



**1993-1996**

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# HIGHLIGHTS

## **DURING 1993 ...**

*The world economy continued to recover ...*

The world's Gross Domestic Product (GDP) grew by an estimated 1.7 per cent in real terms. On a regional basis the change in GDP ranged from an estimated increase of about 4 per cent for Asia/Pacific to a decrease of about 3 per cent for Europe, the latter being adversely affected in part by the poor economic performance of the former centrally planned economies in eastern Europe (see Chapter 1).

*Progressive liberalization of air transport services continued ...*

Initiatives were taken both at the national level and at a regional level, such as by the European Communities and by States belonging to the Andean Pact. On a broader scale, a General Agreement on Trade in Services (GATS) with an Annex on Air Transport Services was adopted at the end of the year, covering certain air transport elements but excluding traffic rights and services directly related to the provision of air services (Chapter 2).

*ICAO convened Conference for 1994 on new regulatory arrangements ...*

The Council of ICAO convened a world-wide Air Transport Conference to take place in 1994 to discuss substantive studies of potential new regulatory arrangements for international air transport (Chapter 2).

*Airline privatization slackened ...*

The privatization of several airlines was deferred because of general economic conditions, the state of the industry or local circumstances (Chapter 2).

*... but foreign investment in airlines did not ...*

Airlines continued to expand transnational alliances, including code sharing, joint services, and joint participation in frequent flyer programmes (Chapter 2).

*Airline traffic showed sustained growth ...*

Over-all scheduled passenger/freight/mail tonne-kilometres performed were up by 4 per cent and international tonne-kilometres by 8 per cent. However, there were significant differences between regions, ranging from a small decrease (about 1 per cent) in total traffic in Africa to increases of about 10 per cent in the Middle East and Asia/Pacific (Chapter 2).



*... and finances finally turned the corner ...*

Preliminary estimates indicate that the world's scheduled airlines as a whole experienced a small operating profit (of 1.1 per cent of operating revenues) after three consecutive years of operating losses (Chapter 2).

*... but aircraft orders were down ...*

The number of turbo-jet aircraft ordered was 341 compared to 362 in 1992. The financial commitment for orders placed for these aircraft in 1993 is estimated to be about U.S.\$ 17 000 million, somewhat less than the U.S.\$ 21 000 million estimated for 1992 (Chapter 2).

*Airport construction continued ...*

Three new international airports opened (Ciudad del Este in Paraguay, Liberia in Costa Rica and Bequia in Saint Vincent and the Grenadines), construction on a number of other new airports continued and major expansion projects were under way in all regions. A trend towards governments establishing autonomous authorities to operate airports and air navigation facility services also continued (Chapter 3).

*Planning to implement a satellite-based navigation system began ...*

Plans for the transition to a global satellite-based Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) system to replace existing line-of-sight ones were initiated by ICAO (Chapter 3).

*... meanwhile existing air navigation facilities and services were enhanced ...*

Air traffic control systems around the world were being updated as part of the evolution process to a global ATM system. Meteorological services were also enhanced through the use of automated weather stations and computer generated weather forecasts (Chapter 3).

*Safety remained a top priority ...*

Preliminary information on aircraft accidents involving passenger fatalities in scheduled air services shows that there were 34 fatal aircraft accidents involving 936 passenger fatalities in 1993 compared to 29 fatal accidents and 1 097 passenger fatalities in 1992. The number of passenger fatalities per 100 million passenger-kilometres decreased from 0.06 in 1992 to 0.05 in 1993. During the year prominence was given to studies on Human Factors in the prevention of aircraft accidents (Chapter 4).

*Security continued to be a major issue ...*

The number of acts of unlawful interference increased significantly. In 1993 there were twenty-nine such incidents compared with only nine in 1992 (Chapter 4).



*Passenger and cargo clearance procedures were streamlined ...*

Several States introduced internationally agreed automated procedures to expedite the clearance of passengers and cargo. Also as from 1 January 1993 all customs controls were removed for travel between all 12 European Union States (Chapter 4).

*Environmental impact studies continued ...*

ICAO continued to review the actions needed to control the effects of aircraft engine emissions around airports and in the upper atmosphere as well as what progress can be made to further reduce aircraft noise (Chapter 4).

#### **BETWEEN 1993 AND 1996 ...**

*Airline traffic is expected to continue to grow ...*

Total scheduled passenger traffic is expected to grow at 5 per cent in 1994, about 6 per cent in 1995 and just over 7 per cent in 1996 (in terms of passenger-kilometres performed) (Chapter 5).

*Airline finances should continue to improve ...*

Scheduled airline revenues (including revenues from freight, mail and other sources) are estimated to increase between 9 and 11 per cent each year, whereas airline expenses are expected to grow between 7 and 10 per cent (Chapter 5).

*Regional disparities in traffic growth will remain ...*

The passenger traffic of airlines of Asia/Pacific is expected to show the highest annual average growth, about 10 per cent, compared with an annual average growth rate of 6 per cent for the world. The passenger traffic of airlines of the Middle East is expected to grow at an annual average of 7 per cent, and that of the airlines of Africa, North America and Latin America and the Caribbean regions is expected to grow at an average of about 5 per cent per year. European airline passenger traffic is expected to grow at only 4 per cent per year, primarily as a result of structural changes in the economies of that region (Chapter 6).



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# FOREWORD

## Introduction

1. This circular, *The World of Civil Aviation — 1993 to 1996*, is the second in an annual series of publications covering recent and future developments in civil aviation, one covering the period 1992-1995 having been published as Circular 244. In the present circular, Part I reviews the main events in or affecting international civil aviation in 1993. Part II analyses trends in the world economy and the air transport industry and presents global forecasts of airline scheduled passenger traffic through to 1996. Part III reviews, on a region-by-region basis, the year 1993 and gives prospects through to 1996.

2. More extensive aviation statistics for the year 1993 may be found in the ICAO statistical yearbook, *Civil Aviation Statistics of the World, 1993* (Doc 9180/19), a compendium of the key statistics published in the various ICAO Digests of Statistics. Other annual publications of the Organization which complement and supplement *The World of Civil Aviation* are the *Surveys of International Air Transport Fares and Rates* and the studies of *Regional Differences in Fares, Rates and Costs for International Air Transport*. Finally, the medium-term forecasts in *The World of Civil Aviation* are complemented by longer-term and more extensive forecasts published biennially or triennially, the most recent publication being the *Outlook for Air Transport to the Year 2003* (Circular 252), currently in production.

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## Sources

4. In addition to the Digests of Statistics and other ICAO publications referred to above, sources of information for *The World of Civil Aviation* include relevant and most recently available statistical publications of the United Nations; the United Nations Conference on Trade and Development (UNCTAD); the International Monetary Fund (IMF); the World Bank; the World Tourism Organization (WTO); the Organization for Economic Co-operation and

Development (OECD); the European Civil Aviation Conference (ECAC); the United States Department of Transportation (DOT); the Airports Council International (ACI); the International Air Transport Association (IATA); the Association of European Airlines (AEA); and Wharton Econometrics Forecasting Associates (WEFA).

5. Another source of information used for *The World of Civil Aviation* was the large and constantly updated collection of research material on hand at ICAO, including completed ICAO studies, periodical and occasional publications of national administrations and international organizations, studies prepared by research agencies and individuals, and the aviation press. Finally, an information collection exercise specifically for *The World of Civil Aviation* was carried out through the seven ICAO Regional Offices, in some cases including questionnaires addressed to States in the region concerned.

6. The statistical data for 1993 appearing in this circular are to be considered as preliminary: experience shows that the margin of error for world totals is probably less than 2 per cent, except in the case of profit margins where it may be considerably higher. *Unless otherwise noted:*

- a) all statistical data are applicable to ICAO Contracting States (182 at the end of 1993);
- b) regional breakdowns are by ICAO statistical region (see map preceding Chapter 6);
- c) traffic statistics are for revenue scheduled services;
- d) total airline financial statistics relate to non-scheduled as well as scheduled operations of scheduled airlines.
- e) the expression "tonne-kilometre" means metric tonne-kilometre; and
- f) the word "billion", when used in this circular, means one thousand million.

### **Monetary Unit**

7. Unless indicated otherwise, all references in this circular to "cents" mean "U.S. cents", and all references to "\$" mean "U.S. dollars".



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PART I  
THE WORLD IN 1993

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# Chapter 1

## Economic Influences

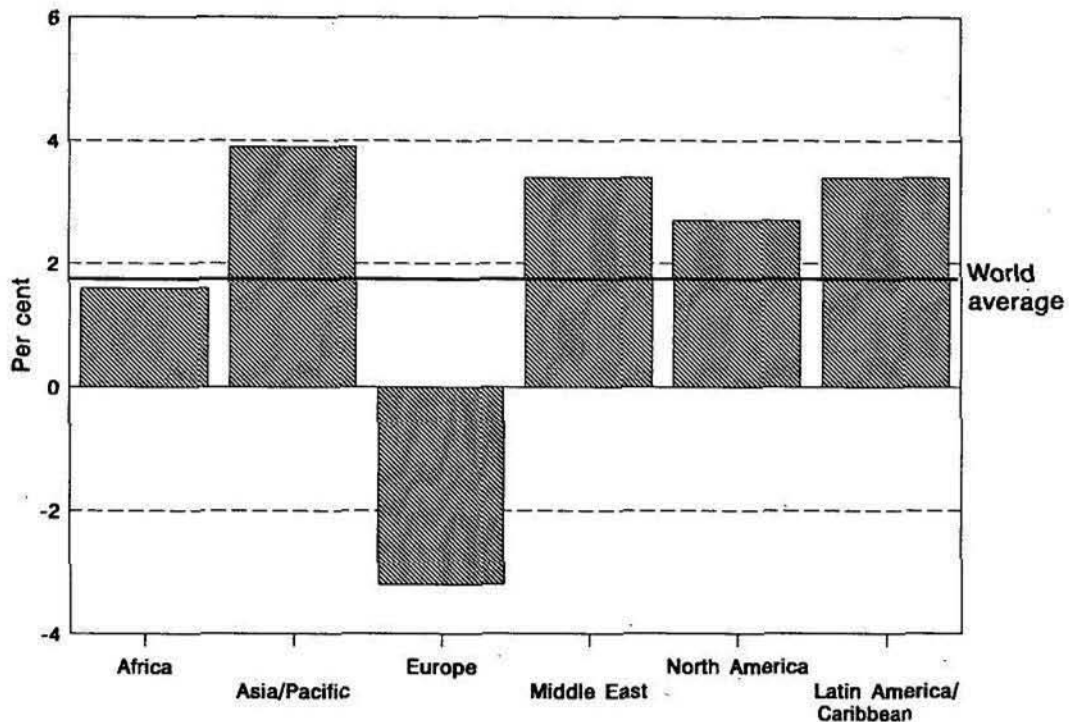
1. While growth in air traffic has historically been much greater than growth in the economy, there is a strong correlation between the two and the demand for air transport is primarily determined by economic development. Developments in personal income affect the level of purchasing power and the propensity to undertake leisure travel in general and air travel in particular. Commercial activity and trade have a direct impact on the demand for business travel and for air freight.
2. Crude oil prices play a key role not only in the health of the world economy, but also in air carrier costs (fuel costs have ranged between 13 and 25 per cent of scheduled airline operating costs over the past decade). Inflation, interest rates and currency markets are among other important factors which affect the world economy in general and international aviation in particular.
3. As background to the analysis of the world of civil aviation in 1993, which follows in Chapters 2 to 4, this chapter reviews developments in 1993 in world economic output and trade, in inflation, interest rates and currency markets, in crude oil and jet fuel availability and prices and in international tourism.

### GROSS DOMESTIC PRODUCT

4. In 1993 the world's Gross Domestic Product (GDP), which is the broadest available measure of economic activity, grew by an estimated 1.7 per cent. Developed countries, as a group, once again experienced below normal economic performance with a growth of about 1.2 per cent. Economic recovery strengthened during the year in North America under the influence of low interest rates. In contrast, the economies of continental western Europe and Japan remained in recession. Falls in asset prices and appreciation of the Yen were the main factors contributing to recession in Japan. Relatively high interest rates related to inflationary pressures in Germany dampened activity in continental Europe.
5. Declines in output occurred in the former centrally planned economies of eastern Europe and the Commonwealth of Independent States (CIS), further exacerbating the deep recession of the previous three years. Activity was especially weak in the Russian Federation. In much of the developing world, conditions were relatively buoyant in 1993. Economic expansion was greatest in the countries of East and South-East Asia, but also substantial in Latin America and the Middle East. However, the developing countries of Africa had another difficult year in 1993.

6. Figure 1-1 illustrates the relative regional economic growth rates in 1993 for the ICAO statistical regions. Performance of the generally buoyant Asia/Pacific region was affected by the recession in Japan, and the performance of Europe by economic declines in the countries of eastern Europe and the CIS.

7. The diverse economic experience was an important factor in widely different air carrier traffic developments in 1993. Most notably, healthy growth in the economy and air traffic of the Asia/Pacific region contrasted with economic and traffic declines in Europe (as a whole). While the relationship between economic growth and air traffic demand is powerful, the link between economic growth in a region and the traffic of airlines registered in the region is becoming more complex as regulatory conditions, airline alliances and market shares change in an increasingly competitive environment. Chapters 5 and 6 discuss economic trends and their impact on traffic; the traffic forecasts presented there take into account the economic outlook for the next three years.



Source: ICAO estimates based on OECD, International Monetary Fund (IMF), Wharton Econometrics Services and other economic sources.

Figure 1-1. Annual change in real GDP, 1993/1992

## TRADE DEVELOPMENTS

8. The weak economies of important trading countries such as Germany, France and Japan had a depressing effect on world trade in 1993. The growth in the export volume of industrial countries fell from more than 4 per cent in 1992 to less than 0.5 per cent in 1993. However, the exports of developing countries expanded vigorously. These trends had an impact on the pattern of international air freight demand and business travel.

9. Conclusion of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) and other regional trade agreements achieved during the year may serve to stimulate trade and economic growth and hence international traffic demand over the long term. Regulatory trends within the air transport industry itself, generally in the direction of greater liberalization as discussed in Chapter 2, could also have a direct positive effect on traffic demand in the long term.

## TOURISM

10. The demand for international air travel derives in part from the demand for international tourism. Preliminary estimates of the World Tourism Organization (WTO) indicate that international tourist arrivals grew by a moderate 3.8 per cent and tourist receipts by 9.3 per cent in 1993. The WTO's East Asia/Pacific region showed the largest increase in tourist arrivals (nearly 12 per cent), from a combined increase in intra-regional and long distance travel. The Middle East and South Asia experienced declines in arrivals in 1993.

## INFLATION, INTEREST RATES AND CURRENCY MARKETS

11. With demand pressures generally relatively weak in product and labour markets, average inflation in industrial countries declined to about 3 per cent in 1993, the lowest rate for many years. In this environment, cost pressures on the airlines of the developed world were subdued. On the other hand a number of developing countries were subjected to high and increasing inflation. Inflation in the countries in economic transition in eastern Europe and the CIS remained very high.

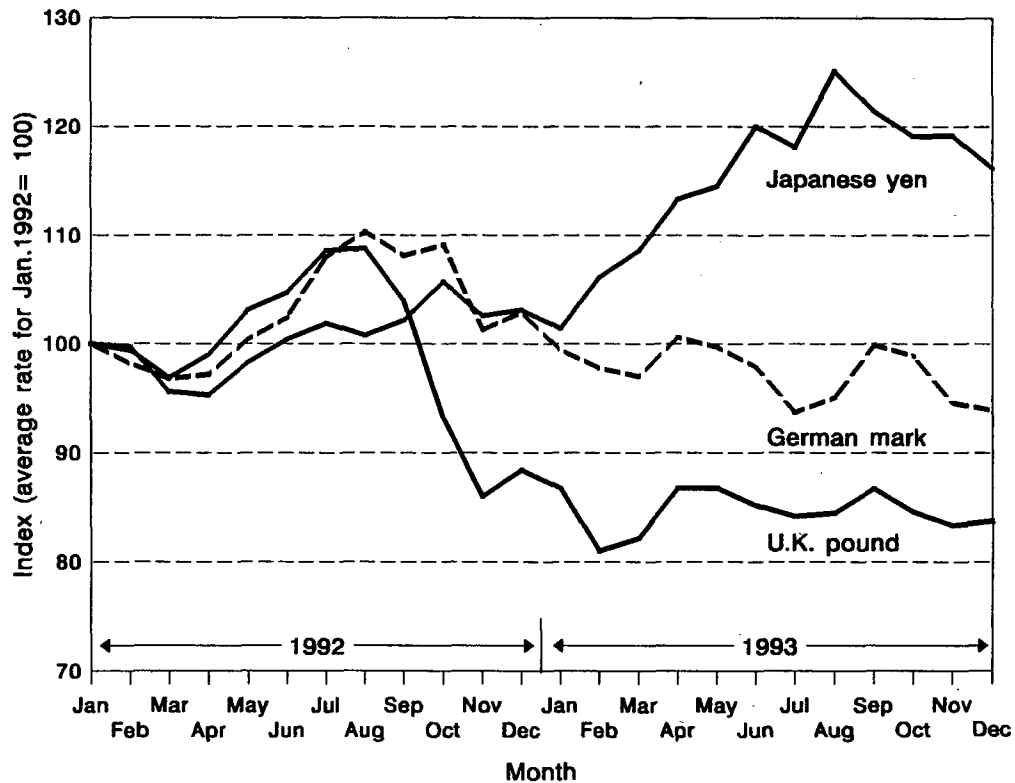
12. Short-term and long-term interest rates generally declined in 1993 in the industrialized countries. Rates were particularly low in Japan and the United States. Short-term rates reflected the mostly expansionary stance of monetary policy; long-term rates reflected an encouraging outlook for inflation. Low interest rates had a favourable impact on the cost of borrowing for the aviation industry.

13. Currency exchange rates during the year responded to international differences in interest rates and inflation rates, and to trade balances and various speculative pressures in

individual countries. Among the major currencies, the largest exchange rate movement in 1993 was the appreciation of the Yen, by around 20 per cent against the United States dollar (Figure 1-2).

14. Movements in exchange rates affect relative prices of international travel markets, and hence the distribution of traffic flows. For example, the appreciation of the Yen against the United States dollar tends to reduce fares and accommodation prices for Japanese residents travelling to the United States and, therefore, to encourage demand in this market, and to have the reverse affect on travel to Japan by residents of the United States.

15. Movements in exchange rates can also affect the profitability and balance sheet of airlines. If the proportion of an airline's expenses incurred in the local currency exceeds the proportion of its local currency revenues, then appreciation of the local currency would tend to reduce the airline's operating profit. On the other hand, there could be a profit associated with that part of its debt denominated in a depreciated foreign currency.



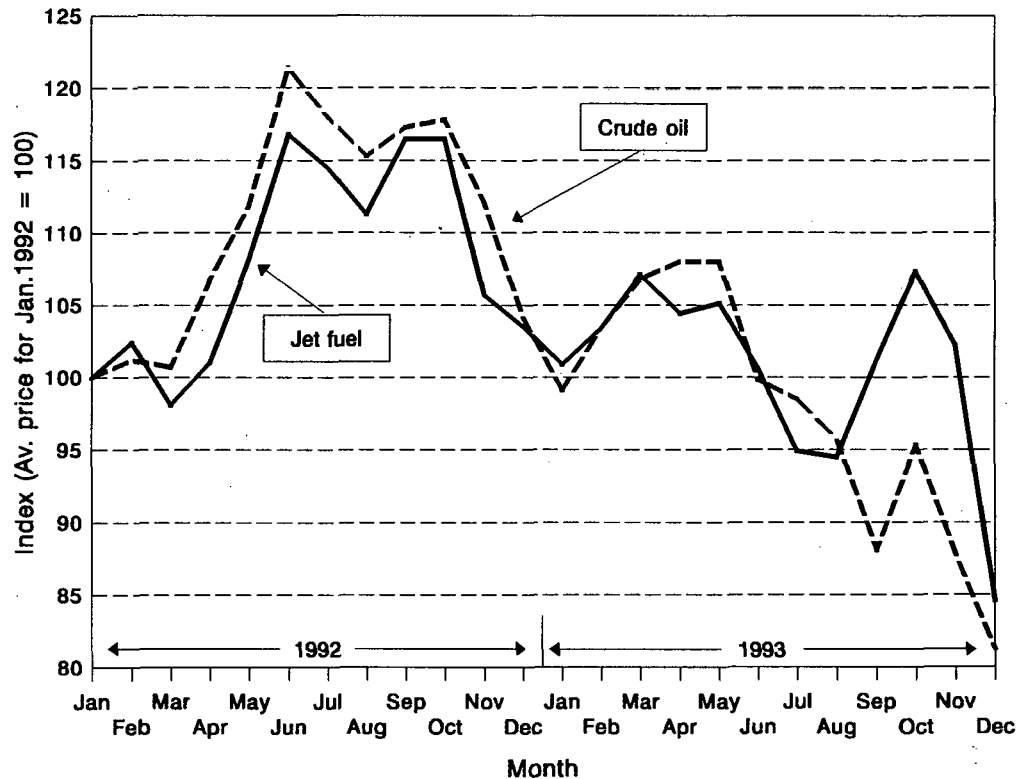
Source: IATA five-day rates.

Figure 1-2. Currency variations with respect to the U.S. dollar



### CRUDE OIL AND FUEL

16. Although fuel markets have experienced short-term volatility, there has been a declining trend in crude oil and jet fuel prices in recent years as supply conditions have improved in the face of static demand. With an agreement allowing supply from Iraq, crude oil prices declined in 1993 to their lowest level since the Gulf conflict in 1991. Jet fuel prices also declined over the year, which provided significant cost savings for airlines (Figure 1-3).



Source: Petroleum Economist and the Journal of Commerce.

**Figure 1-3. Trends in crude oil and jet fuel prices**  
(January 1992 to December 1993)

# Chapter 2

## Air Carriers and their Fleets

1. This chapter reviews developments in 1993 regarding the economic regulation of air carriers; market entry and exit by air carriers; air carrier ownership, alliances and co-operative ventures; the service levels and the fares and rates they offer; the distribution of their products; their traffic, their fleets and their finances. Some information on developments in general aviation activities in 1993 is also included.

### ECONOMIC REGULATION

2. Progressive liberalization of air transport services continued in 1993 in and between a growing number of States. The number of new or amended bilateral air services agreements was approximately the same as the previous year with about 65 new and 20 amended agreements being reported. In contrast to 1992, when bilateral agreements between States in different regions pre-dominated, the new and amended bilateral agreements were about equally divided between those involving States within the same region and those between States in different regions. Several major traffic generating States encountered difficulties in negotiations to amend or replace older bilateral air service agreements to reflect current conditions.

