation exercise is for a green-field plant and as the capital costs include depreciation and fair return on capital, LRMC based prices will ensure (ex ante) that the present value of expected net income over the life of the plant will cover the cost of the plant.

The unit cost of service based on the green field plant may differ from the average unit cost of service for existing plants. Overall budget constraint for the company as well as the desire to avoid sharp changes in tariff may necessitate adjustments in tariff in a gradual manner. Pursuit of social goals as well as the need to curb fast rate of growth of demand require departures from LRMC pricing. Hence, second best pricing rules are appropriate.

*Choice of Aircraft* : Due to many uncertainties regarding the nature and type of technological change in the aircraft industry, the time horizon of the pricing exercise need not be long. Aircraft investment is not lumpy i.e. the annual increment in demand is large relative to the size of an efficient modern aircraft. Existence of leasing in and leasing-out options also facilitates corrections when demand forecasts are not realised. Aircrafts do differ not only in terms of available seats and cargo capacities but also in terms of weight and other characteristics. However, Indian Airlines purchase plan for the near future involves only A-320 aircraft. Hence the cost exercise may be done for A-320 alone.

*Market* : It is meaningful to treat each city pair as one market. Among other things, the markets differ with respect to the length of haul. Some components of airline service costs are fixed with respect to trips and hence they do not vary with distance. Choice of each city pair as a separate market is also necessary, to take care of special variation in certain cost (e.g. landing and navigational charges depending on whether it is an international or national airport, and fuel prices which vary from state to state).

*Time Dimension* : It is desirable to take into account the time period for a scheduled flight. If time-varying charges are adopted for aircraft landing and take-off in major airports and/or the opportunity costs of using aircraft and other resources, whose supplies are fixed, vary in different time periods, then the exercise must also take into account the temporal variation.

*Cost Allocation Among Services* : The cost worked out for each city pair, aircraft-wise and by specific time period, has to be allocated among different services. If the mail and cargo services account for a small proportion of revenue (less than 10 per cent in IA) then the mail and cargo services may be treated as by-products and the exercise may concentrate on computation of passenger service after making adjustments in total costs for the mail and cargo services.

*Classification of Costs* : One major drawback of the ATC cost analysis is that it does not capture adequately the complexity of airline cost structure. For a meaningful cost exercise, we recommend that the airline costs be classified under five heads, viz. (a) cost per block hour; (b) cost per plane hour; (c) cost related to trips; (d) cost related to passengers; and (e) cost related to capacity. All the cost figures must also be in or converted to the reference period (e.g. 1989-90) prices.

*Cost per Block Hour* : Block hour may be defined as the total amount of time elapsed between the time the plane taxis away from one gate and the time the engines are shutoff at the destination gate. Block hour for serving a route includes the amount of time necessary for each take-off and landing and the travel time (based on distance and the cruising speed of the plane involved). Fuel and oil costs, direct aircraft maintenance cost and flying and cabin crew costs vary with block hour. Further, fuel and oil and aircraft maintenance costs per km. decrease with the number of km. flown. Hence the average and marginal costs do diverge.

*Cost per Plane Hour* : We define plane hour for a trip as block hour for a trip plus the time required for loading and unloading. The loading and unloading time is approximately constant for each trip and it is independent of the distance flown. It is meaningful to allocate all capital related cost and air insurance costs on the basis of plane hour rather than block hour. Suppose an aircraft is available for use for 15 hours per day. If the plane is used only for short haul operations the number of trips will be larger (compared with the plane used for long haul operation) but the distance flown and the revenue passenger km will be smaller because for each trip the ground time would be about 45 minutes.

The capital cost per plane hour can be estimated as follows.

Let

I = cost of new aircraft in rupees

L = assumed life of aircraft in years

- $sI$  = scrap value of aircraft after  $L$  years  
 $r$  = the opportunity cost of capital (a weighted average, if the purchase of the aircraft is financed partly by equity and partly by debt)  
 $H$  = number of feasible plane hours in a year  
 $S^* = sle^{rL}$  = The present value of scrap value of aircraft at time  $L$ .

Assuming continuous compounding, the capital cost of using the aircraft per year is

$$(I-s^*) (r/(1-e^{-rL}))$$

The cost per plane hour can be obtained by dividing the above expression by the number of feasible plane hours per year,  $H$ . Alternatively the capital cost can be computed as a sum of annual depreciation charge and the cost of using capital. With straight-line depreciation, the annual depreciation charge is a constant flow of  $(1-sI)/L$ . The capital cost flow may not be a constant amount. A non-constant stream would occur if (a) no return on equity is provided in the initial year, (b) the period for repayment of debt is smaller than  $L$  and (c) interest is computed on the balance amount of loan due at the beginning of each year. Suppose the feasible pattern for payments of interest on debt and return on equity one year by

$$v_1, v_2 \dots \dots \dots, v_i$$

(some  $v_i$ 's could be zero) then the present value of the series can be computed as  $\sum v_t (1+r)^{-t}$ . Then the constant cost flow,  $v$  can be obtained by solving:

$$\sum_{t=1}^L v_t (1+r)^{-t} = v \sum_{t=1}^L (1+r)^{-t}$$

*Cost Related to Trips* : These costs are landing and navigational charges and payments for ground handling staff. These costs are higher for international airports than for domestic airports.