3. During 1993 there were two highly touted re-assessments of liberalized aviation regimes. In the United States the National Commission to Ensure a Strong Competitive Airline Industry made a number of recommendations, including several concerning the negotiation of air service agreements and the limits on foreign ownership in United States air carriers. The Commission of the European Communities announced the creation of a "Committee of Wisemen" to analyse the current state of Community air transport and make recommendations for its development. The Committee's report was expected early in 1994.

4. A number of regulatory authorities continued to be occupied with privatization and the often-related question of foreign investment in airlines with several governments changing or clarifying their positions concerning foreign investment in their national airlines. The permissible levels of such foreign investment ranged from 20 to 49 per cent and were often accompanied by requirements for reciprocity or other requirements. Some authorities became increasingly involved in code-sharing arrangements, in some cases holding different views concerning the authorization of code-shared flights, particularly in the case of such flights serving third countries.

5. The Uruguay Round of trade negotiations under the aegis of General Agreement on Tariffs and Trade (GATT) aimed at the progressive liberalization of world trade in goods and

services concluded on 15 December 1993 with a package of agreements, including a General Agreement on Trade in Services (GATS) and an agreement to establish a new oversight body, the World Trade Organization. The Annex on Air Transport Services to this agreement excludes traffic rights and services directly related to their exercise, but with three exceptions: the repair and maintenance of aircraft, the sale and marketing of air transportation, and computer reservation systems. In addition, the Annex provides that any specific commitment or obligation assumed under the GATS shall not reduce or affect a party's obligations under bilateral or multilateral agreements that are in effect at the entry into force of the agreement establishing the World Trade Organization and that the GATS dispute settlement mechanism is to be invoked only after dispute settlement procedures in bilateral and other multilateral arrangements have been exhausted. Subject to use of an exemptions procedure, States which are parties to the GATS (expected to be in the order of 100 in number initially) will apply a regulatory regime (including such obligations as most-favoured-nation which requires all non-national service providers to be treated equally) for the three air transport services included in the Annex which may well differ from the regime applied by States not parties to the GATS.

6. In the first year of the third phase of liberalization measures designed to create a single aviation market in the European Community (EC), measures were adopted concerning common rules for slot allocations at community airports; interpretive guidelines with respect to capacity sharing and market access, licensing of community air carriers, and the interrelationship of the measures in the third phase of liberalization; amendments to the community code on computer reservation systems; and the conditions under which community air carriers could co-ordinate certain activities, such as tariffs and schedules. The EC, Norway and Sweden agreed to modify their existing civil aviation agreement to extend the third package of liberalization measures to those States. Later in the year agreement was reached to extend the EC air transport rules to all EFTA countries except Switzerland (thus superseding the agreement with Norway and Sweden) with effect from 1 January 1994. In November 1993 the Council of Ministers of the European Communities reached agreement in principle to open negotiations with Switzerland on a sectorial aviation agreement to include that State in the community air transport market.

7. During 1993 a number of airlines had to rely on government aid in order to meet their financial obligations. In Europe the question of government aid became one of the central issues in the on-going liberalization process, numerous calls being made to discontinue financial help to state-owned airlines. In 1993 the Commission of the European Communities conditionally approved state-aid for Aer Lingus (Ireland) and TAP-Air Portugal, but by year-end certain government practices which allegedly distort competition in favour of their national carriers were under investigation by the Commission. In other parts of the world air carriers which were reported as receiving governmental financial aid in one form or another during 1993 included Air Aruba, Finnair, Garuda (Indonesia), Nigeria Airways, Qantas (Australia) and SAS (Scandinavia). In the United States the government adopted new criteria for essential air services (EAS) which resulted in a reduction of governmental subsidies for EAS of about 13 per cent.

8. Member States of the Andean Pact analysed the current market for international air transport services within the region and noted implications of overcapacity and changes in airline ownership for the air transport policy established by the Act of Caracas and Decisions 297 and 320. They identified problems related to interpretation of terms and a need for common

and transparent criteria for authorizing air services within the Andean Pact region, and concluded that more information and study were required concerning the exchange of fifth freedom rights between Pact Member States with respect to/from points outside of the region.

9. Also during the year national postal administrations continued their efforts to increase their competitiveness against independent air express and courier services. For example, the Mexican Post Office entered into a joint venture with TNT Express, while the Japanese, United Kingdom and United States postal administrations contacted the Swedish carrier ASG to handle their express mail. In Canada, Canada Post took over Purolator Courier Ltd, the biggest express company in the country. In Europe, the Commission of the European Communities issued guidelines recommending more competition in premium postal services while preserving the monopoly of the national postal administrations on basic services.

10. Building on the momentum established by the 1992 ICAO World-wide Air Transport Colloquium, the Council, in March 1993, decided to convene a World-wide Air Transport Conference on the theme of "International Air Transport Regulation: Present and Future" in Montreal from 23 November to 6 December 1994. An agenda which includes the key elements in the economic regulation of air transport was approved by the Council in November and provided to Member States and appropriate international organizations. In preparation for this event, a study group of recognized experts drawn from governments, airlines, and airports worked intensively throughout the year on substantive studies of possible new regulatory arrangements for international air transport for each of the key elements on the conference agenda.

## MARKET ENTRY AND EXIT

### *New and Discontinued Carriers*

11. Excluding carriers from the Commonwealth of Independent States (CIS), during 1993 some 150 air carriers were reported to have started operations, and a similar number to have been constituted but, by the end of the year, to have yet to commence operations. Some 80 air carriers went out of business, including a few that had never commenced operations. According to published reports, at least some 25 new airlines started operations in the CIS, while many more were formed. With all these developments, the number of airlines in the world in operation with at least one aircraft with a maximum take-off mass not less than 9 tonnes (20 000 lb) was estimated at over 1 300 at year-end.

12. The majority of the new entrants were small regional or domestic operators, their establishment in many cases fostered by changes in the regulatory environment and/or reduced start-up costs due to the availability of a trained workforce from airlines which had reduced their staff and lowered prices for used aircraft. More than 20 per cent of new entrants which started operations were accounted for in the United States. Nearly one-third of the new entrants, whether they had started operations or not, was accounted for in a further eight countries (in descending order of numbers): China, India, Canada, the United Kingdom, Pakistan, Nigeria, Colombia and Australia.

13. Among the new air carriers which were reported as becoming operational during 1993 some 15 per cent commenced international scheduled passenger services, about 25 per cent started international non-scheduled passenger services and some 30 per cent started domestic scheduled passenger services, the remainder being accounted for by all-freight operations. Among the newly-formed airlines which were slated to start operations after 1993, more than 40 per cent intended to commence domestic scheduled services.

14. Among the 80 or so airlines which ceased operations in 1993 there were many with just a few years of operations, such as Nationair of Canada which had started non-scheduled operations in 1985, and some long-established names such as Sterling Airways of Denmark formed in 1962, and the national airline of Ecuador, Ecuatoriana, which had operated under this name since 1974. More than 40 per cent of the airlines which ceased to exist were registered in Europe.

15. On the basis of schedules published in multilateral airline schedule guides it is estimated that at the end of 1993 there were some 660 air carriers world-wide providing scheduled passenger services (international and/or domestic) and about 60 operating scheduled all-freight services. About 75 per cent of all air carriers operating scheduled air services were accounted for in three regions in almost equal shares: North America, Europe and Asia/Pacific. International scheduled passenger services were provided by some 365 carriers and about 45 carriers provided international scheduled all-freight services. Over 50 per cent of air carriers providing international scheduled services were accounted for in two regions: Europe and Latin America/Caribbean.

### ***New and Discontinued Routes***

16. During 1993 the world's airlines continued to restructure their networks. In September 1993 there were some 1 470 new direct (single passenger aircraft) airlinks between international city-pairs, while 1 250 links were eliminated as compared with September 1992, thus bringing about a net increase of 220 in the number of city-pairs with direct passenger air communication. For the same 12-month period one year earlier there had been a net increase of 530 airlinks.

17. Nearly half of the new direct airlinks were established within two route groups: within Europe and within North America. The same two route groups also accounted for nearly half of the airlinks which were discontinued. Five of 17 international route groups experienced net decreases in the number of airlinks: within North America; across the Mid and South Atlantic; between Europe/Middle East/Africa and Asia/Pacific; and across the South Pacific.

18. Availability of new long-range aircraft in some cases helped airlines to upgrade direct air services with intermediate stops to non-stop services. For example, in 1993, following the introduction of the Airbus A340, Air France opened one of the longest non-stop passenger services in the world, Paris-Buenos Aires, with flights lasting nearly 14 hours. The opening of new airways reduced the duration of some long-haul services, in part by shortening the air distance to be flown, and in part by reducing the congestion on existing routes. Examples of these routes include the new trans-Kamchatka airway in the North-Pacific and four new air routes from Japan to Europe over Siberia.

19. Airlines continued to move into the potentially lucrative but very competitive air express market. Among them were Air France which re-launched its air express product under another name, British Airways and US Air which started small package express delivery to more than 160 cities in 70 countries, and Lufthansa (Germany) which launched two express package services in Europe and planned to expand this operation to North America and the Far East. Courier companies were also expanding in Asia where TNT Express (Australia) started a network comprising Hong Kong, Manila, Singapore and Taipei. DHL and Federal Express (both from the United States) responded by increasing their activity in that area.

## OWNERSHIP, ALLIANCES AND CO-OPERATION

### *Privatization*

20. The pace of partial or full privatization of government-owned airlines slackened considerably in 1993. During the year only Aeroperu was partially privatized, the Malaysian government sold 32 per cent of its 42 per cent stake in the national carrier MAS, and the German government indicated its intention to sell its whole stake in Lufthansa German Airlines from its present holding of about 65 per cent.

21. Also during 1993, privatization objectives were made known for another eight government-owned air carriers (Table 2-1), to be added to some 27 other carriers which had been targeted for privatization during previous years but had not achieved this aim by the end of 1993. During the year the privatization of several carriers had to be deferred or postponed because of economic conditions, the state of the air transport industry or local circumstances. Changes in policy due to a change of government caused the withdrawal of Aer Lingus (Ireland) and Olympic Airways (Greece) from the list of carriers to be privatized. Efforts to privatize Ecuatoriana came to an end in 1993 when the carrier filed for bankruptcy.

22. In addition to airlines for which privatization information was available, listed in Table 2-1, some other airlines, notably from the Commonwealth of Independent States, may also be at different stages of preparation for privatization.

### *National Consolidation*

23. In 1993, further consolidation was reported in the airline industry at a national level through mergers and take-overs, particularly in Western Europe and the United States, but not in Africa or the Middle East.

24. In Mexico, Aeromexico and Mexicana merged organizationally but continue to maintain their separate identities. In Finland, Finnair absorbed its subsidiaries Finnaviation and Karair, in India the government decided to merge Indian Airlines and Vayudoot, and in Vanuatu the government decided to merge Air Vanuatu and Vanair. In Australia, Australian Airlines, which was taken over by Qantas (Australia) during the previous year, lost its corporate identity and became part of the larger carrier. Most of the other mergers took place between relatively small regional air carriers.

**Table 2-1. Government-owned carriers targeted for partial or full privatization**

Targeted during 1993	Targeted prior to 1993 but not yet privatized
Air France	Aeroflot Russian International Airlines
Air Lanka	Air India
Bangladesh Biman Airlines	Air Jamaica
Ghana Airways	Air Niugini (Papua New Guinea)
LAV (Venezuela)	Allitalia
Pacific East Asia Cargo Airlines (Philippines)	Balkan-Bulgarian Airlines
Royal Nepal Airlines Corporation	BWIA (Trinidad and Tobago)
THY Turkish Airlines	Dominicana de Aviación
	El Al (Israel)
	Hemus Air (Bulgaria)
	Garuda (Indonesia)
	Indian Airlines
	JAT (Yugoslavia)
	Kenya Airways
	LAB (Bolivia)
	LAP (Paraguay)
	LIAT (owned by 11 Caribbean States)
	LOT-Polish Airlines
	Nigeria Airways
	PLUNA (Uruguay)
	Royal Jordanian
	Solomon Airlines
	Sudan Airways
	TAP-Air Portugal
	TAROM (Romania)
	Tunis Air
	Uganda Airlines

25. In the United Kingdom, Brymon European Airways was split by its co-owners, British Airways and Maersk Air (Denmark), into its original entities: Brymon Airways and Birmingham European Airways. The former now operates on behalf of British Airways while the latter became part of Maersk Air.

### ***Transnational Ownership***

26. A trend to partial foreign ownership of airlines continued in 1993.

27. After its unsuccessful attempt in 1992 to purchase a 49 per cent equity stake in US Air, at the beginning of 1993 British Airways was allowed by the United States authorities to make a smaller investment representing just under 25 per cent of equity. Two smaller US carriers, World Airways and Kiwi International Airlines, also accepted foreign investments, from Malaysian and Romanian companies respectively.

28. In Latin America and the Caribbean, Aeromexico bought a 49 per cent stake in Aeroperu and added investment by other Mexican interests brought the foreign holding up to 70 per cent. A consortium comprising the French air carrier Corsair, local investors, and local authorities acquired the bankrupt carrier Air Martinique. The governments of Jamaica and Trinidad and Tobago were considering to merge their two airlines (Air Jamaica and BWIA) and to sell equity in the combined carrier to private investors.

29. In the Asia/Pacific region, foreign investors were attracted to a number of relatively small newly established air carriers, such as Jet Airways of India (40 per cent divided equally between Gulf Air and Kuwait Airways), Royal Air Cambodge (40 per cent owned by Singapore Airlines), Air Tahiti Nui (51 per cent owned by Corsair), Hajvairi Airlines of Pakistan (49 per cent owned by Aeroflot Russian International Airlines), Myanmar Airways International (a joint venture between Myanmar Airways and Highsonic Enterprise Pte. Ltd. of Singapore), and an airline under formation in Macau with the Civil Aviation Administration of China and TAP Air Portugal as shareholders.

30. Elsewhere in the world, the bankrupt Slovakian carrier Tatra Air was sold to the Swiss aircraft leasing company Alphalines, EBA Italy was established by Eurobelgian Airlines; Tajikistan Airlines was formed as a joint venture between Euro Global Aviation (UK) and the Tajik government; and a Canadian investor contributed 49 per cent to the capital of the new South African carrier SA Express.

### ***Transnational Alliances***

31. The ownership transactions referred to above involved injections or exchange of equity. Throughout 1993 airlines also continued to expand co-operative ties in other ways, for example by concluding agreements in which code-sharing was a most important element. Such agreements included those of Korean Air with Air Canada; Lufthansa, Emirates and Transbrasil with United Airlines; and Alitalia with the TACA group of Central American airlines. Code-sharing arrangements were also an important objective of the British Airways investment in US Air.

32. Among other inter-regional arrangements, broad co-operative agreements were concluded by Air France separately with Continental Airlines (United States) and with Vietnam Airlines; by Aeromexico and Delta Airlines (United States); by Alitalia and Ansett (Australia); by Lufthansa and Varig (Brazil); and by Thai Airways International and United Airlines. Agreements on specific activities such as the co-ordination of schedules were concluded among others between All Nippon Airways and US Air, Cyprus Airways and United Airlines, and between Kiwi International Airlines (United States) and Virgin Atlantic (United Kingdom).

33. At a regional level the European intercontinental carriers continued in their efforts to establish a series of regional feeder networks, sometimes on the basis of franchises, such as between Iberia and Air UK, by SAS (Scandinavia) and Icelandair, and by Virgin Atlantic with City-Jet (Ireland) and South Eastern European Airlines (Greece). Within the same country similar agreements were reached by Air France with Air Littoral and by British Airways with City Flyer. In 1993, the Air France Group also promoted the idea to establish a federated



network of European routes operated by a consortium of smaller regional carriers under the common name of Europair. Likely members include Air Littoral and Brit Air of France, and Delta Air Transport of Belgium. A major collaborative initiative in Europe, code named Alcazar, which could have involved the merger of the partners in the European Quality Alliance group (Austrian Airlines, SAS and Swissair) with KLM (Netherlands) failed to materialize mainly due to a disagreement among the participants on a North American partner in view of existing collaborative ties (and equity holdings) which some of the European carriers already had with different carriers in the United States.

34. In the Asia/Pacific region, Qantas (Australia) and Air Pacific (Fiji) concluded a co-operative agreement on a wide range of activities including marketing, CRS, ground handling, catering, purchasing and spares management. Polynesian Airlines and Royal Tongan Airlines started blocked space arrangements. Ansett (Australia) signed memoranda of understanding with Malaysian Airlines and with Garuda Indonesia on the establishment of strategic alliances. Korean Air signed separate joint services agreements with Malaysian Airlines and Vietnam Airlines covering services between their respective countries.

35. In the Caribbean, BWIA and LIAT took a first step in their plans for closer co-operation by fully integrating their schedules. Also during the year these two carriers plus another seven Caribbean airlines (Air Aruba, Antillean Airlines (ALM), Air Jamaica, Bahamas Air, Cayman Airways, Guyana Airways, and Surinam Airways) were preparing a plan for a regional marketing and operational alliance.

36. In 1993, linking frequent flyer programmes among partners became increasingly widespread and was one of the major elements of both inter- and intra-regional alliances and co-operative partnerships. In some cases joining these programmes was the major purpose for such agreements.

37. In addition to the cases shown above where there were much broader and comprehensive agreements, many new agreements were reached in 1993 on code-sharing and joint services. In a few cases, the economic advantages of co-operation prevailed over old rivalry, such as between Varig and Transbrasil; United Airlines and TWA; and United Airlines and US Air.

### SERVICE LEVELS

38. During 1993 the business travel market remained soft and indications are that in the long term the relative importance of this market segment is likely to decrease. In response to this trend airlines have been reappraising the class of travel offered and the number of seats offered in each class. For example during the year Air Canada, KLM (Netherlands) and Sabena (Belgium) phased out all their first class services, while Air Namibia, American Airlines and Cathay Pacific (based in Hong Kong) did so on a more selective basis, i.e. either by route or by fleet. At the same time some of these airlines upgraded their business class services to attract the high fare paying passengers. However not all airlines followed this marketing strategy and, in a few cases, airlines continued to develop their first class product.

39. A number of major international air carriers upgraded the quality of service offered on their passenger flights, including the offer of an integrated in-seat entertainment system in first, business and, in a few cases, economy class. A few airlines were also offering ground-to-air, air-to-air and even seat-to-seat telephone calls and fax transmission as multichannel satellite communications systems became more widely available.
40. During the year a number of airlines launched new Frequent Flyer Programmes (FFPs). In the Asia/Pacific region these included a joint programme named "Passages" launched by Cathay Pacific, Malaysia Airlines and Singapore Airlines, as well as FFPs for Thai Airways International and EVA Airways; in Europe they include FFPs launched by Iberia (Spain), LOT Polish Airlines, Lufthansa (Germany), Maersk Air (Denmark) and Meridiana (Italy); and in Central America one launched by COPA (Panama). Many of the existing FFPs were also expanded to cover new markets or to include economy class travellers.
41. In the United States, where FFPs have been available since 1981, a significant number of passengers are taking advantage of privileges earned under these programmes. It has been estimated that in the United States on average some 3 per cent of airline passengers travel free due to the FFPs, and on the largest airlines this proportion could be as high as 8 per cent. To reduce the number of non-revenue passengers during peak times airlines started to limit their number on certain flights, to black out certain dates for this category of passengers, to increase the mileage required to obtain a free ticket and to introduce other restrictions. Airlines also continued to fight against abuses of their FFPs, including the illegal trade of mileage certificates.
42. During the year airlines introduced a new automated ticketing and boarding passenger standard (ATB-2) aimed at reducing passenger check-in and boarding times.

## FARES AND RATES

### *Tariff Levels*

43. Changes in the average levels of international economy class normal (i.e. unrestricted) fares and under-45 kilogramme general cargo rates world-wide and in various geographical areas, between September 1992 and September 1993 and over the period 1984-1993, are shown in Tables 2-2 and 2-3.
44. From Table 2-2 it may be seen that normal economy class fares, as expressed in United States dollars, decreased by an average of 2 per cent world-wide between September 1992 and September 1993, with changes for individual route groups ranging from an average decrease of 12 per cent for routes in local Africa and between Europe/Middle East and Africa to an average increase of 7 per cent for routes between North America and Central America/Caribbean and between Canada/Mexico and the United States. These changes reflect both changes in fares in local selling currencies and changes in the bankers' exchange rates between

**Table 2-2. Comparison of average economy class normal fares by route group at average city-pair distance**

Route group	Average city-pair distance (1993) (km)	Average economy class normal fare			Percentage change 1993/1992		Average annual percentage change 1993/1984 (in fares expressed in constant U.S.\$)
		Sept. 1984 (U.S.\$)	Sept. 1992 (U.S.\$)	Sept. 1993 (U.S.\$)	(in fares expressed in U.S.\$)	(in fares expressed in selling currencies)	
I. International average — world	3 300	444	711	694	-2	7	2
II. International route groups:							
1. Between North America and Central America/Caribbean	2 200	243	402	431	7	8	3
2. Between and within Central America and the Caribbean	600	130	169	176	4	6	-1
3. Between Canada, Mexico and the United States	1 800	196	331	356	7	10	4
4. Between North America/ Central America/Caribbean and South America	4 100	505	656	670	2	2	-1
5. Local South America	2 000	273	339	340	0	1	-2
6. Local Europe	1 200	231	482	459	-5	16	5
7. Local Middle East	1 400	256	289	288	-0	4	-4
8. Local Africa	1 600	215	375	332	-12	5	1
9. Between Europe and Middle East	3 300	542	847	804	-5	6	1
10. Between Europe/Middle East and Africa	5 400	687	1 221	1 080	-12	3	2
11. North Atlantic	7 300	769	1 413	1 273	-10	0	2
12. Mid Atlantic	8 200	898	1 567	1 428	-9	2	2
13. South Atlantic	10 100	1 088	1 907	1 731	-9	1	2
14. Local Asia/Pacific	2 900	355	504	518	3	2	0
15. Between Europe/Middle East/ Africa and Asia/Pacific	7 500	858	1 202	1 211	1	9	0
16. North and Mid Pacific	11 000	986	1 243	1 302	5	3	-1
17. South Pacific	8 800	984	1 501	1 514	1	4	1

Source: ICAO Surveys of International Air Transport Fares and Rates.

**Table 2-3. Comparison of average general cargo rates under 45 kilogrammes by route group at average city-pair distance**

Route group	Average city-pair distance (1993) (km)	Average under-45 kg general cargo rate per kilogramme			Percentage change 1993/1992		Average annual percentage change 1993/1984 (in rates expressed in constant U.S.\$)
		Sept. 1984 (U.S.\$)	Sept. 1992 (U.S.\$)	Sept. 1993 (U.S.\$)	(in rates expressed in constant U.S.\$)	(in rates expressed in selling currencies)	
I. International average — world	5 300	5.11	6.62	6.25	-5	2	-2
II. International route groups:							
1. Between North America and Central America/Caribbean	2 600	2.54	3.07	3.00	-2	-1	-3
2. Between and within Central America and the Caribbean	600	1.08	1.33	1.59	20	20	1
3. Between Canada, Mexico and the United States	2 200	1.60	1.72	1.75	2	5	-4
4. Between North America/ Central America/Caribbean and South America	5 600	5.01	5.72	5.78	1	2	-3
5. Local South America	2 600	3.33	3.36	3.20	-5	-5	-7
6. Local Europe	1 500	2.03	3.72	2.85	-23	-7	0
7. Local Middle East	1 300	1.90	1.82	2.03	12	17	-5
8. Local Africa	1 900	1.99	2.92	2.79	-5	14	0
9. Between Europe and Middle East	3 800	4.67	6.25	5.72	-8	2	-2
10. Between Europe/Middle East and Africa	5 900	5.29	8.63	7.55	-13	3	0
11. North Atlantic	7 200	6.22	7.95	7.18	-10	0	-3
12. Mid Atlantic	8 000	8.54	11.55	10.38	-10	2	-3
13. South Atlantic	9 600	9.85	13.72	12.45	-9	2	-2
14. Local Asia/Pacific	3 700	3.36	4.29	4.45	4	3	-1
15. Between Europe/Middle East/ Africa and Asia/Pacific	7 900	7.40	9.00	8.51	-5	2	-3
16. North and Mid Pacific	11 700	8.49	9.94	10.16	2	0	-3
17. South Pacific	9 500	7.57	9.31	9.22	-1	1	-2

Source: ICAO Surveys of International Air Transport Fares and Rates.

these currencies and the United States dollar. Calculated on the basis of selling currencies, average international fares increased by 7 per cent world-wide, with variations for individual route groups ranging from no change (across the North Atlantic) to an increase of 16 per cent in local Europe. With some exceptions, the trends in normal economy fares appear to reflect trends in fares generally.

45. The long-term trend in fare levels is shown by comparing the fares for September 1984 with those for September 1993 (last column in Table 2-2), expressed in constant U.S. dollars in order to have a measure of the real change. Over the period concerned the average economy class normal fare for the world increased in real terms at an average of 2 per cent per annum. On a route group basis, average annual changes ranged from an increase of about 5 per cent for routes within Europe to a decrease of some 4 per cent for those within the Middle East. It should be noted that these figures are influenced by the relationship of the U.S. dollar with the other currencies over the same period.

46. With respect to cargo rates, as will be seen from Table 2-3, the average rate for shipments under 45 kg decreased world-wide by 5 per cent between September 1992 and September 1993 when expressed in U.S. dollars; however, in terms of selling currencies it increased on average by 2 per cent. The long-term trend in cargo rates shows that between September 1984 and September 1993, the average general cargo rate for shipments under 45 kg has, in general, been decreasing in real terms for almost all areas of the world.

### ***Tariff Establishment***

47. In 1993 competition law requirements continued to have a significant impact on the IATA multilateral tariff negotiation process. The Commission of the European Communities granted a new "block exemption" from certain aspects of European Community (EC) competition law requirements with effect from 1 July 1993 which allows inter-airline tariff consultations to take place within IATA provided that they are aimed at facilitating interlining. Though this exemption was granted with a five year validity, the Commission intends to reassess the effects of such consultations on competition in the light of the recently liberalized tariff approval system for intra-EC routes and make necessary changes to the exemption during this period. Meanwhile, the outcome of IATA's submission to the United States authorities in 1990 for approval of the current provisions for the conduct of IATA's Traffic Conferences remained under consideration.

48. In the case of cargo, IATA made a number of attempts during the year to achieve revenue improvement on a world-wide basis in order to cover cost increases. However, agreements reached on an "across-the-board" surcharge or increase failed to secure the necessary government approvals and were rescinded by IATA pending further consideration in early 1994.

49. In response to requests from the European Commission regarding the application of the IATA currency conversion system for passenger fares between European Community airports,

IATA made some changes to its currency resolutions to remove certain rules considered to place restrictions on consumer choices. At year end, responses to some of the requests were still under consideration.

50. In 1993 France joined Canada, the United Kingdom and the United States in accepting tariffs filed electronically. Whereas in North America carriers can only file electronically through the system operated by the Airline Tariff Publishing Company (ATPCO), those filing with States in Europe can also choose to do so through the systems operated by the Reed Travel Group (publishers of the ABC World Airways Guide and the Official Airlines Guide, OAG) or the system operated by the Société Internationale de Télécommunications Aéronautiques (SITA). During 1993 a few further States in Europe and Latin America were evaluating one or more of these systems for adoption in 1994 or 1995.

### PRODUCT DISTRIBUTION

51. In parallel to the trend in mergers, alliances, and other co-operative ventures by international air carriers, in 1993 major airline computer reservation systems (CRSs) continued to use a variety of links involving hardware, software, operational, financial and/or marketing agreements to forge global distribution systems. In several countries, direct access by travel agents to more than one CRS from a single terminal became a reality.

52. During 1993 the Electronic Ticket Delivery Network (ETDN) became operational in the United States. This system enables travel agents (and airlines) to issue tickets to their clients through shared facilities offered by third parties in a variety of locations, notably at airports but also at banks, local shopping centres, etc. Among earlier users of the ETDN technology were the four major CRSs in the United States. Also in 1993 the Galileo International CRS announced plans to launch a direct sell system, initially in the United States and Germany, where customers would be able to make reservations with airlines, hotels and car rental companies through the use of their personal computers, or through cable or satellite television.

53. By year end twenty-six States had indicated they would follow the ICAO Code of Conduct on computer reservation systems and it was being tacitly followed by a number of others. As mentioned above, another regulatory regime for computer reservation systems was created by including such services in the Annex on Air Transport Services of the General Agreement on Trade in Services (GATS).

54. In 1993 the European Commission and the European Civil Aviation Conference (ECAC), working in close co-operation, revised their respective codes of conduct for CRSs in several respects such as broadening the scope to include charter flights; requiring the technical and legal separation of an airline vendor's internal distribution system from its CRS; prohibiting certain practices in contracts between system vendors and participants; and under certain conditions, requiring parent carriers to participate in the CRSs of competing vendors. The revised European Commission's code came into effect in 1993; the ECAC code is expected to become applicable during 1994.

## TRAFFIC

55. Indicators are given below of the development of airline scheduled traffic in 1993, international and domestic, including rates of growth, load factors and the ranking of airlines, States and city-pairs by volume of airline traffic, along with some estimates regarding the development of non-scheduled traffic.

**Scheduled: world totals**

56. The total scheduled traffic (domestic plus international) carried by the airlines of the 182 Contracting States of ICAO in 1993 is estimated at 251 billion tonne-kilometres performed, an increase of about 4 per cent over 1992. The airlines carried a total of about 1 171 million passengers in 1993, compared with 1 161 million passengers in 1992, and some 18 million tonnes of freight in each year (Table 2-4). The passenger and over-all (weight) load factors remained unchanged at 66 and 58 per cent respectively.

57. In 1993, international scheduled traffic showed stronger growth with increases of about 8 per cent in tonne-kilometres performed, 6 per cent in passengers carried, and some 6 per cent in freight tonnes carried. International traffic accounted for 53 per cent of total passenger-kilometres performed, 82 per cent of the freight tonne-kilometres performed and some 62 per cent of the total tonne-kilometres performed.

**Table 2-4. Scheduled services of airlines of ICAO Contracting States**

	Passengers carried (millions)	Passenger- km performed (millions)	Passenger load factor (%)	Freight tonnes carried (millions)	Freight tonne-km performed (millions)	Mail tonne-km performed (millions)	Total tonne-km performed (millions)	Weight load factor (%)
<b>TOTAL (international plus domestic)</b>								
1992	1 161	1 927 000	66	17.3	62 810	5 120	242 210	58
1993	1 171	1 971 000	66	17.5	67 650	5 250	251 210	58
Percentage change	0.9	2.3	—	1.2	7.7	2.7	3.7	—
<b>INTERNATIONAL</b>								
1992	302	983 000	66	9.4	50 770	2 200	143 610	60
1993	320	1 046 000	66	10.0	55 660	2 220	154 790	61
Percentage change	6.0	6.4	—	6.4	9.6	0.9	7.8	1.0
<b>DOMESTIC</b>								
1992	859	944 000	66	7.9	12 040	2 920	98 600	55
1993	851	925 000	65	7.5	11 970	3 040	96 430	53
Percentage change	-0.9	-2.0	-1.0	-5.1	-0.4	4.1	-2.2	-2.0

Source: ICAO Air Transport Reporting Form A-1.

58. Domestic traffic declined from some 99 billion tonne-kilometres performed in 1992 to about 96 billion tonne-kilometres performed in 1993. This small decline is attributed to domestic traffic developments in the two predominant markets: no significant growth in the United States domestic traffic and a substantial decline in traffic for the second successive year within the Commonwealth of Independent States, the traffic of which is all classified as domestic for the time being.

### **Scheduled: regional breakdown**

59. Between 1992 and 1993 development in total and international scheduled traffic varied considerably among regions of carrier registration with respect to both passengers and freight. In terms of *total* passenger-kilometres performed the change in traffic ranged from a decrease of nearly 3 per cent for the airlines registered in Africa to an increase of over 9 per cent for those registered in the Middle East (Table 2-5). In 1993 all regions except Africa showed

**Table 2-5. Growth of scheduled traffic by region of airline registration: 1992-1993**  
(annual percentage change)

Region of registration	Passengers carried	Passenger-kilometres	Freight tonne-km performed	Mail tonne-km performed	Total tonne-km performed
<b>TOTAL (international plus domestic)</b>					
Africa	-7.0	-2.6	2.5	0.0	-1.4
Asia and Pacific	5.9	8.6	13.3	8.0	9.6
Europe	-2.5	-1.5	3.7	-6.8	0.5
Middle East	6.4	9.4	11.8	14.3	10.4
North America	0.6	1.2	4.7	4.8	2.1
Latin America and Caribbean	1.1	2.3	11.8	-15.4	4.7
Total	0.9	2.3	7.7	2.7	3.7
<b>INTERNATIONAL</b>					
Africa	-3.1	-1.0	3.5	0.0	0.2
Asia and Pacific	8.0	8.7	14.5	7.7	11.0
Europe	7.5	7.1	6.3	-2.6	7.3
Middle East	7.2	10.1	12.5	33.3	11.0
North America	4.9	4.2	7.0	0.0	5.2
Latin America and Caribbean	1.5	2.4	9.1	-16.7	4.3
Total	6.0	6.4	9.6	0.9	7.8

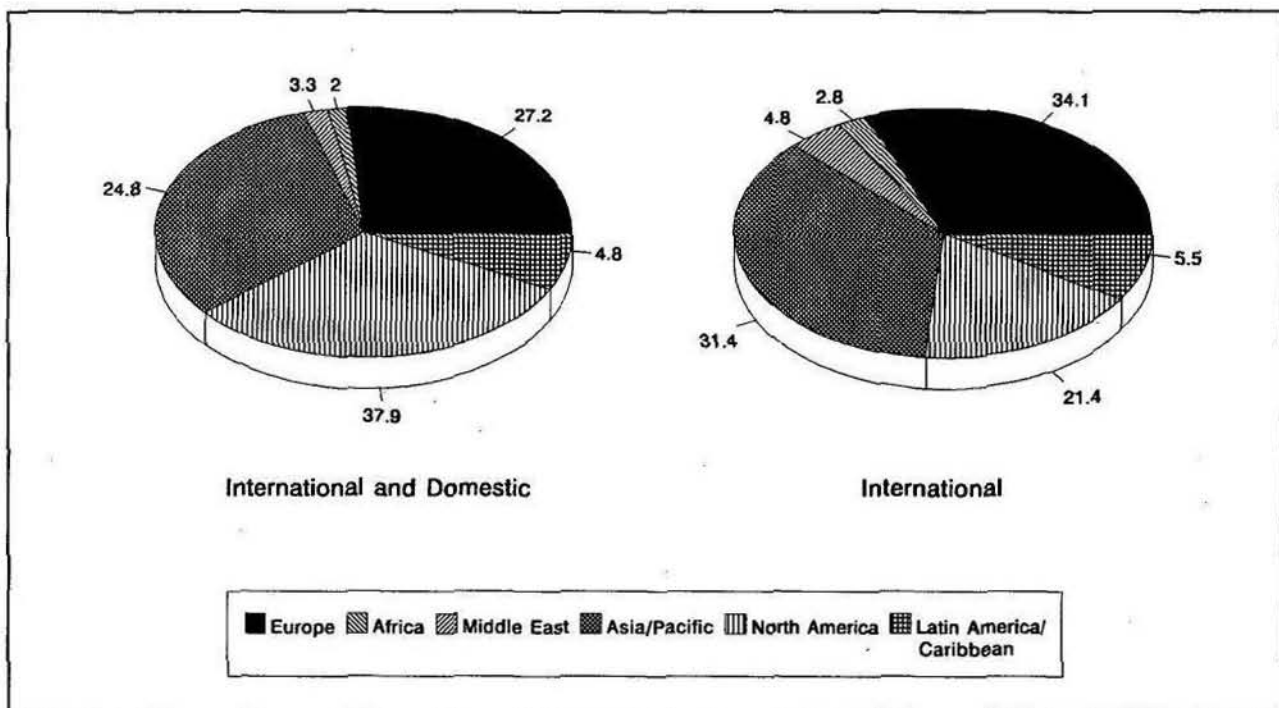
Source: ICAO Air Transport Reporting Form A-1.



positive increases for passenger-kilometres performed by *international* scheduled services, with the airlines of the Middle East showing the largest gain (about 10 per cent). Increases in total and international freight tonne-kilometres performed were recorded for all regions.

60. The differences in the regional traffic development between 1992 and 1993 caused some small changes in the distribution of the regional traffic. The regional distribution for total and for international scheduled traffic in 1993 is shown in Figure 2-1 (detailed traffic data by region are shown in Table A1-1 in Appendix 1). In terms of total scheduled traffic (international plus domestic) in 1993 the airlines of North America carried about 38 per cent of the total world traffic. However, the largest share of international scheduled traffic (about 34 per cent) was carried by the airlines of Europe.

61. In 1993 airlines registered in Asia/Pacific showed the highest average annual weight load factor on international scheduled services (about 65 per cent), while those in Africa showed the lowest average load factor (some 48 per cent). Compared with 1992, the weight load factors for international scheduled services (shown in Table A1-1 in Appendix 1) represent an increase in average weight load factor of about 3 percentage points for the airlines of Asia/Pacific, about 2 percentage points for those of Europe, and about 1 percentage point for those of Latin America/Caribbean and the Middle East. For the airlines of Africa the average weight load factor decreased some 2 percentage points, while there was no change in the average weight load factor for airlines of North America between 1992 and 1993.



Source: ICAO Air Transport Reporting Form A-1.

**Figure 2-1. Percentage distribution of scheduled traffic in 1993 according to region of registration of airline — total tonne-kilometres performed**

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**Scheduled: carrier rankings**

62. Table 2-6 shows the top 30 air carriers in the world in 1993 in terms of the *over-all* volume of passenger-kilometres performed, freight and mail tonne-kilometres performed and total (passenger, freight and mail) tonne-kilometres performed, compared with the ranking of the same carriers in 1992 and in 1984. Table 2-7 shows the top 30 air carrier rankings according to the same parameters but in terms of *international* scheduled traffic.

63. These Tables show the rise in ranking of a number of Asian carriers associated with the relatively high growth in traffic in that region. They also illustrate the restructuring which has taken place in the air transport industry in the United States, and the ranking of the United States carriers operating international scheduled services is particularly striking. In 1984 Pan American, now defunct, ranked number two (after British Airways) in the world in terms of passenger-kilometres performed and fifth in terms of total traffic carried, and TWA which ranked sixth and eighth respectively in 1984 moved to 28th and 31st in 1993. On the other hand, United which ranked 46th (passenger-kilometres) and 49th (total) in 1984, rose to second and fourth respectively by 1993, American moved from 28th to fourth in terms of passenger-kilometres and from 33rd to eighth in total, and Delta moved from 45th to ninth (passenger-kilometres) and from 47th to 13th (total) over the same period.

**Scheduled: country rankings**

64. Rankings for the top 30 countries or groups of countries by volume of scheduled traffic generated by their airlines in 1993, 1992 and 1984 according to the same parameters of passenger-kilometres, freight and mail tonne-kilometres and total (passenger, freight and mail) tonne-kilometres, for over-all and for international services, are presented in Tables 2-8 and 2-9. In 1993, approximately 43 per cent of the total volume of scheduled passenger, freight and mail traffic on international and domestic services was accounted for by the carriers of two countries, the United States and the United Kingdom (36 and 7 per cent, respectively). On international services, about 30 per cent of all traffic was carried by the airlines of the same two countries, the United States and the United Kingdom (19 and 11 per cent, respectively).

**Scheduled: city-pair rankings**

65. The 25 largest city-pair traffic flows in terms of passengers carried on international scheduled services represented a total of about 37 million passengers in 1992 (Table 2-10; owing to incomplete data it has not been possible to include figures for 1993). This represents some 12 per cent of the world total of international scheduled passengers. The table shows that of the 25 major passenger flows 12 involved international routes within eastern Asia, six routes were within Europe, and three routes each were across the North Atlantic and the North-Mid Pacific. In terms of cities, Tokyo and London appear most frequently, nine times each. All the city-pairs shown involve over-water sectors.

**Table 2-6. Top 30 scheduled air carriers in 1993 and their ranking in 1992 and 1984 in terms of TOTAL (international and domestic) scheduled traffic carried<sup>1</sup>**

PASSENGER-KILOMETRES PERFORMED				FREIGHT AND MAIL TONNE-KILOMETRES PERFORMED					TOTAL TONNE-KILOMETRES PERFORMED					
Carrier	1993 (millions)	Ranking			Carrier	1993 (millions)	Ranking			Carrier	1993 (millions)	Ranking		
		1993	1992	1984			1993	1992	1984			1993	1992	1984
United	162 494	1	2	2	Federal Express	5 709	1	1	15	United	17 673	1	2	2
American	156 172	2	1	3	Lufthansa	4 806	2	2	5	American	16 906	2	1	3
Delta	133 326	3	3	7	Air France	3 741	3	3	4	Delta	14 010	3	3	12
Northwest	93 374	4	5	10	JAL	3 468	4	4	3	Northwest	11 667	4	5	11
British Airways	78 901	5	6	8	Korean Air Lines	3 314	6	6	8	British Airways	10 254	5	6	10
Aeroflot	76 444	6	4	1	Northwest	3 194	6	5	6	Lufthansa	10 080	6	7	9
Continental	64 132	7	7	16	KLM	3 159	7	9	7	JAL	8 317	7	8	4
USair	56 670	8	8	24	United	2 928	8	7	9	Air France	8 221	8	10	7
JAL	54 615	9	9	9	SIA	2 875	9	11	12	Aeroflot	7 801	9	4	1
Lufthansa	52 662	10	10	12	American	2 735	10	10	13	SIA	6 826	10	12	15
Air France	43 532	11	14	11	British Airways	2 732	11	8	10	Continental	6 722	11	9	22
SIA	41 262	12	13	14	Cathay Pacific	2 063	12	13	18	KLM	6 617	12	14	14
Qantas	37 766	13	16	19	Delta	1 912	13	12	24	Korean Air Lines	5 735	13	15	17
All Nippon Airways	36 920	14	12	15	Qantas	1 465	14	16	21	Federal Express	5 709	14	11	49
KLM	36 807	15	15	17	Alitalia	1 362	15	15	17	USAir	5 564	15	13	31
TWA	36 467	16	11	5	Nippon Cargo <sup>2</sup>	1 294	16	17	—	Qantas	4 987	16	18	18
Cathay Pacific	29 069	17	17	29	Swissair	1 292	17	18	19	Cathay Pacific	4 831	17	17	24
Southwest	26 896	18	21	40	Thai Airways	1 101	18	20	33	TWA	3 929	18	16	6
Korean Air Lines	25 588	19	18	26	Varig	1 082	19	21	20	All Nippon Airways	3 687	19	19	25
Alitalia	24 520	20	20	23	Aeroflot	917	20	14	2	Alitalia	3 569	20	20	20
Iberia	23 265	21	19	18	Continental	902	21	19	38	Thai Airways	3 167	21	21	34
Thai Airways	22 874	22	23	35	El Al	866	22	22	25	Varig	3 061	22	25	27
Varig	21 191	23	27	33	Air Canada	851	23	24	16	Swissair	2 955	23	24	23
Air Canada	20 491	24	22	13	All Nippon Airways	781	24	26	42	Air Canada	2 709	24	23	16
Canadian	19 935	25	24	30	Saudia	744	25	27	28	Iberia	2 683	25	22	19
Saudia	18 572	26	26	20	Malaysian Airlines	709	26	23	43	Southwest	2 506	26	29	50
SAS	18 146	27	30	28	Canadian	633	27	29	35	Canadian	2 441	27	26	33
America West	18 002	28	25	83	TWA	620	28	25	14	Saudia	2 415	28	27	21
Malaysia Airlines	17 445	29	29	50	Iberia	589	29	28	26	Malaysian Airlines	2 178	29	28	48
Swissair	17 135	30	28	27	Garuda	582	30	32	47	SAS	2 107	30	30	28

1. Some 1993 data are rounded estimates, thus the ranking may change when final data become available.

2. Started operations in 1985.

Source: ICAO Air Transport Reporting Form A-1 and IATA.