*Cost Related to Passengers* : These costs are for passengers' food and other amenities and passenger insurance.

*Cost Related to Capacity* : These costs are indirect operating costs such as administration and other overheads. Regulatory agencies allocate these costs among aircrafts and then among different sectors by one of the fully distributed cost method (relative output, relative revenue or attributable cost). There is some arbitrariness in the allocation of these costs. It may be the case that part of the indirect cost may vary with revenue tonne/passenger km or available tonne km. One way to resolve this problem is to estimate an indirect cost function and then reallocate the cost among the various cost components. If estimation of the cost function is not feasible (or desirable because the cost data are subject to many distortions) or if the indirect cost forms a small part of the total cost, it may be allocated on the basis of attributable cost method.

### **Sector-wise LRMC's**

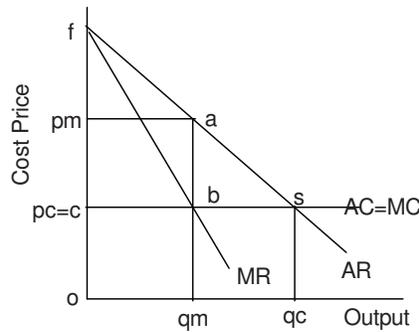
In order to arrive at LRMC per passenger km for each sector, norms relating to block hour and plane hour for each sector, conversion ratio between executive class and ordinary class seats and load factor are needed. Chapter 5 spells out in detail the method used, the parameters/norms/relationship used and some minor changes in the computation procedure followed (necessitated by informational and other constraints) in the estimation of LRMC's for A-320 aircraft. Since our costing exercise is different from the exercise carried out so far, we have recomputed sectoral costs per passenger revenue km for two existing aircraft, Boeing 737 and AB-300 following our new cost classification. The effects of changes in the norms/parameters/procedures on the cost figures are studied by means of sensitivity analysis.

**Uses of LRMC's**

Sector wise LRMC figures are used in Chapter 7 for determination of whether a particular route is economic or uneconomic and for the development of a criterion for cross-subsidisation. These figures also serve as base values in the development of a tariff in Chapter 8. The components of LRMC's (e.g. costs other than capital related costs, cost of operating an extra flight) can be used for providing lower bounds for prices for certain categories of consumers/ seasons/sectors.

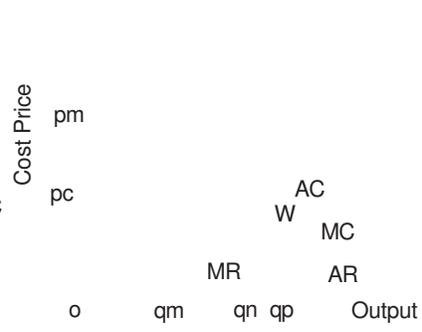
### Profit Maximising Prices

**Figure 3.1 : With Constant Costs**



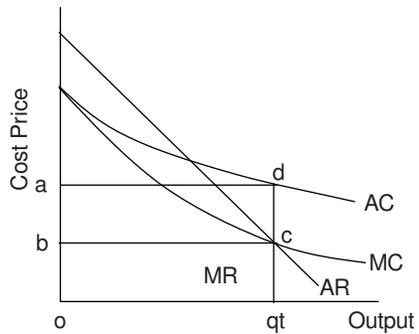
qm : Monopoly output  
 qc : Competitive output (output at which  $p=MC$ )  
 pm : Monopoly price  
 cbapm : Monopoly profit

**Figure 3.2 : With Declining Costs**



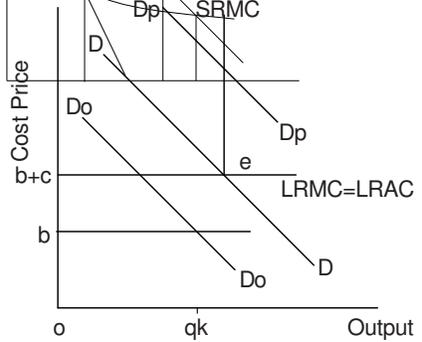
qm : Monopoly output  
 qn : Regulated output  
 qp : Output at which  $p = MC$   
 pm : Monopoly price  
 pn : Regulated price

**Figure 3.3 : Two Part/Multi Part Tariff**



Total cost :  $oqtda$   
 Revenue at marginal price :  $ob : oqtcb$   
 Lumpsum (licence fee) :  $(bcda/\text{No. of customers})$   
 qt : Output under two-part tariff

**Figure 3.4 : Peak Load Pricing**



b : SRMC      c : Unit capacity cost  
 qk : Capacity output at which  $LRMC=LRAC=SRMC$   
 Do Do : Off-peak demand curve  
 Dp Dp : Peak demand curve  
 d : SRMC = off-peak price  
 a : Peak price=SRMC during peak