Table 2-7. Top 30 scheduled air carriers in 1993 and their ranking in 1992 and 1984 in terms of INTERNATIONAL scheduled traffic carried<sup>1</sup>

PASSENGER-KILOMETRES PERFORMED					FREIGHT AND MAIL TONNE-KILOMETRES PERFORMED					TOTAL TONNE-KILOMETRES PERFORMED				
Carrier	1993 (millions)	Ranking			Carrier	1993 (millions)	Ranking			Carrier	1993 (millions)	Ranking		
		1993	1992	1984			1993	1992	1984			1993	1992	1984
British Airways	76 548	1	1	1	Lufthansa	4 743	1	1	2	British Airways	10 052	1	1	2
United	62 633	2	2	46	Air France	3 608	2	2	3	Lufthansa	9 523	2	2	3
Lufthansa	47 628	3	3	5	Korean Air Lines	3 258	3	4	6	Air France	7 347	2	4	4
American	46 246	4	4	28	JAL	3 181	4	3	1	United	7 304	4	5	49
JAL	41 372	5	6	3	KLM	3 159	5	6	5	JAL	7 034	5	3	1
SIA	41 262	6	7	7	SIA	2 875	6	8	9	SIA	6 826	6	6	7
Northwest	39 982	7	5	9	British Airways	2 728	7	5	7	KLM	6 617	7	8	6
KLM	36 804	8	9	8	Federal Express	2 087	8	7	130	American	5 715	8	9	33
Delta	36 512	9	8	45	Cathay Pacific	1 983	9	10	12	Northwest	5 508	9	7	10
Air France	36 376	10	11	4	Northwest	1 880	10	9	10	Korean Air Lines	5 399	10	10	9
Qantas	36 015	11	10	10	United	1 621	11	13	47	Qantas	4 781	11	12	11
Cathay Pacific	26 668	12	12	15	American	1 519	12	14	46	Cathay Pacific	4 523	12	11	15
Alitalia	22 374	13	13	12	Qantas	1 436	13	11	14	Delta	4 165	13	13	47
Korean Air Lines	22 097	14	14	16	Alitalia	1 345	14	12	11	Alitalia	3 359	14	14	14
Thai Airways	20 609	15	15	20	Nippon Cargo <sup>2</sup>	1 294	15	15	—	Thai Airways	2 940	15	16	21
Iberia	17 407	16	17	11	Swissair	1 287	16	16	13	Swissair	2 934	16	15	13
Swissair	16 973	17	18	13	Thai Airways	1 079	17	17	26	Varig	2 181	17	20	23
Aeroflot	15 232	18	24	14	El Al	866	18	18	16	Federal Express	2 087	18	17	144
Malaysian Airlines	14 431	19	21	37	Delta	852	19	21	48	Iberia	2 063	19	19	16
Varig	14 315	20	22	23	Varig	781	20	20	17	Malaysian Airlines	1 898	20	21	34
Continental	14 225	21	16	49	Saudia	678	21	22	25	Saudia	1 816	21	23	19
SAS	13 876	22	20	19	Malaysian Airlines	675	22	19	35	Aeroflot	1 764	22	30	17
Canadian	13 283	23	23	25	Air Canada	598	23	23	22	SAS	1 702	23	26	20
Saudia	12 646	24	25	17	United Parcel Service <sup>3</sup>	571	24	24	—	Continental	1 702	24	18	52
Garuda	12 540	25	26	35	Garuda	530	25	30	41	Canadian	1 700	25	27	31
Air New Zealand	12 194	26	29	29	Air China <sup>4</sup>	520	26	—	—	Garuda	1 695	26	28	35
Air Canada	11 653	27	27	18	Iberia	496	27	25	23	Air Canada	1 655	27	24	18
TWA	11 324	28	19	6	Canadian	495	28	28	32	El Al	1 638	28	25	24
PAL	11 295	29	28	22	Air New Zealand	459	29	32	30	Air New Zealand	1 622	29	29	30
Virgin Atlantic	9 602	30	31	103	SAS	445	30	29	24	PAL	1 478	30	31	28

1. Some 1993 data are rounded estimates, thus the ranking may change when final data become available.

2. Started operations in 1985.

3. Started operations in 1987.

4. No data for individual air carriers were reported by China prior to 1993.

Source: ICAO Air Transport Reporting Form A-1 and IATA.

**Table 2-8. Top 30 countries or groups of countries in 1993 and their ranking in 1992 and 1984 in terms of TOTAL (international and domestic) traffic carried on their airlines' scheduled services<sup>1</sup>**

PASSENGER-KILOMETRES PERFORMED					FREIGHT AND MAIL TONNE-KILOMETRES PERFORMED					TOTAL TONNE-KILOMETRES PERFORMED				
Country or group of countries	Estimated 1993 (millions)	Ranking			Country or group of countries	Estimated 1993 (millions)	Ranking			Country or group of countries	Estimated 1993 (millions)	Ranking		
		1993	1992	1984			1993	1992	1984			1993	1992	1984
United States	775 900	1	1	1	United States	19 447	1	1	1	United States	89 845	1	1	1
United Kingdom	126 240	2	3	4	Japan	5 809	2	2	3	United Kingdom	17 427	2	2	4
Japan	110 770	3	4	3	United Kingdom	5 469	3	3	5	Japan	14 679	3	4	3
Russian Federation <sup>2</sup>	104 400	4	2	2	Germany	4 833	4	4	6	Russian Federation <sup>2</sup>	10 870	4	3	2
Australia	66 010	5	6	7	Republic of Korea	4 032	5	6	8	Germany	10 495	5	6	6
France	60 100	6	5	5	France	3 844	6	5	4	France	9 612	6	5	5
Germany	56 952	7	7	8	Netherlands	3 159	7	7	7	Australia	7 806	7	7	8
China <sup>3</sup>	45 000	8	9	24	Singapore	2 875	8	8	10	Republic of Korea	7 191	8	8	11
Singapore	41 262	9	10	9	Australia	1 668	9	10	12	Singapore	6 826	9	9	10
Canada	40 426	10	8	6	Canada	1 484	10	11	9	Netherlands	6 652	10	10	9
Netherlands	38 160	11	11	11	Russian Federation <sup>2</sup>	1 468	11	9	2	Canada	5 151	11	11	7
Republic of Korea	35 270	12	13	18	China <sup>3</sup>	1 455	12	12	25	China <sup>3</sup>	4 760	12	12	27
Brazil	30 165	13	14	13	Brazil	1 394	13	14	11	Brazil	4 167	13	14	12
Italy	29 560	14	12	14	Italy	1 369	14	13	13	Italy	4 030	14	13	13
Spain	28 171	15	15	10	Switzerland	1 292	15	15	14	Thailand	3 167	15	16	21
Scandinavia <sup>4</sup>	23 410	16	18	17	Thailand	1 102	16	16	23	Spain	3 123	16	15	14
Thailand	22 874	17	16	21	Israel	877	17	17	17	Switzerland	2 982	17	17	17
Indonesia	19 270	18	19	22	Saudi Arabia	744	18	19	20	Scandinavia <sup>4</sup>	2 598	18	20	18
Saudi Arabia	18 572	19	20	15	Malaysia	709	19	18	29	Saudi Arabia	2 415	19	18	16
Mexico	18 240	20	17	12	Gulf States <sup>5</sup>	634	20	25	36	Indonesia	2 340	20	19	26
Malaysia	18 070	21	23	30	Indonesia	621	21	23	32	Malaysia	2 208	21	21	31
Switzerland	17 420	22	22	19	Chile	620	22	21	39	Gulf States <sup>5</sup>	2 047	22	24	34
Gulf States <sup>5</sup>	14 510	23	26	33	Spain	604	23	20	18	New Zealand	1 797	23	25	25
India	14 348	24	21	16	Scandinavia <sup>4</sup>	497	24	24	21	Mexico	1 737	24	23	19
New Zealand	13 860	25	25	26	Colombia	495	25	22	24	Philippines	1 686	25	27	23
Philippines	13 410	26	24	23	Pakistan	494	26	28	27	Israel	1 674	26	26	22
South Africa	10 790	27	29	20	Belgium	487	27	29	16	India	1 663	27	22	15
Pakistan	9 210	28	28	27	New Zealand	481	28	27	26	Pakistan	1 336	28	28	28
Israel	8 860	29	30	29	India	385	29	26	15	South Africa	1 276	29	30	20
Argentina	8 830	30	27	25	Philippines	365	30	30	28	Belgium	1 071	30	32	24

1. Most 1993 data are rounded estimates, thus the ranking may change when final data become available.
2. Traffic is for 11 Commonwealth of Independent States that are ICAO Contracting States, namely: Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Republic of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.
3. Not including the Taiwan Province.
4. Three States, Denmark, Norway and Sweden, are partners in the consortium airline "Scandinavian Airlines System".
5. Four States, Bahrain, Oman, Qatar and United Arab Emirates, are partners in the multinational airline "Gulf Air".

Source: ICAO Air Transport Reporting Form A-1.

**Table 2-9. Top 30 countries or groups of countries in 1993 and their ranking in 1992 and 1984 in terms of traffic carried on their airlines' INTERNATIONAL scheduled services<sup>1</sup>**

PASSENGER-KILOMETRES PERFORMED					FREIGHT AND MAIL TONNE-KILOMETRES PERFORMED					TOTAL TONNE-KILOMETRES PERFORMED				
Country or group of countries	1993	Ranking			Country or group of countries	1993	Ranking			Country or group of countries	1993	Ranking		
	(millions)	1993	1992	1984		(millions)	1993	1992	1984		(millions)	1993	1992	1984
United States	223 900	1	1	1	United States	9 408	1	1	1	United States	29 725	1	1	1
United Kingdom	121 510	2	2	2	United Kingdom	5 377	2	2	4	United Kingdom	17 026	2	2	2
Japan	54 340	3	3	3	Japan	5 073	3	4	3	Japan	10 103	3	3	3
Germany	51 819	4	4	5	Germany	4 770	4	3	5	Germany	9 928	4	4	5
Singapore	41 262	5	6	6	Republic of Korea	3 927	5	6	7	France	7 573	5	5	4
France	40 170	6	5	4	France	3 655	6	5	2	Singapore	6 826	6	6	7
Netherlands	38 110	7	7	7	Netherlands	3 159	7	7	6	Republic of Korea	6 660	7	8	8
Australia	36 800	8	8	8	Singapore	2 875	8	8	8	Netherlands	6 652	8	7	6
Republic of Korea	29 940	9	10	14	Australia	1 463	9	9	12	Australia	4 881	9	9	9
Canada	24 936	10	9	9	Italy	1 345	10	10	9	Italy	3 395	10	10	12
Italy	22 790	11	11	11	Switzerland	1 287	11	11	11	Canada	3 355	11	11	10
Thailand	20 660	12	12	17	Canada	1 093	12	12	10	Switzerland	2 957	12	12	11
Spain	18 560	13	13	10	Thailand	1 079	13	13	21	Thailand	2 945	13	13	18
Switzerland	17 210	14	14	12	China <sup>5</sup>	955	14	15	31	Brazil	2 523	14	14	19
Brazil	16 863	15	15	20	Brazil	912	15	16	15	Spain	2 169	15	15	13
Russian Federation <sup>2</sup>	15 232	16	18	13	Israel	875	16	14	14	Gulf States <sup>3</sup>	2 041	16	19	30
Malaysia	14 520	17	17	29	Saudi Arabia	678	17	18	20	Malaysia	1 898	17	16	27
Gulf States <sup>3</sup>	14 440	18	20	30	Malaysia	675	18	17	29	China <sup>5</sup>	1 870	18	18	39
Scandinavia <sup>4</sup>	14 180	19	16	16	Gulf States <sup>3</sup>	634	19	22	35	Saudi Arabia	1 816	19	17	15
Indonesia	12 651	20	19	27	Chile	595	20	19	39	Russian Federation <sup>2</sup>	1 764	20	23	14
Saudi Arabia	12 646	21	21	15	Indonesia	531	21	24	36	Scandinavia <sup>4</sup>	1 741	21	20	16
New Zealand	12 194	22	24	24	Spain	499	22	20	18	Indonesia	1 705	22	22	28
China <sup>5</sup>	12 000	23	22	36	Belgium	487	23	25	13	Israel	1 658	23	21	20
Philippines	11 295	24	23	21	Colombia	465	24	21	24	New Zealand	1 622	24	24	24
Israel	8 700	25	27	23	New Zealand	459	25	26	25	Philippines	1 478	25	25	23
Mexico	8 070	26	25	19	Scandinavia	458	26	23	19	Belgium	1 071	26	28	21
India	7 862	27	26	18	Pakistan	432	27	27	26	Pakistan	1 061	27	27	26
South Africa	7 539	28	32	22	Russian Federation <sup>2</sup>	389	28	29	23	India	1 037	28	26	17
Greece	6 964	29	31	28	Philippines	323	29	30	27	South Africa	953	29	31	22
Pakistan	6 873	30	28	26	South Africa	297	30	31	22	Chile	844	30	33	50

1. Most 1993 data are rounded estimates, thus the ranking may change when final data become available.

2. Traffic is for 11 Commonwealth of Independent States that are ICAO Contracting States, namely: Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Republic of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

3. Not including the Taiwan Province.

4. Three States, Denmark, Norway and Sweden, are partners in the consortium airline "Scandinavian Airlines System".

5. Four States, Bahrain, Oman, Qatar and United Arab Emirates, are partners in the multinational airline "Gulf Air".

Source: ICAO Air Transport Reporting Form A-1.

**Table 2-10. Scheduled passenger traffic on world's major international city-pairs**  
(top 25 city-pairs ranked by international passengers, 1992<sup>1</sup>)

Rank	City-pair	Distance (km)	1992 <sup>1</sup> (thousands)	1991 (thousands)	1992/91 %	1992/84 average
1	London-Paris	346	3 402	3 191	6.6	5.2
2	London-New York	5 539	2 276	2 175	4.7	1.5
3	Hong Kong-Taipei	777	2 223	2 066	7.6	11.1
4	Honolulu-Tokyo	6 134	2 131	1 908	11.7	9.1
5	Kuala Lumpur-Singapore	335	2 109	2 095	0.7	5.4
6	Seoul-Tokyo	1 227	2 023	1 191	69.9	10.3
7	Hong Kong-Tokyo	2 938	2 019	1 972	2.4	5.5
8	Amsterdam-London	369	1 775	1 617	9.8	5.3
9	Dublin-London	449	1 720	1 687	2.0	8.2
10	Bangkok-Hong Kong	1 711	1 649	1 700	-3.0	6.9
11	Jakarta-Singapore	906	1 381	2 024	-31.8	10.0
12	Singapore-Tokyo	5 356	1 256	1 117	12.4	16.0
13	Frankfurt-London	654	1 222	1 139	7.3	5.4
14	New York-Paris	5 833	1 218	1 300	-6.3	3.5
15	Los Angeles-Tokyo	8 752	1 094	1 006	8.8	5.5
16	Taipei-Tokyo	2 182	1 090	1 015	7.4	3.8
17	London-Los Angeles	8 759	1 015	825	23.1	6.9
18	Brussels-London	349	1 015	797	27.4	6.0
19	Hong Kong-Manila	1 126	998	1 040	-4.1	6.1
20	Hong Kong-Singapore	2 578	997	1 023	-2.5	3.9
21	Bangkok-Singapore	1 444	982	1 020	-3.8	4.4
22	London-Tokyo	9 590	951	711	33.7	17.0
23	London-Zurich	787	908	898	1.2	5.6
24	Bangkok-Tokyo	4 644	901	862	4.5	14.6
25	Guam Island-Tokyo	2 516	858	771	11.2	9.4
	TOTAL		37 215	35 150	5.9	6.7

1. Year ending 30 September 1992.

Source: ICAO Air Transport Reporting Form B.

66. Table 2-10 also gives an indication of the long-term growth in the traffic flows for the city-pairs concerned by including the average annual percentage increase between 1984 and 1992. The figures show that there were significant differences in the rate of growth amongst individual city-pairs and between route areas. Between 1984 and 1992 the number of passengers between the 12 city-pairs in eastern Asia and the ones across the North-Mid Pacific increased at an average annual rate of about 8 per cent, those involving traffic within Europe grew at almost 6 per cent, and the ones across the North Atlantic some 3 per cent.

### **Non-scheduled**

67. Total international non-scheduled passenger-kilometres performed throughout the world increased by an estimated 2 per cent in 1993 after an increase of almost 12 per cent in 1992 (reflecting a recovery after a decline of just over 14 per cent in 1991, Table 2-11). In 1993 the share of international non-scheduled air passenger traffic was about 15 per cent of over-all international air passenger traffic compared with a share of almost 16 per cent in 1992. According to preliminary estimates in 1993 the shares of charter operators and scheduled airlines in the carriage of the non-scheduled traffic were 58 per cent and 42 per cent respectively. Non-scheduled traffic in Europe is the largest single component of the world charter market. Domestic non-scheduled passenger traffic is estimated to represent about 10 per cent of total non-scheduled passenger traffic and under 2 per cent of total domestic passenger traffic world-wide. Non-scheduled cargo operations tend to be largely of an *ad hoc* nature and little information is available as to their volume.

### **FLEETS**

68. The evolution of the commercial air transport fleets summarised below does not generally include aircraft fleet and manufacturer data for the Commonwealth of Independent States (CIS) and China. However, statistics on certain types of aircraft manufactured in the CIS and employed in the fleets of States other than the CIS and China are included in the tables shown unless otherwise stated. Also, unless otherwise stated, statistics of aircraft having a maximum take-off mass of less than 9 000 kg (20 000 lbs) are not included.

### **Orders and Deliveries**

69. In 1993 the number of turbo-jet aircraft ordered was 341 compared with 362 in 1992. The financial commitment represented by orders placed in 1993 for these aircraft is estimated to be about \$17 000 million, somewhat less than the \$21 000 million estimated for 1992. In 1993, 655 aircraft were delivered compared with 786 aircraft in 1992. The backlog of unfilled orders declined from 2 738 aircraft at the end of 1992 to 2 150 aircraft at the end of 1993. The status of orders and deliveries for the year 1993 is shown in Table A1-2 in Appendix 1, which gives data by manufacturer and model for turbo-jet and turboprop aircraft.

70. The turbo-jet types shown in Table 2-12 were most active in 1993 in terms of orders and deliveries, accounting for about 80 per cent of the orders, and for about 50 per cent each of the deliveries made and of the backlog of unfilled orders in 1993. The number of turboprop aircraft ordered in 1993 was 108, and 166 aircraft were delivered during the year. The backlog of turboprop aircraft was 285 at the end of the year.



**Table 2-11. Estimated international non-scheduled revenue passenger traffic, 1992-1993**

Category	Millions of passenger-kilometres performed		Annual change (%) 1993/92
	1992	1993	
Scheduled carriers	74 800	78 300	4.7
% of total carriers	41	42	
Non-scheduled carriers	109 600	110 300	0.6
% of total carriers	59	58	
Scheduled traffic	982 500	1 045 600	6.4
Non-scheduled traffic	184 400	188 600	2.3
Total traffic	1 166 900	1 234 200	5.8
Non-scheduled traffic as percentage of total	15.8	15.3	

Source: ICAO Air Transport Reporting Forms A-1 and A-2.

**Table 2-12. Main aircraft types ordered and delivered in 1993**

Aircraft	Orders	Deliveries	Backlog
Boeing 737	110	152	465
Boeing 767	66	51	141
Boeing 757	40	71	246
Fokker 100	29	66	37
Boeing 777	29	—	147

Source: Aircraft manufacturers.

## Composition

71. Between 1984 and 1993 the number of commercial air transport fixed-wing aircraft in service with a take-off mass of 9 000 kg and over increased by over 56 per cent, from 9 167 to 14 310 as shown in Table 2-13. During this period, the number of jet aircraft increased from 6 818 to 11 200 rising from about 74 per cent to some 78 per cent of the fleet, while turboprop aircraft increased from 1 540 to 2 680, or from 17 to 19 per cent. On the other hand, the number of piston-engined aircraft declined by almost 50 per cent, from 809 to 430, and now constitutes only about 3 per cent of the total world fleet.

72. It is estimated that between September 1992 and September 1993 the number of stored jet aircraft world-wide increased by some 25 per cent from about 850 to approximately 1 060 aircraft. Among them, the share of aircraft complying with the ICAO noise standards in Annex 16, Volume I, Chapter 3, increased to above 30 per cent of the total. The number of commercial jets for sale or lease started a decline in the second half of 1993 reaching an estimated 712 units by the year-end, however, this figure was still about 10 per cent higher than that one for the previous year. During the year the proportion of new aircraft in storage increased from about 15 per cent to nearly 20 per cent of the total. The market value of narrow-body aircraft complying with the ICAO noise standards in Annex 16, Volume I, Chapter 2, as well as that of wide-body aircraft complying with Chapter 3 was reported as declining noticeably during 1993 whereas prices of narrow-body aircraft complying with Chapter 3 remained fairly stable.

## Leasing Developments

73. At the end of 1993 there were over 40 operating leasing companies, owning some 1 900 jet aircraft valued at some \$33 billion (an increase over the previous year of about 100 aircraft). Nearly 57 per cent of these aircraft were owned by just three companies: Guinness Peat Aviation Group PLC (GPA) and affiliated companies, Ireland (433 aircraft); General

**Table 2-13. Commercial transport fleet<sup>1</sup>  
at the end of each year — 1984, 1992, 1993<sup>2</sup>**

Year	TURBO-JET		TURBOPROP		PISTON-ENGINE		Total aircraft all types
	Number	Percent-age	Number	Percent-age	Number	Percent-age	
1984	6 818	74.4	1 540	16.8	809	8.8	9 167
1992	10 775	78.0	2 589	18.7	455	3.3	13 819
1993	11 200	78.3	2 680	18.7	430	3.0	14 310

1. Aircraft having a maximum take-off mass of less than 9 000 kg (20 000 lb) are not included.

2. Owing to lack of information, data for China and the Commonwealth of Independent States are not included.

Source: ICAO Air Transport Reporting Form H.

Electric Capital Corporation (GECC) and Polaris Aircraft Leasing Corporation, United States (415 aircraft); and the International Lease Finance Corporation (ILFC), United States (232 aircraft).

74. In 1993, excluding China and the CIS for which complete data were not available, the proportion of aircraft owned by operating leasing companies remained at about 17 per cent of the total number of commercial jet aircraft. Aircraft leased by airlines from other institutions, from other carriers and aircraft manufacturers is also thought to be significant, and hence the proportion of leased (as opposed to owned) aircraft in the industry is substantial.

75. The share of stored aircraft in the total fleet owned by leasing companies decreased slightly (about 1 per cent) to nearly 15 per cent. During the year market conditions caused leasing rates to fall. In September 1993 leasing rates for wide-body aircraft and narrow-body aircraft complying with the ICAO noise standards in Annex 16, Volume I, Chapter 3, were some 5 to 15 per cent lower than those on offer a year earlier whereas the leasing rates for narrow-body aircraft complying with Chapter 2 were some 10 to 30 per cent lower.

76. Against this background, a major development in the re-shaping of the aircraft leasing industry took place when GECC took control of GPA, which had been experiencing financial difficulties, initially under a 15-year management contract with an option to buy up to 67 per cent of the latter by March 1998. As a part of this deal, GECC acquired an 85 per cent interest in the book value of 45 GPA new aircraft for \$1.35 billion. Under an agreed restructuring plan, GPA cut orders from 242 aircraft valued at \$11.3 billion to 57 aircraft worth some \$3.6 billion. Also in 1993, a few smaller leasing companies went out of business, the largest of these being United Aviation Services of the United States with 33 jet aircraft.

77. In 1993 there was also some consolidation of the aircraft leasing industry. Singapore Airlines and United States lessor Boullioun Aviation established as a joint venture Singapore Aircraft Leasing Enterprise with the intention to pool resources and to share the risk of multi-aircraft leasing deals with other equity and debt investors.

## AIRCRAFT TECHNOLOGY

78. During 1993, a number of new commercial aircraft reached the final stages of development. The four-engine wide-body Airbus A340 entered commercial operation and the twin-engine Airbus A330 (412 seats), the first airliner to achieve simultaneous European and American certification, was delivered to its launch customer. The Airbus A300-600 freighter made its maiden flight. At the Boeing Commercial Airplane Company final assembly of the new Boeing 777 twin-jet was being completed with a planned roll-out for April 1994 and first delivery scheduled for May 1995. In 1993 Boeing delivered the one-thousandth 747 after a 25-year production of this aircraft type. The model's first freighter Boeing 747-400F was certified and put into commercial service. Boeing also considered the development of a very long-range version of the 767 (up to 13 300 km) and started to build an engineering mock-up of the 767 freighter. The Douglas Aircraft Company studied five derivatives of the MD-11 and a new 220-seat aircraft to serve medium-range high-density routes. The launch of the MD-12 continued to be dependent on the success of the company in finding a risk-sharing partner. In

the Russian Federation, the four-engine Ilyushin 96-300, the only nationally produced aircraft to comply with the ICAO noise standards in Annex 16, Volume I, Chapter 3, entered scheduled passenger operations. An extended version equipped with western engines and avionics made its maiden flight, and is expected to obtain its certification in 1995.

79. During 1993, the mid-size medium-haul aircraft sector also saw some important developments. The stretched version of the Airbus A320, the A321 (185-seats) was certified and initial deliveries were expected for the beginning of 1994. The shortened version of this type, the A319 (124 seats), was launched with deliveries aimed for April 1996. Boeing rolled out the 2 500th 737 in June 1993. At the same time it started to upgrade its 737 family of aircraft. First deliveries of the 737-700 (128 seats), which is to replace the 737-300, are planned for the fall of 1997. McDonnell Douglas rolled out the MD-90 Series 30 (153 seats) with certification expected by August 1994. In the Russian Federation, Tupolev delivered the first twin-engine TU-204 (214 seats) to Russian carriers, and started development of a twin-turboprop high-wing freighter, the TU-330. The Yakovlev design bureau completed a mock-up of the YAK-242 (160 to 180 seats); its introduction into service is expected in 1997.

80. The regional aircraft market became even more competitive with at least nine established manufacturers considering regional airliners in the 30 to 120 seat range plus about half a dozen potential players from the former Eastern block and a couple of projects mooted by aspiring Asian manufacturers. Avion de Transport Régional (Aérospatiale/Alenia) launched the ATR-42-500, an enhanced version of the ATR-42, with first delivery expected in the Spring of 1995. British Aerospace aimed at an early 1994 certification of the Jetstream 61 (70 seats), announced in April 1993, and completed the certification program for the 70-130 seat family of Regional Jet Airliners, derivatives of the BAe 146. The smallest member of the family of jets planned by the Fokker Aircraft Company, the F.70 (79 seats), was launched in June three months after its maiden flight. The Dornier DO328 twin-turboprop was certified and delivered to a launch carrier. Certification of the twin-turboprop SAAB 2000 (50 to 56 seats) was delayed for one year due to technical problems. Production of the twin-turboprop Ilyushin IL-114 (60 seats) was started with certification expected in 1994. Construction of the Tupolev TU-334, a 120 seat twin-jet, was near completion with the first flight planned for 1994.

81. Projects under development in 1993 and which came short of being launched included the ATR 82 (78 seats); the CASA-3000 (70 seats) of Construcciones Aeronáuticas, S.A. of Spain; the deHavilland Dash 8-400 (70 seats) and the RJX (70 seats), a new regional jet by Bombardier of Canada; the EMB-145 (50 seats) by Embraer of Brasil; the F.60 (60 seats), the stretched version of F.50 turboprop by Fokker; the extended version of the N250 under development by IPTN (Industri Pesawat Terbang Nusantara) of Indonesia; and the Jetstream 51 (52 seats) and Jetstream 71 (72 to 78 seats) turboprops by British Aerospace. Finding a risk-sharing partner was a primary condition for the launch of many of these projects.

82. Aerospace companies world-wide continued to study the technology associated with the development of a High Speed Civil Transport (HSCT). Engine manufacturers in the United States and Europe selected preferred configurations for the HSCT propulsion system for further study. A decision on whether to build such an airplane is not expected to be taken until 2001.

83. In January 1993, Boeing and members of Airbus Industrie (acting as independent companies) agreed on a year-long joint study on the feasibility of developing a very large

commercial transport (VLCT). The study focused on a 600-seat double-deck aircraft with an initial range of about 13 000 km. In an interim report, the participants concluded that there could be a potential market of between 400 and 500 VLCTs by 2010 and that no insurmountable technical problems existed in the construction of such an aircraft. Airbus Industry, McDonnell Douglas Corporation and some design bureaux in the Russian Federation also carried out their own studies on VLCTs. About ten major international carriers actively participated in these preliminary studies.

84. Some of the research projects being undertaken in the Russian Federation reached the stage of large-scale model testing. Among them was a 40-metre diameter prototype of an aerostatic aircraft, the ALA-600, intended to carry 600 tonnes of freight over 5 000 km at speeds of about 220 kilometres per hour, and three remotely-piloted 9-tonne models of a combined wing/fuselage aircraft, the EKIP L3, capable of carrying a 44 tonne payload over some 8 200 km at speeds of some 700 kilometres per hour. The common characteristic of these two aircraft is projected lower operating costs compared with those of aircraft currently being produced.

85. With regard to aircraft engines, all major manufacturers continued to advance their work on the very large turbo-fan engines needed to power the new generation of wide-body twin-jet aircraft. General Electric started flight testing its new GE90, which during ground testing achieved 468 kN (kiloNewton) of thrust. Rolls-Royce commenced running the Trent 800, the most powerful derivative of the RB211 family intended to compete against the GE90, and delivered the first Trent 700 (320 kN) to power the Airbus A330. Pratt & Whitney began flight testing the PW4084 (373 kN), a derivative of the PW4000 family, of which a less powerful version (302 kN) was certified to enter service on the Airbus A330 in 1994. In the United States, the National Aeronautics and Space Administration (NASA) began testing the advanced ducted prop (ultra-high bypass engine) technology demonstrator of Pratt & Whitney.

86. During 1993 there was some consolidation of the European aircraft manufacturing industry when Deutsche Aerospace AG (DASA) took over the Fokker Aircraft Company of the Netherlands. British Aerospace and the Taiwan Aerospace Corporation failed to finalize a preliminary agreement for the production of a family of regional jets. This prompted British Aerospace to sign a preliminary agreement with IPTN (Indonesia) on defining a joint venture for the production of turbo-prop commuter aircraft. In 1993 there were also a number of co-operative initiatives involving Asian aerospace companies; one of these involved a South Korean proposal to aerospace companies in China, Indonesia and Singapore for the production of an "Asian Airbus".

## PERSONNEL

87. The number of staff employed by the world's scheduled airlines (excluding those of the Commonwealth of Independent States and China) fell marginally in 1993. Employment had peaked at 1.53 million in 1989 and is estimated on a preliminary basis as 1.51 million in 1993. This decrease stems mainly from the reduction in staff by the international scheduled airlines, for which employee numbers fell for the fourth year in succession (from a peak of about 1.15 million in 1988 and 1989 to about 1.13 million in 1993). Employment among the domestic scheduled airlines is estimated to have remained between 375 and 380 thousand since 1988.

88. These generic figures cannot fully describe the over-all impact of employment changes in the airline industry, since they encompass both recruitment by some airlines and the lay-offs by other airlines which in many instances do not involve the same personnel.

89. During 1993 some airlines aimed to reduce operating expenses in part through a reduction in staff costs. Efforts were also made to deploy the workforce more efficiently, to reallocate some labour-intensive activities in countries with lower staff costs and to provide greater flexibility in the management decision-making process. In addition to lay-offs, redundancies and attrition, some airlines offered incentives to encourage early retirement. In view of their employers' financial difficulties some labour unions agreed to make concessions in terms of working hours, salaries and/or other benefits. Some management staff also took voluntary or enforced cuts in remuneration. In several instances concessions made by staff were associated with the offer by employers of equity in the company.

90. Another method used by airlines to reduce costs, mainly in Europe and the United States, was the continuing creation of subsidiary companies where generally non-unionized staff are paid salaries at levels significantly lower than those for comparable jobs at the mother company.

## FINANCES

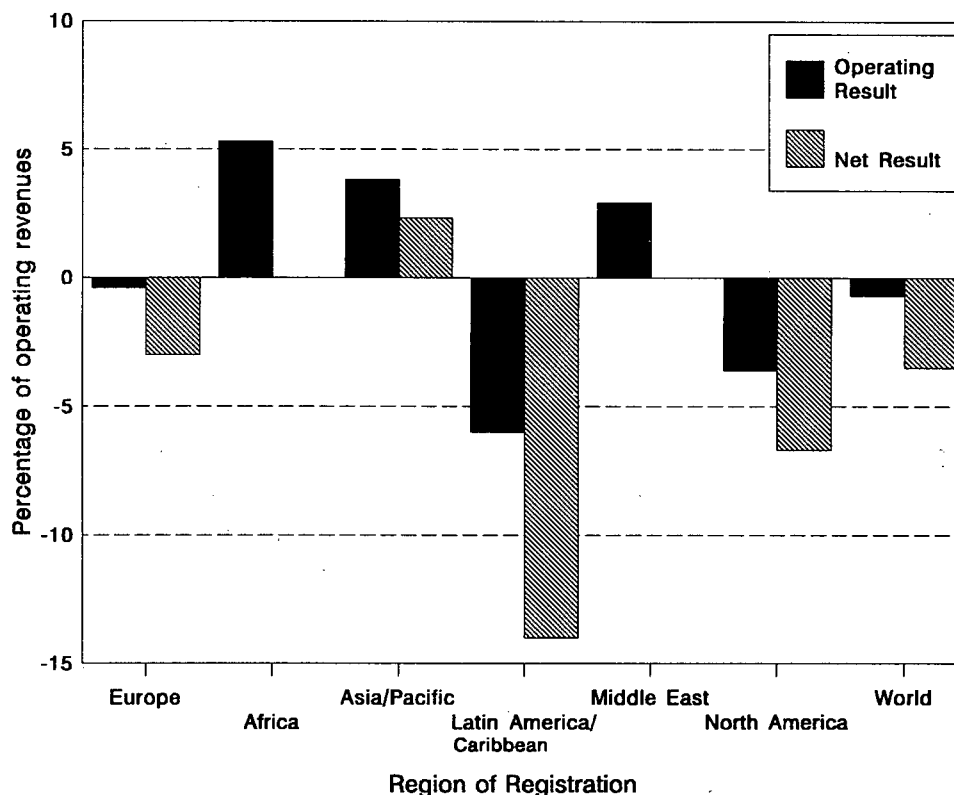
### *Financial Results*

91. Preliminary estimates for 1993 indicate that the world's scheduled airlines as a whole experienced a small *operating* profit, 1.1 per cent of total operating revenues, after three years of operating losses (0.8 per cent in 1990, 0.2 per cent in 1991 and 0.7 per cent in 1992). The operating revenues of scheduled airlines (excluding operations within the Commonwealth of Independent States) are tentatively estimated at \$227 000 million in 1993, an increase of just over 4 per cent compared with the \$217 500 million earned in 1992. Expressed in United States currency, the operating revenues per tonne-kilometre performed decreased by about 1 per cent from 90.5 cents in 1992 to an estimated 89.2 cents in 1993. The operating expenses for the same airlines are tentatively estimated at \$224 500 million in 1993, an increase of some 2 per cent over the \$219 000 million incurred in 1992. The operating expenses per tonne-kilometre performed fell by just over 3 per cent to 88.2 cents in 1993 from 91.1 cents in 1992.

92. The estimated *operating* result for the world's scheduled airlines is the difference between estimated operating revenues and expenses and is therefore subject to a relatively wide margin of error. For 1993, the estimated operating profit of about \$2 500 million represents a significant improvement from the 1992 operating loss of \$1 500 million. The improved financial situation in 1993 is primarily a consequence of a turnaround in the results for North American airlines, boosted by a return to economic growth in that region, stable operating costs and increased revenue yields. Elsewhere, airline financial performance was estimated to be generally similar to that reported for 1992; improvements in most major economies are expected to provide a foundation for better results in 1994.

93. The *net* result, derived from the operating result by taking into account the non-operating items and taxes, cannot yet be estimated for 1993, but in 1992 the world's scheduled airlines showed a net loss of \$7 700 million, representing 3.5 per cent of operating revenues. Information on both operating and net results over the period 1982-1992 and distribution of operating revenues and expenses by item in 1982 and 1992 may be found in Tables 5-4 and 5-5 in Chapter 5.

94. The estimates of the world's scheduled airlines as a whole do not portray the considerable difference in results achieved by individual airlines. In 1992 about 45 per cent of airlines experienced operating profits, with 55 per cent reporting operating losses. On a regional basis, in 1992 the operating result expressed as a percentage of operating revenues ranged from an operating profit of just over 5 per cent for the airlines in Africa to an operating loss of about 6 per cent for those based in Latin America and the Caribbean. Net results ranged from a surplus of just over 2 per cent of operating revenues for the airlines based in Asia/Pacific to a net loss of almost 14 per cent of operating revenues for those in Latin America and the Caribbean (Figure 2-2).



Source: ICAO Air Transport Reporting Form EF-1.

**Figure 2-2. Financial results by region in 1992 — scheduled airlines**

95. In 1993, the United States scheduled airlines ("majors" and "nationals") as a group accounted for about 36 per cent of the total operating revenues of the scheduled airlines of ICAO Contracting States (excluding operations within the CIS). Preliminary data indicate that their operating result in 1993 was a profit of \$1 400 million, compared with a loss of \$2 500 million experienced in 1992. For the airlines of the rest of the world combined (excluding operations within the CIS), the preliminary estimated operating profit in 1993 was \$1 000 million, almost exactly the same as the previous year.

96. Available financial data on non-scheduled carriers are insufficient to provide an accurate picture.

### ***Consolidated Balance Sheet***

97. At the end of the fiscal year 1992 (1993 data were not available at the time of writing) the total assets of the scheduled airlines of ICAO Contracting States (excluding operations within the CIS) stood at \$270 140 million compared with \$243 570 million at the end of the fiscal year 1991 (Table 2-14). Of these some 23 per cent were represented by current assets, 62 per cent by fixed assets and the remainder by other assets.

98. At the end of 1992, the net value of the aircraft fleet (i.e. after depreciation charges) was \$125 050 million compared with \$107 880 million at the end of 1991, representing an increase of 16 per cent, or from 44 to 46 per cent of total assets. Accumulated depreciation charges stood at \$103 550 million of which \$78 660 million were for the aircraft fleet, representing some 39 per cent of the gross value of the fleet. The remaining accumulated depreciation charges covered ground property and equipment and represented some 47 per cent of their gross value.

99. Between the end of fiscal year 1991 and 1992, stockholders' equity was little changed (from \$41 790 million to \$42 000 million), but in relative terms it decreased from 17 to almost 15 per cent of total liabilities. During the same period long term debt increased from \$80 150 million to \$99 800 million, i.e. from 33 per cent to 37 per cent of total liabilities. At the end of fiscal year 1992 current liabilities, including unearned transportation revenue, stood at \$76 850 million, or some 29 per cent of total liabilities compared with some 32 per cent in 1991. Hence during 1992 the acquisition of fleet equipment and other investments appear to have been financed mainly through an increase in long term debt. Unearned transportation revenue represented about 6 per cent of total liabilities and some 8 per cent of the total traffic revenue for 1992.

100. Long-term trends in the balance sheet elements may be discerned from comparing the figures for 1992 with those for 1984, which are also contained in Table 2-14. At the end of fiscal year 1984 total assets stood at \$104 985 million compared with \$270 140 million at the end of 1992. Relative to the totals, the most significant difference between 1984 and 1992 is the decrease in the proportion of current assets (from 31 to 23 per cent of the total) and the corresponding increase in other assets, largely due to the relative increase in deferred credits. The proportion of fixed assets is virtually the same in both years (61 per cent of total assets in 1984 compared with 62 per cent in 1992); however there was a significant relative increase in investment in affiliated companies (from about 1 per cent of total assets in 1984 to some 5 per cent in 1992), and a reduction in the relative amount represented by flight equipment.



**Table 2-14. Consolidated balance sheet  
Scheduled airlines of ICAO Contracting States<sup>1</sup>  
End of fiscal years 1984, 1991 and 1992**

	1984		1991		1992	
	U.S.\$ (million)	% of total	U.S.\$ (million)	% of total	U.S.\$ (million)	% of total
<b>ASSETS</b>						
Current assets	32 518	31	62 600	26	63 270	23
Fixed assets						
Flight equipment	51 025	49	107 880	44	125 050	46
Ground property and equipment	10 940	10	23 080	9	25 910	10
Land	602	1	1 640	1	2 210	1
Investments in affiliated companies	1 543	1	11 200	5	12 430	5
Other assets	8 357	8	37 170	15	41 270	15
<b>TOTAL ASSETS</b>	<b>104 985</b>	<b>100</b>	<b>243 570</b>	<b>100</b>	<b>270 140</b>	<b>100</b>
<b>LIABILITIES</b>						
Current liabilities						
Current liabilities	26 490	25	63 750	26	61 950	23
Unearned transportation revenues	7 457	7	14 170	6	14 900	6
Long/medium-term liabilities						
Long-term debt	38 212	37	80 150	33	99 800	37
Other medium/long-term liabilities	10 164	10	43 710	18	51 490	19
Stockholders' equity						
Share capital	9 597	9	18 200	7	21 570	8
Other capital	13 065	12	23 590	10	20 430	7
<b>TOTAL LIABILITIES</b>	<b>104 985</b>	<b>100</b>	<b>243 570</b>	<b>100</b>	<b>270 140</b>	<b>100</b>
<b>ACCUMULATED DEPRECIATION</b>						
Flight equipment	33 993	78	72 810	76	78 660	76
Ground property and equipment	9 575	22	22 870	24	24 890	24
<b>TOTAL ACCUMULATED DEPRECIATION</b>	<b>43 568</b>	<b>100</b>	<b>95 680</b>	<b>100</b>	<b>103 550</b>	<b>100</b>

1. Excludes domestic operations within the CIS.

Source: ICAO Air Transport Reporting Form EF-1.

101. As regards liabilities, between 1984 and 1992 there was a reduction in the proportion of current liabilities (from 25 to 23 per cent of total liabilities) and stockholders' equity (from 21 to 15 per cent) with a corresponding increase in long term liabilities. The change in the latter was due to increases in some reserves, deferred credits and in advances from affiliated companies; there was no change in the relative amount of long term debt. With regard to stockholders' equity, between 1984 and 1992 there was a small decrease in the proportion of share capital and a more significant relative decrease in the capital surplus in part due to the negative net balance of unappropriated retained earnings (i.e. cumulative losses) at the end of fiscal year 1992.

### GENERAL AVIATION

102. General aviation is here defined as civil aviation other than scheduled and non-scheduled commercial air transport. On the basis of world-wide statistics for 1992 and available 1993 data for the States where general aviation activity is highly developed, it is possible to draw some over-all conclusions on the development of this branch of civil aviation in 1993. The number of civil aircraft on register in ICAO Contracting States which are operated by other than commercial air transport operators provides another indication of the volume of general aviation activity.

103. General aviation flying in ICAO Contracting States (excluding the CIS and China) is estimated to have decreased slightly in 1993 from the (readjusted) 1992 estimate of about 41 million hours, to about 40 million hours (Table 2-15). Of this total for 1993, an estimated 9.5 million hours (24 per cent) were flown in instructional flying, 21.5 million hours (54 per cent) in business and pleasure flying and 9.0 million hours (22 per cent) in aerial work and other flying. The total of 40 million general aviation flying hours compares with a total of about 25 million hours flown on scheduled services by the airlines of the same Contracting States in 1993.

**Table 2-15. Estimated number of hours  
flown in general aviation activities, 1992-1993  
(excluding the CIS and China)**

Type of flying	Millions of hours	
	1992	1993
Instructional	9.8	9.5
Business/pleasure	21.5	21.5
Aerial work/other	9.4	9.0
TOTAL	40.7	40.0

Source: ICAO survey on aviation activities.

104. The number of civil aircraft on register in ICAO Contracting States (excluding the CIS and China), operated by other than commercial air transport operators and mostly utilized in general aviation activities, increased slightly from 336 450 at the end of 1991 to an estimated 337 550 at the end of 1992. During the same period, the number of fixed-wing aircraft also increased, from 321 790 to an estimated 322 630; the United States continued to account for about 75 per cent of such aircraft. The number of turbo-jet and turboprop aircraft increased relatively rapidly over the period but piston-engine aircraft remained by far the dominant category and single-engine types constituted 82 per cent of the total general aviation fleet at the end of 1992.

105. The number of valid private pilot licences at the end of 1993 in ICAO Contracting States (excluding the CIS and China) was estimated at about 561 000 compared with some 566 000 in 1992, an estimated decrease of about 1 per cent.

# Chapter 3

## Airports and Air Navigation

1. This chapter discusses developments in 1993 in the management and organization of airports and air navigation facilities and services, in the infrastructure, traffic and financing of airports, and in technical aspects of air navigation services.

### MANAGEMENT AND ORGANIZATION

2. The trend towards the establishment by governments of autonomous authorities to operate airports and/or air navigation services continued in 1993, and increased attention was given to more active private involvement in airport operations. In South Africa, nine state-owned airports were transferred to the newly created South African Airports Co. and air traffic control (ATC) services are to be operated by another specially-formed entity, the South African Air Traffic and Navigation Services Co. In Cameroon, the government is in the process of setting up Aéroports du Cameroon (ADC) to run the passenger terminals and non-aeronautical activities at seven major airports. In Mexico and Venezuela, steps were taken towards privatizing major airports activities while in Argentina and Brazil the governments were giving active consideration to transferring the operation of the major international airports and possibly air navigation services to private enterprises. In India the government decided to merge the International Airport Authority, which operates the Country's five major international airports, with the National Airport Authority. In Indonesia the government transformed the two airport management organizations Perum Angkasa Pura I and II into semi-autonomous limited liability companies.

3. In Austria the government decided that the holding of private interests in Vienna Airport Corp. should be increased from the previously-established level of 27 per cent; however, the government will retain a strong majority holding. In another development and with an expected change in Austria's Federal Office for Civil Aviation in 1994, all air traffic control activities will become the responsibility of a limited company wholly owned by the State. In Denmark the government is offering 25 per cent of its 100 per cent share holding in Copenhagen Airports A/S for public sale; company statutes allow for a limit of 49 per cent to be publicly held.

4. In the United Kingdom, the civil aviation authority (CAA) separated its air traffic control activities from its regulatory activities and intends to run them on an increasingly commercial basis. In the United States, the administration was studying proposals for its air traffic control functions to be transferred to a non-profit government corporation.

5. In contrast to these developments, in Canada the government cancelled the privatization plans for Terminals 1 and 2 at Toronto's Lester B. Pearson airport, and in Singapore the government decided to shelve its plan to privatize the national civil aviation authority which operates the State's airports and air navigation services.

### MAJOR AIRPORT PROJECTS

6. There were 1 050 airports in the world at the end of 1993 serving international operations. During 1993, new international airports were opened at Ciudad del Este (Paraguay); Liberia (Costa Rica) and Bequia Island (Saint Vincent and the Grenadines). The replacement airport at Hiroshima (Japan) became operational on 29 October 1993. Construction continued on a number of other new airports, notably in the Asia/Pacific region, where they included the off-shore Kansai International at Osaka (Japan), due to open in September 1994; Kuala Lumpur International (Malaysia); and Seoul International (Republic of Korea), due to open in 2000. In the next few years China plans to invest some 300 billion yuan (\$5 billion) in the construction of new airports or the expansion of existing ones; a total of 100 airports are involved. Construction was under way for Zhengzhou international airport in the Henan Province, Tianhe International Airport in Wuhan (to be opened in 1994), and the new Liangjiang International Airport (1995). New international airports were also being planned for Canton (1997), and in the Jiangsu province. In addition, construction continued at Macau International due to open in 1995, and planning and preliminary work continued for Chek Lap Kok in Hong Kong, due to open in 1997. In Thailand, planning for the new Bangkok International Airport at Nong Ngu Hao continued during the year and the first phase of the new airport is expected to open in the year 2000. In North America, the new Denver International, Airport (United States) is due to open in 1994. In the Middle East, Al Ain International, Abu Dhabi (United Arab Emirates) is to be inaugurated on 31 March 1994. Dhahran International Airport (Saudi Arabia) is to become operational by the end of 1994.

7. Major airport expansion projects were under way in all regions in 1993. Projects completed during the year included: a terminal building for Sydney/Kingsford-Smith International Airport (Australia); the West Passenger Terminal at Haneda Airport (Japan); the new domestic passenger terminal at the existing Bangkok International Airport (Thailand) which opened on 1 December 1993; and the enlargement of the apron of the San José International Airport (Costa Rica) which was also completed in 1993. A new Wing for terminal 2 at Guarulhos in São Paulo (Brazil) was inaugurated in July 1993. Work was progressing on schedule on the construction of the third runway at Sydney/Kingsford-Smith International Airport, and also continued on the expansion of Brisbane International Airport (Australia). Work was in progress on the rehabilitation and expansion of Beirut International Airport (Lebanon) including the terminal building and installation of new runways and the target date for their completion is in the year 2000. The international terminal at Santiago (Chile) is scheduled to open in March 1994. Construction of new terminals for Tampa International Airport (United States) and Rio de Janeiro (Brazil) was under way. The first phase of development of the international airport of Port-of-Spain (Trinidad and Tobago) was started and is to include a new terminal building of 22 800 square meters with 11 gates and 7 loading bridges. The improvement and expansion of Moi International Airport, Mombasa (Kenya) is

expected to be completed at the end of 1995. Expansion of the terminal building at Asmara International Airport (Eritrea) is expected to be completed at the end of 1994. In Mexico, some \$134 million, most of which came from private sources, were invested for improvements at the airports in Mexico City, Guadalajara, Tijuana and Toluca.

### AIRPORT TRAFFIC

8. The 25 largest airports in the world in terms of passenger throughput, 16 of which are located in the United States, handled a combined total of about 785 million passengers in 1993 (Table 3-1). This represents about 30 per cent of the world total of scheduled and non-scheduled passengers or an average per airport of 86 thousand passengers every twenty-four hours. These 25 airports also handled a combined total of about 9.4 million aircraft movements in 1993, corresponding to an average per airport of one take-off or landing every one minute and twenty-three seconds.

9. There are significant differences between the rankings of airports by passengers and by movements. For example, Tokyo-Haneda ranks sixth in terms of passengers handled but forty-eighth in terms of aircraft movements, Frankfurt ninth by passengers but eighteenth by movements, and Hong Kong fifteenth by passengers but sixty-second by movements, illustrating that a substantial part of traffic at these airports was carried on wide-body aircraft. Airports which do not make the listing by passengers but which would make a top 25 listing by movements are St. Louis-Lambert (10), Pittsburgh (11), Charlotte (16), Washington-National (17), Philadelphia (19), Seattle (20), New York-La Guardia (23), and Houston (25).

10. Table 3-1 also includes 1984 data to illustrate the longer term rate of growth of airport traffic. Passengers handled at the large airports concerned increased at 5 per cent per annum on average over the 1984-1993 period, while aircraft movements increased at about three and a half per cent per annum, illustrating a trend to the use of larger aircraft. There were substantial differences in the rates of growth amongst individual airports.

11. Table 3-2 lists the 25 largest airports in the world in terms of *international* passengers handled. In marked contrast to Table 3-1, only 3 of the 25 airports are located in the United States. The 25 airports together, representing less than two and a half per cent of airports serving international operations, handled about 368 million passengers in 1993, or about 44 per cent of the world total of international scheduled and non-scheduled passengers.

12. Over the 1984-1993 period the number of international passengers handled at these airports increased at about 7 per cent per annum and the number of international aircraft movements increased at about 6 per cent per annum. Over this period, the highest annual growth rates recorded in terms of individual passengers were in general for airports in the Asia/Pacific region (Seoul 13 per cent, Hong Kong and Bangkok each at 11 per cent, and Singapore and Tokyo-Narita each at 9 per cent), while Seoul achieved the highest annual growth rate in terms of international aircraft movements (12 per cent, followed by Brussels 10 per cent and Bangkok, Hong Kong, Munich, Paris-Charles de Gaulle and Singapore each at 9 per cent).

**Table 3-1. Scheduled and non-scheduled traffic at world's major airports**  
(top 25 airports ranked by TOTAL passengers, 1993)

Rank No.	Airport (ranking by total commercial aircraft movements given in brackets)	Passengers embarked and disembarked				Aircraft movements			
		1993 (thousands)	1992 (thousands)	Change 1993/92 (%)	Average change per annum 1993/84 (%)	1993 (thousands)	1992 (thousands)	Change 1993/92 (%)	Average change per annum 1993/84 (%)
1	Chicago (1)	65 078	64 441	1.0	4.4	840.6	822.5	2.2	2.1
2	Dallas/Ft.Worth (2)	49 970	51 944	-3.8	5.0	788.9	749.9	5.2	5.2
3	Los Angeles (4)	47 845	46 695	2.5	3.7	602.2	600.4	0.3	2.7
4	London-Heathrow (12)	47 601	44 968	5.9	5.6	396.1	388.2	2.0	4.0
5	Atlanta (3)	47 088	42 033	12.0	2.1	643.6	595.9	8.0	-0.1
6	Tokyo-Haneda (48)	41 562	42 639	-2.5	5.2	183.9	188.8	-2.6	5.8
7	San Francisco (13)	32 737	31 789	3.0	3.4	392.0	385.4	1.7	-0.2
8	Denver (5)	32 623	30 877	5.7	1.4	514.2	471.7	9.0	1.6
9	Frankfurt (18)	32 536	30 085	8.1	6.6	348.6	324.6	7.4	5.8
10	Miami (7)	28 660	26 484	8.2	4.5	435.6	405.6	7.4	5.1
11	New York-Kennedy (22)	26 790	27 761	-3.5	-1.2	314.1	304.1	3.3	1.5
12	Paris-Charles de Gaulle (24)	26 115	24 770	5.4	7.5	303.4	289.8	4.7	9.6
13	New York-Newark (8)	25 613	24 287	5.5	0.9	410.5	389.3	5.4	3.5
14	Paris-Orly (38)	25 368	25 009	1.4	4.4	208.8	205.9	1.4	3.5
15	Hong Kong (62)	25 156	22 061	14.0	11.4	134.7	121.4	11.0	9.9
16	Boston (6)	24 215	22 989	5.3	2.5	466.7	451.4	3.4	4.3
17	Detroit (9)	24 171	22 841	5.8	8.4	406.2	373.3	8.8	5.1
18	Phoenix (14)	23 609	22 112	6.8	9.7	384.1	375.8	2.2	4.8
19	Minneapolis (15)	23 402	22 907	2.2	10.3	376.8	354.5	6.3	5.8
20	Osaka (67)	23 361	23 458	-0.4	3.2	130.4	130.9	-0.4	3.6
21	Seoul (75)	22 634	21 332	6.1	17.2	120.7	113.2	6.6	12.5
22	Honolulu (31)	22 618	21 290	6.2	3.5	247.7	261.3	-5.2	0.8
23	Las Vegas (21)	22 491	20 913	7.5	9.5	329.3	296.7	11.0	6.7
24	Tokyo-Narita (65)	22 141	19 996	10.7	10.6	132.0	119.2	10.7	7.3
25	Orlando (26)	21 466	21 848	-1.7	10.5	299.7	277.0	8.2	8.0
	TOTAL	784 850	755 529	3.9	5.0	9 410.8	8 996.8	4.6	3.7

Source: ICAO Air Transport Reporting Form I and Airports Council International.

**Table 3-2. Scheduled and non-scheduled traffic at world's major airports**  
(top 25 airports ranked by INTERNATIONAL passengers, 1993)

Rank No.	Airport (ranking by international commercial aircraft movements given in brackets)	International passengers embarked and disembarked				International aircraft movements			
		1993 (thousands)	1992 (thousands)	Change 1993/92 (%)	Average change per annum 1993/84 (%)	1993 (thousands)	1992 (thousands)	Change 1993/92 (%)	Average change per annum 1993/84 (%)
1	London-Heathrow (1)	40 848	38 257	6.8	6.0	320.0	308.1	3.9	5.5
2	Frankfurt (3)	25 290	23 271	8.7	7.4	255.0	245.5	3.9	6.5
3	Hong Kong (11)	24 420	22 061	10.7	11.0	122.0	121.0	0.8	8.8
4	Paris-Charles de Gaulle (2)	23 338	22 444	4.0	7.5	268.9	257.7	4.3	9.4
5	Amsterdam-Schipol (4)	20 658	18 609	11.0	7.8	251.6	231.5	8.7	7.0
6	Tokyo-Narita (13)	18 947	19 022	-0.4	9.3	114.4	114.5	-0.1	6.1
7	London-Gatwick (8)	18 656	18 690	-0.2	4.3	144.2	150.5	-4.2	3.1
8	Singapore (9)	18 513	16 882	9.7	9.2	134.0	125.5	6.8	8.6
9	New York-Kennedy (20)	14 821	15 110	-1.9	-1.1	94.0	93.4	0.6	0.4
10	Bangkok (17)	12 754	11 281	13.1	10.5	97.5	92.9	5.0	8.9
11	Miami (10)	12 373	11 514	7.5	6.6	132.0	125.8	4.9	6.2
12	Zurich (6)	12 186	12 007	1.5	4.4	175.9	171.9	2.3	5.2
13	Los Angeles (26)	11 945	11 456	4.3	9.2	67.4	66.7	1.0	5.0
14	Toronto (12)	11 077	9 553	16.0	5.8	121.6	129.3	-6.0	5.4
15	Manchester (21)	10 791	9 749	10.7	9.7	92.8	89.0	4.3	8.3
16	Seoul (30)	10 327	9 800	5.4	13.2	58.9	57.2	3.0	11.6
17	Rome-Fiumicino (18)	10 263	9 873	4.0	4.6	95.0	93.0	2.2	3.5
18	Paris-Orly (24)	10 075	9 923	1.5	3.6	84.0	81.0	3.7	3.6
19	Copenhagen (7)	9 610	9 699	-0.9	3.5	164.0	158.6	3.4	4.5
20	Dusseldorf (15)	9 596	9 098	5.5	6.3	101.0	97.2	3.9	7.4
21	Brussels (5)	9 309	9 256	0.6	6.7	187.6	181.6	3.3	9.7
22	Palma de Mallorca (32)	9 175	8 265	11.0	2.3	57.0	54.1	5.4	0.4
23	Madrid (16)	8 621	8 477	1.7	6.4	98.4	96.7	1.8	7.6
24	Munich (14)	7 879	7 347	7.2	7.9	105.0	99.6	5.4	8.5
25	Stockholm (19)	6 270	6 376	-1.7	5.9	94.4	91.7	2.9	7.3
	T O T A L	367 742	348 020	5.7	6.5	3 436.6	3 334.0	3.1	6.3

Source: ICAO Air Transport Reporting Form I and Airports Council International.



### AIRPORT FINANCES

13. The number of international airports with revenues in excess of expenses is increasing, although the majority of the 1 050 airports listed in the ICAO regional air navigation plans probably still operate at a loss. The improvement in the financial situation of airports continues to be primarily attributable to increases in revenues derived from non-aeronautical rather than aeronautical activities which, as a rule, are operated at a loss.

14. The recent improvements in airport finances have been achieved without increasing the share which airport charges represent in total airline operating expenses. That share has remained relatively stable and actually fell from 1980 to 1985 from 3.5 per cent to 3.3 per cent, thereafter fluctuating slightly upwards to 4 per cent in 1991 before levelling off.

15. On the policy side, in 1993 seven major European airlines lodged complaints with the Commission of the European Communities against three airports or airport-handling companies in Europe, charging them with abusing their monopoly position in the provision of aircraft handling services. The carriers claimed that the level of charges for these services at the airports concerned were some 30 to 50 per cent higher than at airports where a choice of services was available, and requested that competition be encouraged among companies providing aircraft handling at all the airports in the Communities.

### AIR NAVIGATION FACILITIES AND SERVICES

16. In 1992 route facility charges cost scheduled airlines \$5 090 million, or 2.1 per cent of their total operating expenses. The latter proportion is the highest annual one during the 1984-1992 period (the lowest being 1.4 per cent in 1984) and is expected to increase further as States continue a trend towards recouping costs for air navigation services from air carriers rather than the public purse.

17. Work on introducing satellite-based air navigation to replace existing line-of-sight systems was concentrated mainly on the development and finalization of the global co-ordinated plan for transition to the ICAO Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM) systems. The plan includes a description of the systems, planning guidelines for navigation and communications and guidance for transition for each of the elements of the systems; also included are examples of implementation scenarios to be used in the development of an appropriate framework for the implementation, operation and management of a global CNS/ATM system.

18. The introduction of the ICAO CNS/ATM systems represents a significant departure from the present air navigation systems and as such will require unprecedented co-operative effort between civil aviation administrations, international organizations, service providers and users.

19. Major developments during the year in the fields of aeronautical communications, navigation and surveillance, air traffic services, search and rescue, and aeronautical meteorology are described below.

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**Communications, Navigation, and Surveillance**

20. Studies related to the aeronautical telecommunication network (ATN) were carried out to define end-to-end performance requirements, network security and network management features of the ATN and its applications. A planning document was being developed for the world-wide evolutionary implementation of the ATN.
21. Research and development efforts in a number of Contracting States resulted in draft Standards and Recommended Practices (SARPs) for the Mode S digital data link representing one of three air-ground data links (Mode S, AMSS and VHF) being considered by ICAO as sub-networks of the aeronautical telecommunication network. The Mode S sub-network is intended to provide for introduction of digital air-ground communications in both ATN compatible and Mode S specific modes of operation.
22. Validation of Standards necessary for use in the aeronautical mobile-satellite service (AMS(R)S) has continued in a number of States with participation of international organizations and communication service providers. It is expected that work on these Standards essential to the implementation of the CNS/ATM systems will be completed in 1994.
23. Additionally, work continued on the future VHF air-ground digital link which is expected to be defined in ICAO SARPs after the validation through respective programmes in States.
24. Following the assessment of the results of the international operational evaluations of an airborne collision avoidance system (ACAS) having vertical resolution capability (ACAS II), which were initiated by ICAO and carried out in a number of Contracting States, draft SARPs for ACAS II have been completed and they are being processed for approval and inclusion in ICAO's Annex 10.
25. Air traffic control systems around the world were being updated as part of the evolutionary process leading to a future global air traffic management system, which will include satellite-based automatic dependent surveillance systems to complement current radar equipment.
26. Automatic dependent surveillance (ADS) was being tested in the Pacific Engineering Trials, in which aircraft outfitted with satellite communications avionics report their position every 5 minutes on Pacific crossings, making use of information from the aircraft's flight management system. Similar tests were undertaken in the Satellite Communications and ADS Trials in the North Atlantic and, in addition, several evaluation programmes were conducted in other regions.
27. Many States developed short- and medium-term programmes and ordered equipment to update their air traffic control (ATC) systems within the near future. Modernization of systems was achieved through introduction of new surveillance radar equipment, including monopulse and Mode-S secondary surveillance radar (SSR), multi-radar tracking systems and raster scan colour displays, new flight plan data processing systems and ATC simulators as well as improved communications.

28. The European Air Traffic Control Harmonization and Integration Programme (EATCHIP), intended to increase airspace capacity through the implementation of a single, unified ATC system for western Europe, was continued. The Four-States/EUROCONTROL Integration Project, providing air traffic control centres and certain military centres access to each other's radar data and flight information processing, was implemented.

29. The administrations of Canada, France, Iceland, Norway, Sweden and the United Kingdom continued with their programmes to upgrade the air traffic control system infrastructure. As part of Germany's radar replacement and modernization programme, technical improvements to all primary and secondary radar systems were planned. Replacement or implementation of radar data processing and flight data processing systems were pursued in Antigua, Bolivia, Czech Republic, Greece, Indonesia, Ireland, Malta and Slovakia.

30. In the United States, the long-term ATC modernization plan, now called the Capital Investment Plan, continued to progress towards full system implementation after the turn of the century. Key elements of the plan include replacement of computers, increased automation, consolidation of facilities, new surveillance radars and precision landing systems.

31. The satellite-based COSPAS-SARSAT<sup>1</sup> system had an important role in detecting emergency locator transmitters (ELTs) and in locating aviation distress sites. The system continued to expand its capability. There were 6 satellites in operation and 7 replacement satellites incorporating technical enhancements were being built. The ground system of local user terminals (LUTs) and mission control centres (MCCs) was improved and expanded. At year's end, 30 LUTs and 16 MCCs were in operation or under test. Although global coverage was already provided on 406 MHz, additional LUTs were planned to increase the real-time coverage of the system and reduce over-all response time.

32. To date, the COSPAS-SARSAT system has contributed to the rescue of over 3 400 persons in aeronautical, maritime and terrestrial incidents since it began trial operations in September 1982.

33. Installation of automated weather observing systems to support human observers or to provide partial weather reports for general aviation aerodromes for which hitherto there had been no weather observations was reported by an increasing number of States.

34. A tendency towards the centralization of meteorological forecast services continued in 1993, and in a number of States the meteorological services were commercialized to varying degrees.

35. Developments have accelerated towards computer preparation by the world area forecast centres (WAFCs) of global forecasts of significant weather. As a result, currently, the significant weather (SIGWX) charts for the North Atlantic Region are prepared in WAFc London by means of an interactive computer work station. The capability to prepare SIGWX charts with a global

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1. COSPAS — space system for search of vessels in distress;  
SARSAT — search and rescue satellite-aided tracking.

coverage is expected to be achieved in this centre within one or two years. In preparing their products, both the London and Washington WAFCs are benefiting from the increasing number of air-reports sent automatically through air/ground data links.

36. The installation of terminal doppler weather radar at key aerodromes in the United States continued during the year. Doppler remote-sensing capability and highly sophisticated signal processing techniques permit the radar to detect wind shear, including microbursts, in the terminal area. Work was continuing on the development of an "add-on" wind shear processing capability for the doppler radars used by air traffic control or airport surveillance. Towards the end of the year, two forward-looking airborne wind shear warning systems based on doppler radar technology were submitted for certification in the United States.

37. A new volcanic ash forecast transport and deposition (VAFTAD) computer model became operational in the United States during the year. The VAFTAD focuses specifically on volcanic ash hazards to aircraft operations, with an emphasis on ash location in time and space. The forecast product is a four-panel chart intended for use by pilots, operators and air traffic controllers showing relative ash concentrations through four different layers of the atmosphere.

38. New aeronautical meteorological codes (METAR, SPECI and TAF) were introduced world-wide on 1 July 1993 and, according to information provided by States, the changeover to the new codes proceeded smoothly.

# Chapter 4

## User and Public Interest

1. This chapter reviews the levels of safety and security in air transport in 1993, efforts during the year to further facilitate the flow of passengers and cargo at airports, and air transport aspects of the broader social issues of environmental protection and of smoking restrictions.

### SAFETY

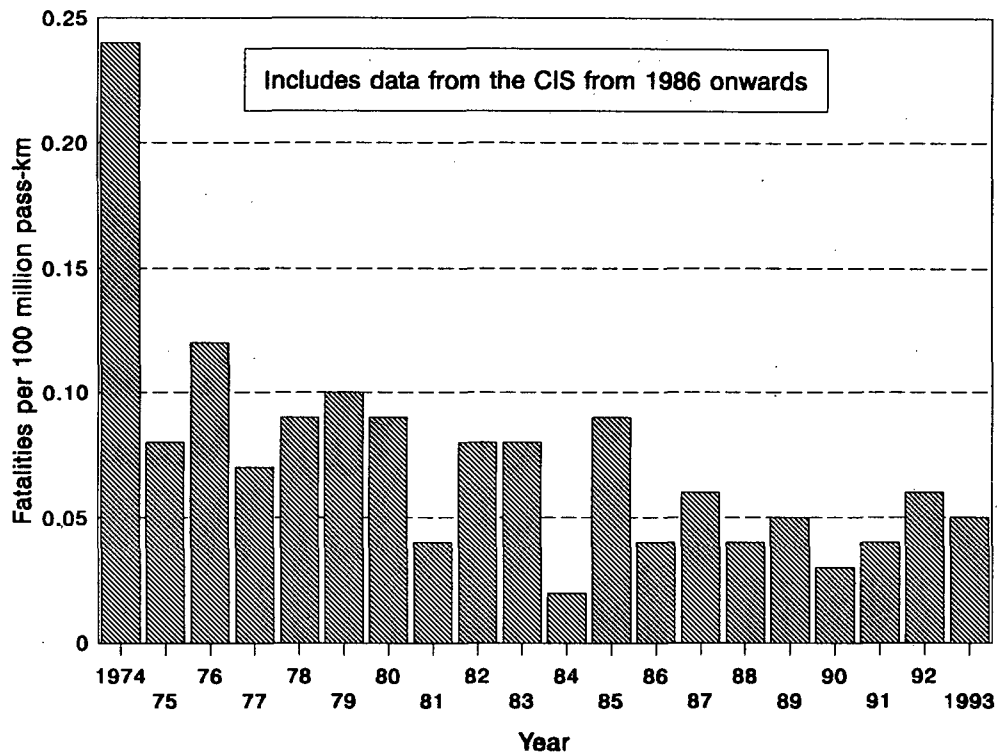
#### *Scheduled Operations*

2. Preliminary information on aircraft accidents involving passenger fatalities in scheduled air services for ICAO Contracting States shows that there were 34 fatal aircraft accidents in 1993 involving 936 passenger fatalities compared to 29 fatal accidents and 1 097 passenger fatalities in 1992 (Table A1-3 in Appendix 1). Relating passenger fatalities to the volume of traffic, the number of passenger fatalities per 100 million passenger-kilometres decreased from 0.06 in 1992 to 0.05 in 1993 (Figure 4-1). Excluding the Commonwealth of Independent States (for which the relevant data were not available), the number of fatal aircraft accidents per 100 000 aircraft hours flown increased to 0.12 in 1993 from 0.10 in 1992 (Figure 4-2), and the number of fatal aircraft accidents per 100 000 landings also increased, to 0.20 in 1993 from the previous rate of 0.17 in 1992 (Figure 4-3).

3. The safety levels are significantly different for the various types of aircraft operated on scheduled passenger services. For instance, in turbo-jet aircraft operations, which account for about 95 per cent of the total volume of scheduled traffic (i.e. in terms of passenger-kilometres performed), there were 13 accidents in 1993 with 728 passenger fatalities; in turboprop and piston-engined aircraft operations, which account for about 5 per cent of the scheduled traffic volume, there were 21 accidents with 208 passenger fatalities. The passenger fatality rate for turbo-jet aircraft operations was, therefore, far lower than for propeller-driven aircraft.

#### *Non-Scheduled Commercial Operations*

4. Non-scheduled commercial operations include both the non-scheduled flights of scheduled airlines and all air transport flights of non-scheduled commercial operators. Data available to ICAO on the safety of non-scheduled passenger operations show that in 1993 there were 29 fatal accidents with 144 passenger fatalities, compared to 44 fatal accidents with 366 passenger fatalities in 1992.



Source: ICAO Air Transport Reporting Form G and other reports.

**Figure 4-1. Number of passengers killed per 100 million passenger-kilometres on scheduled services**

5. In non-scheduled operations performed with aircraft of more than 9 000 kg take-off mass, whether by scheduled airlines or non-scheduled operators, there were 6 fatal accidents with 48 passenger fatalities in 1993, compared to 12 accidents with 224 passenger fatalities in 1992.

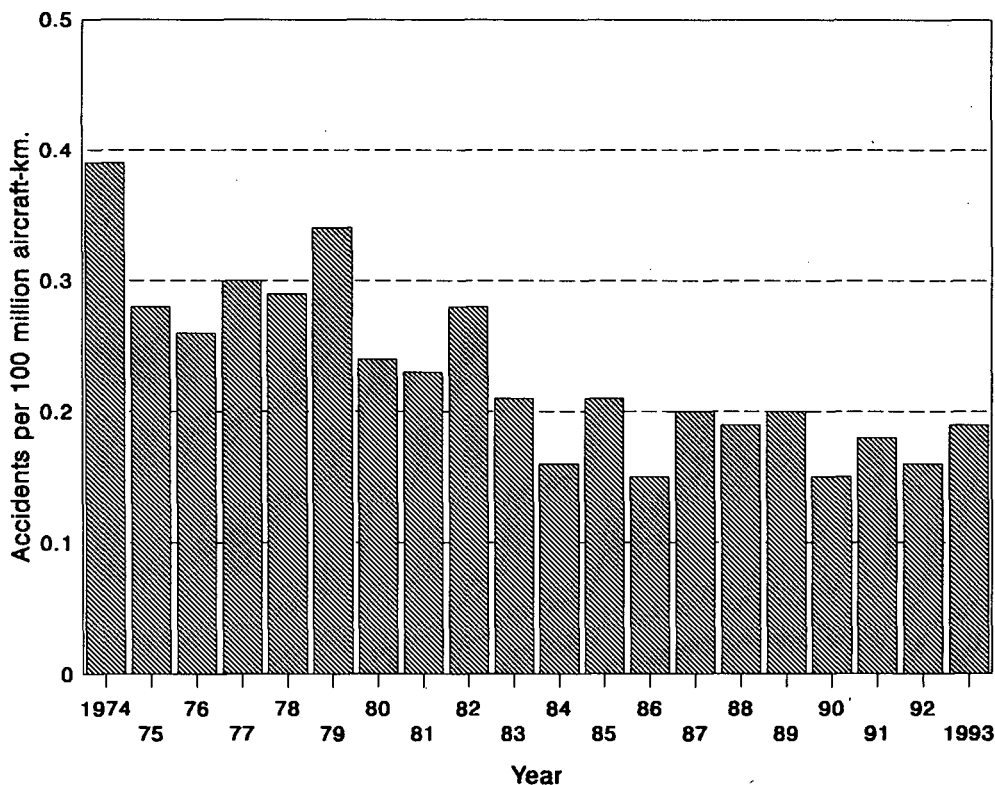
### **General Aviation**

6. Complete statistical information is not available on safety in general aviation operations. In 1992, it is estimated that general aviation aircraft were involved in about 760 fatal accidents and that the number of fatalities in these accidents was about 1 600. The number of fatal accidents per 100 000 aircraft hours flown was about 1.85 in 1992. In the United States, which accounts for about 60 per cent of all general aviation activities in the world (excluding China and the CIS) there were 385 fatal accidents in 1993 resulting in 715 fatalities, according to preliminary information. The corresponding numbers for 1992 were 447 fatal accidents and 862 fatalities. For the United States, the rate of fatal general aviation accidents per 100 000 aircraft hours flown was about 1.67 in 1993, compared to 1.87 in 1992.

### Planning for Safety

7. In view of anticipated growth in international air transportation in the coming years, the numbers of accidents per year will rise unless there is a distinct downward trend in the accident rate. Coupled with the need for efficient aircraft operations in a climate of limited financial resources, governments and the industry will need to increase vigilance over the causes of accidents and serious incidents, and concerted efforts will have to be undertaken to identify opportunities for preventing accidents and serious incidents. These efforts will require improving international standards and recommended practices and guidance material and implementation of prevention activities.

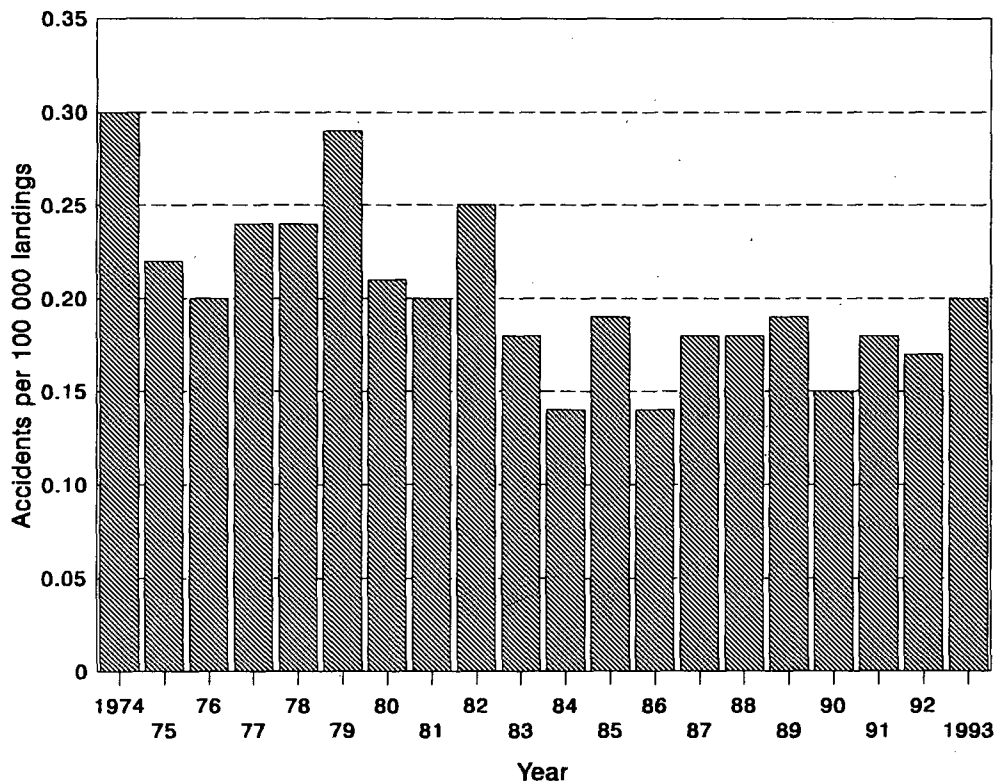
8. ICAO has taken steps to initiate a downward trend in the rate of accidents. A proposed amendment to Annex 13 will have a positive impact on the quality of aircraft accident investigations in identifying root causes of accidents and thus the quality of corrective actions. The redevelopment of the ICAO Accident/Incident Data Reporting system will provide the support for the timely exchange of safety data. The continuing Flight Safety and Human



Note.— Excludes data from the CIS as some information was not available.

Source: ICAO Air Transport Reporting Form G and other reports.

**Figure 4-2. Number of fatal accidents  
per 100 million aircraft-kilometres flown on scheduled services**



Note.— Excludes data from the CIS as some information was not available.

Source: ICAO Air Transport Reporting Form G and other reports.

**Figure 4-3. Number of fatal accidents per 100 000 landings by aircraft on scheduled services**

Factors programme not only has increased the awareness of the importance of Human Factors in aviation safety, but also has produced a rich source of knowledge and information from which safety professionals can take advantage in the development of prevention strategies and programmes. These initiatives are coming together to meet the future safety challenges posed by the growth in air transportation.

9. The incidence of aircraft accidents involving controlled flight into terrain (CFIT) has been a particular concern. An analysis of aircraft accidents covering a fifteen-year period (1978-1992) revealed that there were over 288 CFIT accidents in commercial and general aviation operations with more than 6 312 fatalities (Figure 4-4). The occurrence rate of CFIT accidents far exceeds that of other major accident categories in recent years. ICAO has taken steps to define the minimum requirements for ground proximity warning systems (GPWS) and has requested that States take urgent steps to reduce the incidence of CFIT accidents. An industry CFIT task force, in which ICAO initiated participation in 1993, was formed with declared goals of reducing approach and landing CFIT accidents by 50 per cent and reducing the world-wide rate for these occurrences to no more than twice the lowest rate in any geographic region.



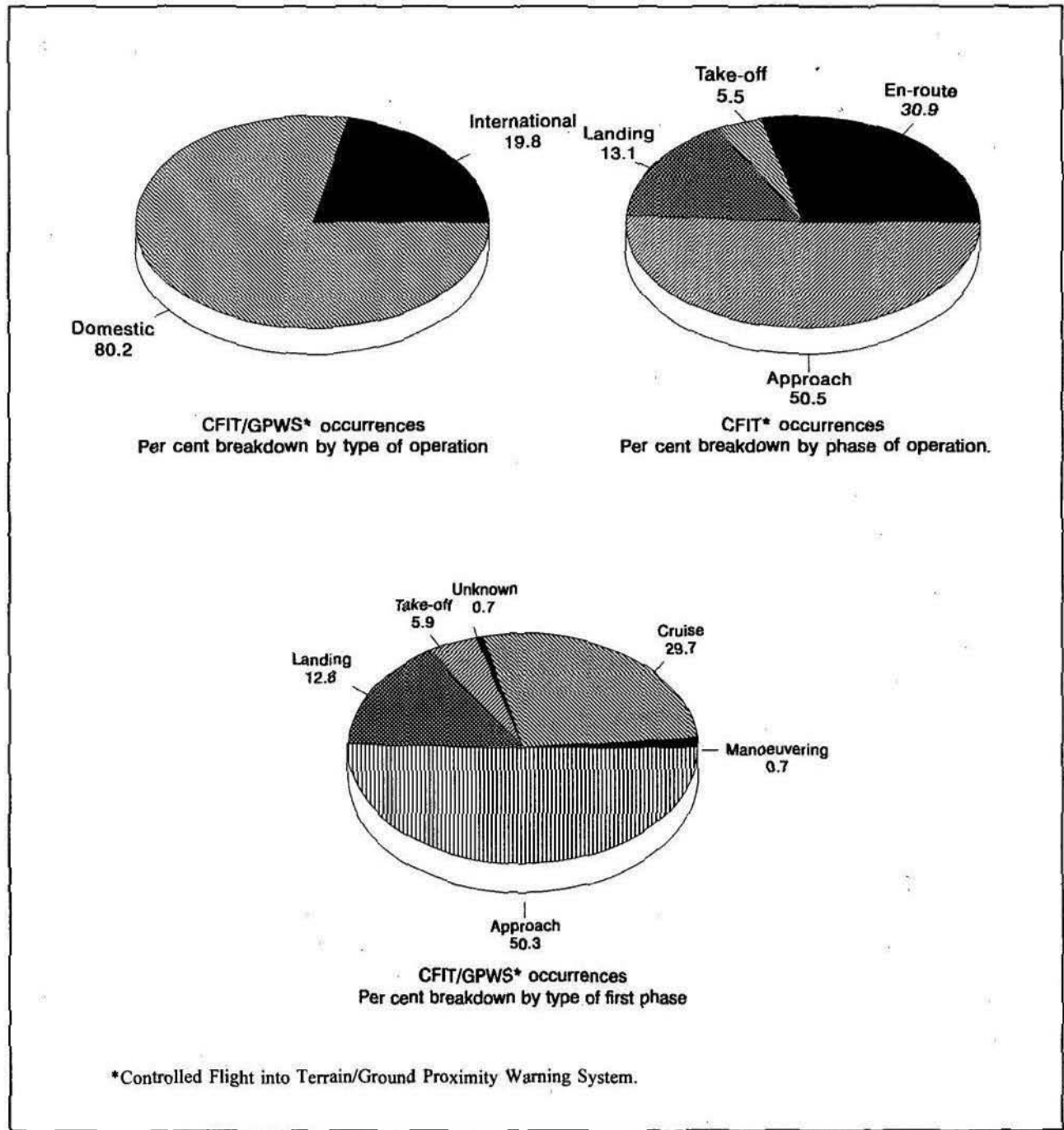


Figure 4-4. CFIT occurrences

## SECURITY

10. In 1993, there were twenty-nine acts of unlawful interference, which represent a significant increase when compared with nine in 1992. Twenty-one of the incidents were unlawful seizures, four were attempted seizures, two constituted in-flight attacks, one was an attack on a ground facility and one was an unlawful act against the safety of civil aviation. These acts of unlawful interference resulted in the deaths of twenty-eight persons and injuries to two persons. Developments in acts of unlawful interference since 1974 are shown in Figures 4-5 to 4-7 and in Appendix 1, Table A1-4.

11. The substance of Amendment 8 to Annex 17, which became applicable on 1 April 1993, created, *inter alia*, a new provision in the form of a Recommended Practice that all checked baggage be security screened before being placed on board aircraft. In this context, the British Airport Authority (United Kingdom) in collaboration with the Federal Aviation Administration (United States) undertook research and developed a system for the security screening of baggage to be applied at high capacity airports. After passengers check in, registered baggage is subjected to an automatic baggage handling process which uses Programmable Logic Controllers (PLCs) in a five-tiered security screening system. Those bags that fail to be cleared at a particular screening stage are automatically directed to the next in-depth level for further analysis, to the final stage where reconciliation with the passenger for physical examination

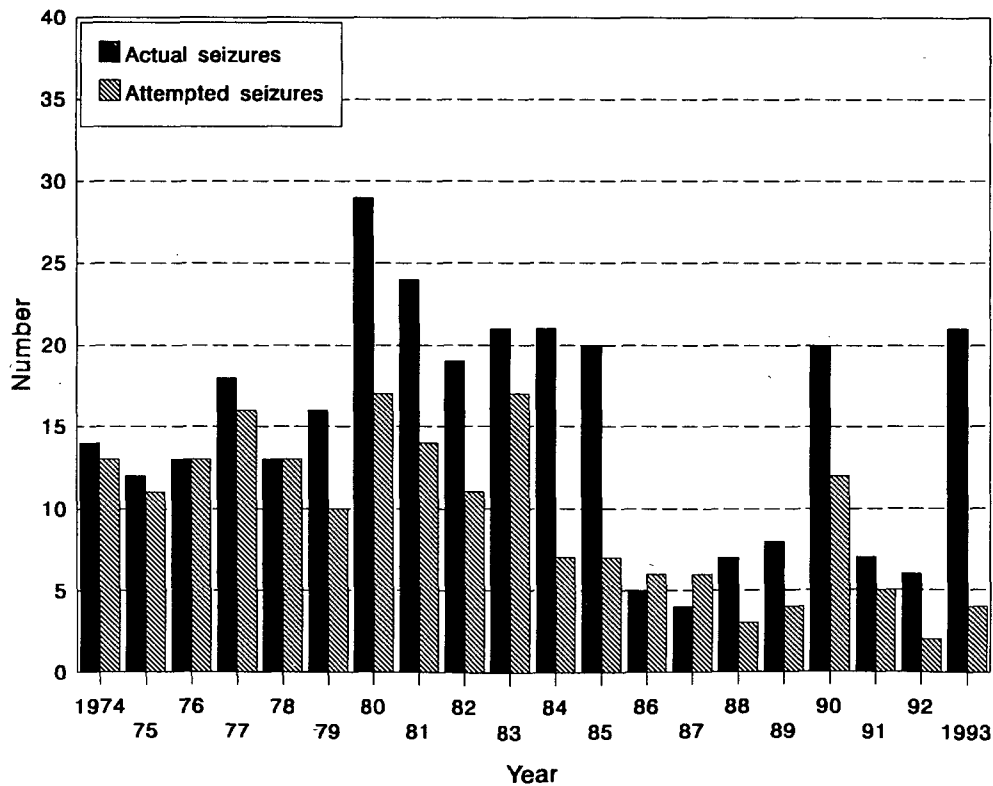


Figure 4-5. Acts of unlawful seizure

is achieved if necessary. This system has the customer-service advantage of avoiding pre-check-in security screening. The concept applied demonstrates a significant and consistent improvement in explosive material detection making the requirement by some governments that a minimum percentage of bags be opened for physical inspections redundant. It is now being validated in real time at Glasgow International Airport. It is apparent that once implemented, the system will be less expensive than conventional systems and will require significantly fewer staff to operate.

12. The ICAO Mechanism for financial, technical and material assistance to States with regard to aviation security continued to enhance global implementation of the aviation security system. Since the commencement of the Mechanism activities in 1989, 102 States have requested assistance; of these, 57 received technical evaluation missions and 16 have been the subject of follow-up missions. Arising from findings under the Mechanism and in recognition of the importance of the human element in the safeguarding of international civil aviation against acts of unlawful interference, ICAO is developing under this programme its Training Programme for Aviation Security which comprises a series of Standardized Training Packages (STPs), designed for global application. The purpose of this initiative is to provide States with the necessary training tools that will in turn assist them in developing the components of their national aviation security training programme. In the development of this material, particular care is being taken to ensure standardization of aviation security training requirements by

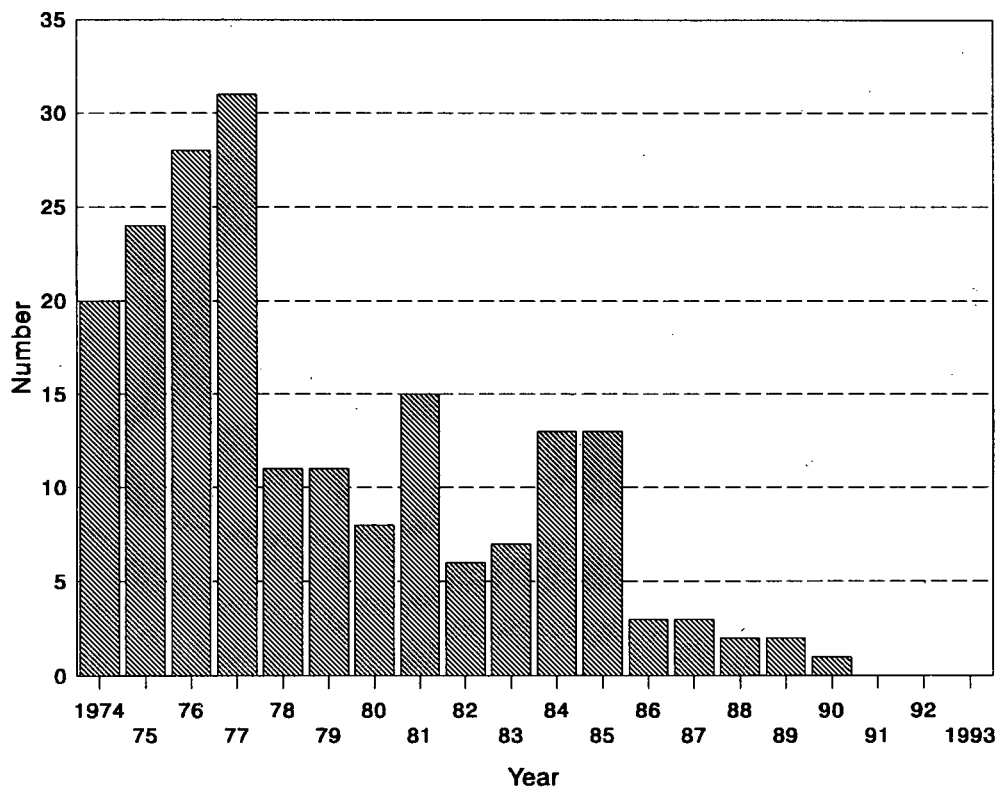


Figure 4-6. Incidents of sabotage

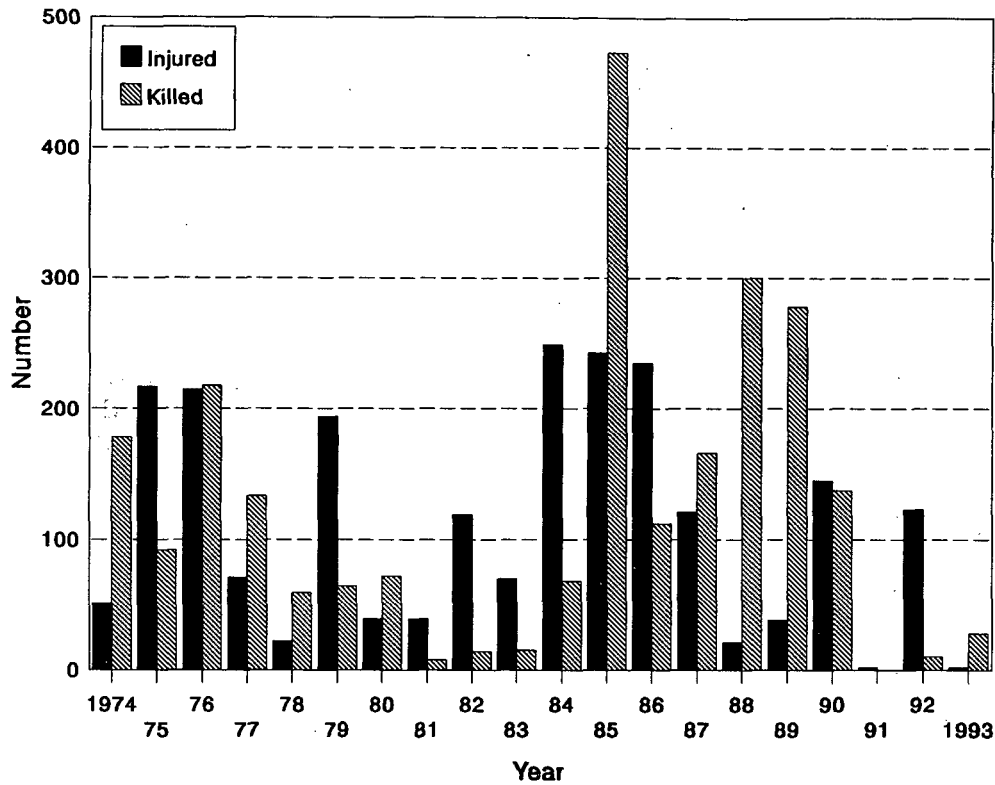


Figure 4-7. Number of persons killed or injured

States at all levels of staff development. The unique and diverse characteristics of individual States is recognized in the design of each package. The first such package, designed for Airport Security Personnel, has been distributed to Contracting States and international organizations; a further six STPs are being developed and these will address Aviation Security Management, Aviation Security Crisis Management, Aviation Security Supervisors, Aviation Cargo and Mail Security, Airline Security Training Programme, and Aviation Security Instructors.

## FACILITATION

13. The purpose of facilitation is to ensure the free, expeditious and unimpeded passage of an aircraft and its occupants across international boundaries — in the words of the Chicago Convention, “to prevent unnecessary delays to aircraft, crews, passengers and cargo, especially in the administration of the laws relating to immigration, quarantine customs and clearance”. This can be achieved in two ways; first, by cutting red tape through reducing, simplifying and, where possible, eliminating border crossing formalities and, second, through automating whatever formalities cannot be dispensed with.

14. During 1993 much emphasis was put on automation as a means of streamlining the border processing operation. The World Travel and Tourism Council (WTTC), IATA and the Air Transport Association of America (ATA) were active in supporting projects designed to verify a traveller's identity by linking a person to his or her travel document and made clear their commitment to future automated screening for travellers (known as the "FAST" project) as well as their strong support for the use of machine readable travel documents based on ICAO specifications. One such project involved the use of biometric identification through hand geometry and in 1993 the United States began tests of a system, known as INSPASS, utilizing this technology. Germany was well advanced in plans for a similar project and in the Netherlands a test project was already under way based on the fingerprint as the biometric identification feature.

15. In another initiative, Canada introduced machine readable visas which followed ICAO specifications and also included a feature which enabled machine readers to verify their authenticity. ICAO began a review of the various technologies available to establish whether a worldwide standard for biometric identification and for machine verification of travel documents was feasible.

16. During the year, the Customs Co-operation Council (CCC) and IATA adopted joint guidelines for Advance Passenger Information (API) systems to standardize the procedures involved in the electronic transmission of passengers' passport details to the authorities of the country of destination prior to the arrival of the aircraft in order to allow expedited clearance on arrival.

17. Another feature in 1993 was the continued emphasis on regional groupings and the resultant interest in harmonizing border procedures for a common area. In Europe, as of 1 January 1993, all customs controls were removed for travel between all 12 European Union (EU) States. The elimination of immigration controls planned for implementation in 1993 for travel between the Schengen States (all the EU States with the exception of Denmark, Ireland and the United Kingdom) proved difficult to finalize and implementation was postponed to 1994. Australia and New Zealand were pursuing the development of a "Single Aviation Market" for their two countries which includes a goal of immigration preclearance and streamlined Customs and Quarantine processing at airports, based on API.

18. Automation in cargo processing remained a major concern for a wide range of States. For example, in 1993 China reported that its Automated Entry Processing System (AEPS) was now processing 70 per cent of all goods declarations, and Australia, France, Finland, Switzerland, the United Kingdom and the United States reported that they were actively working to streamline and expand the coverage of their automated systems. The United Nations Conference on Trade and Development (UNCTAD) continued to promote the automating of customs procedures in developing countries through the use of its Automated System for Customs Data (ASYCUDA), notably in a "showcase" pilot project in Zimbabwe.

## ENVIRONMENTAL PROTECTION

19. Governments, both independently and through the United Nations system, started to implement "Agenda 21", the action plan for all major areas affecting the relationship between the environment and development that was adopted in 1992 by the UN Conference on Environment and Development, also known as the "Earth Summit". The relevance of Agenda 21 for civil aviation mainly lies in the plan's chapter on protection of the atmosphere.

20. ICAO's Committee on Aviation Environmental Protection (CAEP) continued a review of the actions needed to control the effects of aircraft engine emissions around airports and in the upper atmosphere, taking account of the environmental need to control these emissions and the technical feasibility, safety and economic consequences of doing so. In connection with this review, during the year ICAO approached those UN bodies responsible for preparing scientific assessment reports on climate change and on depletion of the ozone layer, with a view to obtaining a consensus on whether — and, if so, to what extent — aircraft engine emissions are contributing to these problems, based on information which is as complete and accurate as possible. As a result, co-operative arrangements have now been established with these bodies and inventories of aircraft engine emissions are being made available to assist the scientific community in this work.

21. Meanwhile, CAEP has also been considering to what extent further progress can be made in reducing aircraft noise in the long term, once States have implemented the phasing out of operations by aircraft which do not comply with the ICAO noise standards in Annex 16, Volume I, Chapter 3.

## SMOKING RESTRICTIONS

22. In 1992 the 29th Session of the ICAO Assembly adopted Resolution A29-15 urging all Contracting States to take all the necessary measures as soon as possible to restrict smoking progressively on all international flights, with the objective of implementing a complete smoking ban by 1 July 1996. During 1993 at least a dozen major international airlines introduced new smoking bans covering not only flights of short to medium duration but also many long-haul flights. Among these were British Airways services to Australia, New Zealand and the West Coast of the United States and Cathay Pacific (based in Hong Kong) flights between Hong Kong and London. The United States government started to negotiate a series of regional or bilateral agreements to ban smoking without putting the U.S. airlines at a commercial disadvantage. During the year smoking was banned on domestic flight by a number of countries, adding to the long list of those where such bans have been in effect for a number of years.

23. However during 1993 there were also some set-backs in the implementation of smoke-free air services. SAS (Scandinavia) lifted its smoking ban on European flights of up to 2.5 hours after only three months of a six-month trial. Canada deferred for a year a smoking ban on passenger flights which was scheduled to go into effect on 1 July 1993; however, Air Canada and Canadian Airlines International had already banned smoking on most of their flights including long-haul services.

PART II

WORLD OUTLOOK TO 1996

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# Chapter 5

## Global Trends and Forecasts

1. This chapter reviews developments in the world economy over the period since 1982 (and anticipated developments through to 1996), examines trends in airline traffic, productivity, prices and finances, and presents airline scheduled passenger traffic forecasts and, to the extent possible, airline financial forecasts, through to 1996.

### ECONOMIC TRENDS

2. The demand for air passenger travel is primarily determined by income levels and demographics, and the cost of air travel. World energy demand, supply and prices are critically important both to economic progress and to the cost of travel. Hence, the airline industry is highly vulnerable to economic cycles and fluctuations in fuel prices.

3. Between 1982 and 1992, the aggregate world economy measured in terms of Gross Domestic Product (GDP) grew at an average annual rate of 2.9 per cent in real terms. Growth rates varied across regions, from a high of 5.4 per cent for Asia/Pacific to a low of 1.7 per cent for the Latin America and Caribbean region (see Chapter 6 for details). World population growth between 1982 and 1992 increased at an average annual rate of 1.7 per cent. Hence, growth of the world's GDP per capita between 1982 and 1992 increased at an average annual rate of 1.2 per cent, significantly lower than the growth of GDP itself, as indicated in Figure 5-1.

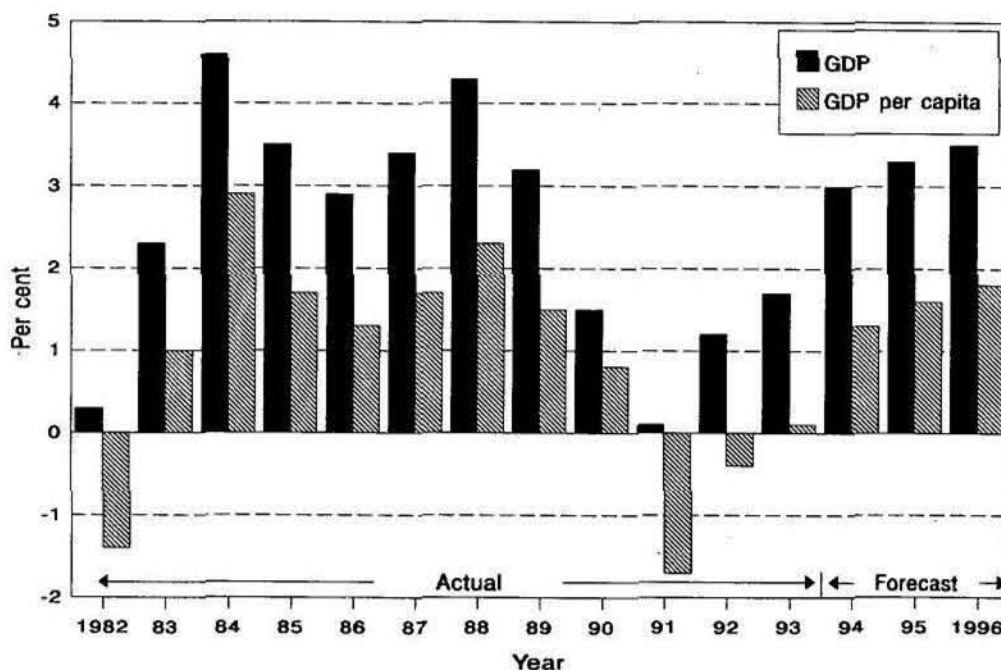
4. Following the recession of 1980-1982, the years 1983 to 1989 saw the world economy experience its longest period of sustained progress since World War II, achieving an average annual growth rate of 3.6 per cent. This extended period of growth in the world economy came to a halt during 1990. The economies of the United States, the United Kingdom and Canada entered into a recession, followed later by slow-downs in Germany and Japan. In addition, the former centrally planned economies of eastern Europe and the CIS (designated "countries in transition" by the International Monetary Fund) went into serious decline. As a result, the world economy was almost stationary in 1991, the most difficult year for the global economy since 1982, and was still quite weak in 1992 despite the commencement of recovery in North America. The world economy improved in 1993, although continental western Europe and Japan remained in recession.

5. Developing countries as a group (excluding eastern Europe and CIS) have generally maintained an annual growth of 4 to 6 per cent since the mid 1980s, and their performance has not been greatly affected by the recent recession in the developed economies. Structural reform

and the sustained implementation of prudent macro economic policies supported strong growth in the Asia/Pacific region and an improved performance in Latin America. In the former region, strong domestic demand and rapid growth of regional trade helped to off-set the weakness of export markets in industrialized countries. The past decade has been a disappointing one for Africa.

6. On several occasions in the last quarter century, sharp movements in crude oil prices have impacted powerfully on the world economy. In particular, the recessions of the mid 1970s and early 1980s were linked to the oil price increases of 1973 and 1979/80. The shortlived price rise in 1990 had a lesser impact. Oil market conditions are therefore of great interest when assessing global economic performance. However, the capability of the economies of the industrialized countries to cope with the oil price increases has improved because of reduced energy dependency and the effects of structural reforms in the 1980s. Furthermore, world oil prices have settled into lower levels in recent years as markets have adjusted to shifts in supply and demand.

7. Oil price rises contributed to double digit inflation in the industrial countries in the 1970s and early 1980s. Since 1983, inflation has moderated to the 3 to 5 per cent range. Inflation rates have been high and variable in many developing countries and have tended to increase over the 1980s. The average annual rate for developing countries since 1982 has been around 50 per cent.



Source: IMF, Wharton Econometrics Services.

Figure 5-1. Annual change in real GDP and GDP per capita — World

8. There appears to be consensus amongst economic forecasters that 1994 will mark the turning point for a full recovery of the global economy, although it could be slower than the historical experience. The most recent International Monetary Fund (IMF) and Organization for Economic Co-operation and Development (OECD) forecasts anticipate a noticeable increase in world trade and GDP growth in most major economies. These forecasts indicate strong performance in North America, signs of recovery in Europe and some weakness in Japan. Leading indicators and underlying strength in major demand components suggest real growth in 1994 to be around 3 per cent followed by growth rates of 3.3 and 3.6 per cent for the years 1995 and 1996.

9. As regards the economic prospects by region, Table 5-1 depicts real average annual GDP growth rates for the years 1991 to 1995.

### AIRLINE TRAFFIC TRENDS

10. Total scheduled airline traffic, measured in terms of total tonne-kilometres performed, grew at an average annual rate of 5.8 per cent over the ten years between 1983 and 1993. Passenger-kilometres grew at an average rate of 5.5 per cent per annum and freight tonne-kilometres at 6.9 per cent per annum.

11. Global traffic data for each year of the decade 1982-1993 are given in Tables 5-2 (total traffic) and 5-3 (international traffic).

**Table 5-1. Economic growth (GDP) by region**  
(real average annual growth rates, per cent)

Region	Actual 1992	Estimated 1993	Forecast		
			1994	1995	1996
Africa	0.4	1.6	2.5	3.2	3.5
Asia/Pacific	4.2	3.9	4.0	5.0	5.5
Europe	-3.8	-3.2	0.8	1.8	2.1
Europe (excluding Eastern Europe and CIS)	1.0	-0.3	1.6	2.5	2.7
Middle East	7.8	3.4	4.5	5.0	5.2
North America	2.4	2.7	2.8	3.0	3.4
Latin America and Caribbean	2.5	3.4	2.8	3.0	3.1
World	1.2	1.7	3.0	3.3	3.5

Source: ICAO estimates based on World Bank, International Monetary Fund (IMF), Wharton Econometrics Services and other economic sources.

**Table 5-2. World total international and domestic revenue traffic**  
(scheduled services of airlines of ICAO Contracting States, 1982-1993)

Year	Passengers carried		Passenger-km		Freight tonnes carried		Freight tonne-km performed		Mail tonne-km performed		Total tonne-km performed	
	Millions	Annual increase (%)	Millions	Annual increase (%)	Millions	Annual increase (%)	Millions	Annual increase (%)	Millions	Annual increase (%)	Millions	Annual increase (%)
1982	765	2.0	1 142 000	2.1	11.6	6.4	31 540	2.1	3 880	2.1	138 450	2.2
1983	798	4.2	1 190 000	4.2	12.3	6.0	35 110	11.3	4 000	3.3	146 390	5.7
1984	848	6.3	1 278 000	7.4	13.4	8.9	39 670	13.0	4 310	7.8	159 200	8.8
1985	899	6.0	1 367 000	7.0	13.7	2.2	39 840	0.4	4 400	2.1	167 690	5.3
1986	960	6.8	1 452 000	6.2	14.7	7.3	43 190	8.4	4 540	3.2	178 800	6.6
1987	1 028	7.1	1 589 000	9.4	16.1	9.5	48 320	11.9	4 700	3.5	196 460	9.9
1988	1 082	5.3	1 705 000	7.3	17.2	6.8	53 270	10.2	4 830	2.8	212 110	8.0
1989	1 119	3.4	1 780 000	4.4	18.1	5.2	57 210	7.4	5 060	4.8	223 650	5.4
1990	1 165	4.1	1 894 000	6.4	18.2	0.6	58 820	2.8	5 330	5.3	235 240	5.2
1991	1 134	-2.7	1 844 000	-2.6	17.4	-4.4	58 620	-0.3	5 110	-4.1	230 720	-1.9
1992	1 161	2.4	1 927 000	4.5	17.3	-0.6	62 810	7.1	5 120	0.2	242 210	5.0
1993	1 171	0.9	1 971 000	2.3	17.5	1.2	67 650	7.7	5 260	2.7	251 220	3.7

Source: ICAO Air Transport Reporting Form A-1.

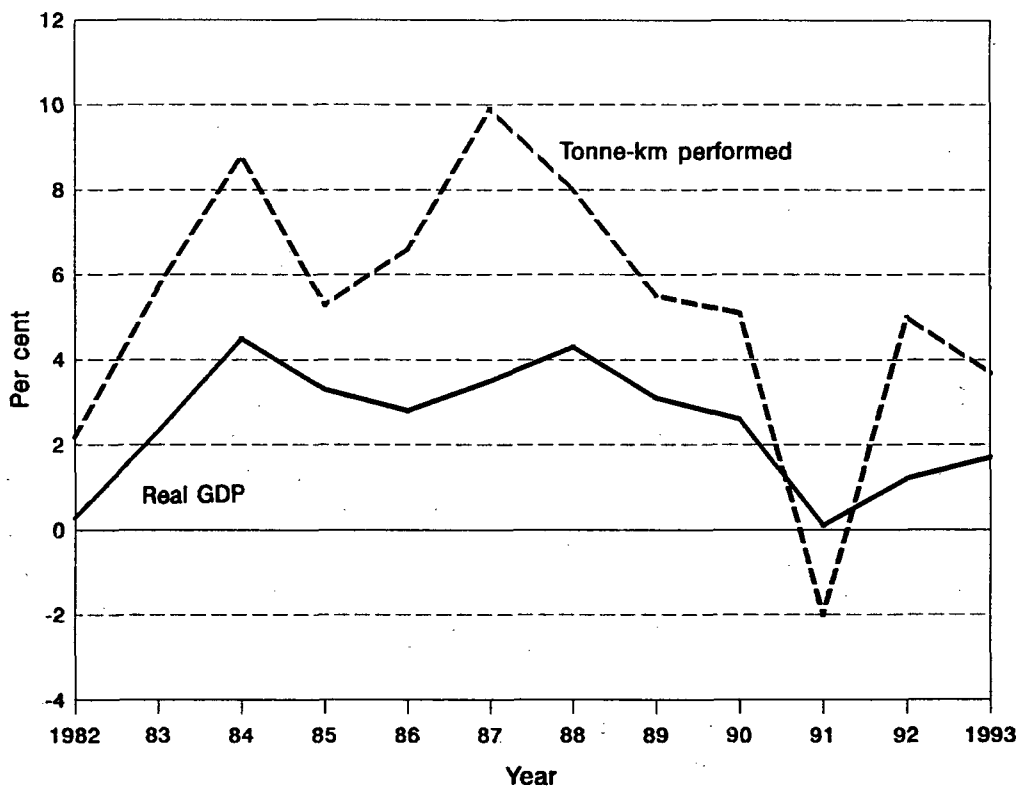
**Table 5-3. World international revenue traffic**  
(scheduled services of airlines of ICAO Contracting States, 1982-1993)

Year	Passengers carried		Passenger-km		Freight tonnes carried		Freight tonne-km performed		Mail tonne-km performed		Total tonne-km performed	
	Millions	Annual increase (%)	Millions	Annual increase (%)	Millions	Annual increase (%)	Millions	Annual increase (%)	Millions	Annual increase (%)	Millions	Annual increase (%)
1982	170	-1.7	497 000	0.6	4.7	2.2	22 630	4.3	1 640	4.5	69 880	2.1
1983	173	1.8	511 000	2.8	5.1	8.5	25 200	11.5	1 700	6.3	73 780	5.6
1984	185	6.9	556 000	8.8	5.8	13.7	28 940	14.8	1 840	8.2	81 800	10.9
1985	194	4.9	590 000	6.1	5.9	1.7	29 380	1.5	1 860	1.1	85 600	4.6
1986	196	1.0	603 000	2.2	6.4	8.5	32 220	9.7	1 880	1.1	89 710	4.8
1987	222	13.3	688 000	14.1	7.2	12.5	36 700	13.9	1 940	3.2	101 970	13.7
1988	243	9.5	761 000	10.6	7.8	8.3	41 020	11.8	1 990	2.6	113 180	11.0
1989	262	7.8	824 000	8.3	8.6	10.3	44 930	9.5	2 080	4.5	123 050	8.7
1990	280	6.9	894 000	8.5	8.9	3.5	46 320	3.1	2 190	5.3	130 730	6.2
1991	266	-5.0	860 000	-3.8	8.5	-4.5	46 450	0.3	2 210	0.9	128 250	-1.9
1992	302	13.5	983 000	14.3	9.4	10.6	50 770	9.3	2 200	-0.5	143 610	12.0
1993	320	6.0	1 046 000	6.4	10.0	6.4	55 660	9.6	2 220	0.9	154 790	7.8

Source: ICAO Air Transport Reporting Form A-1.

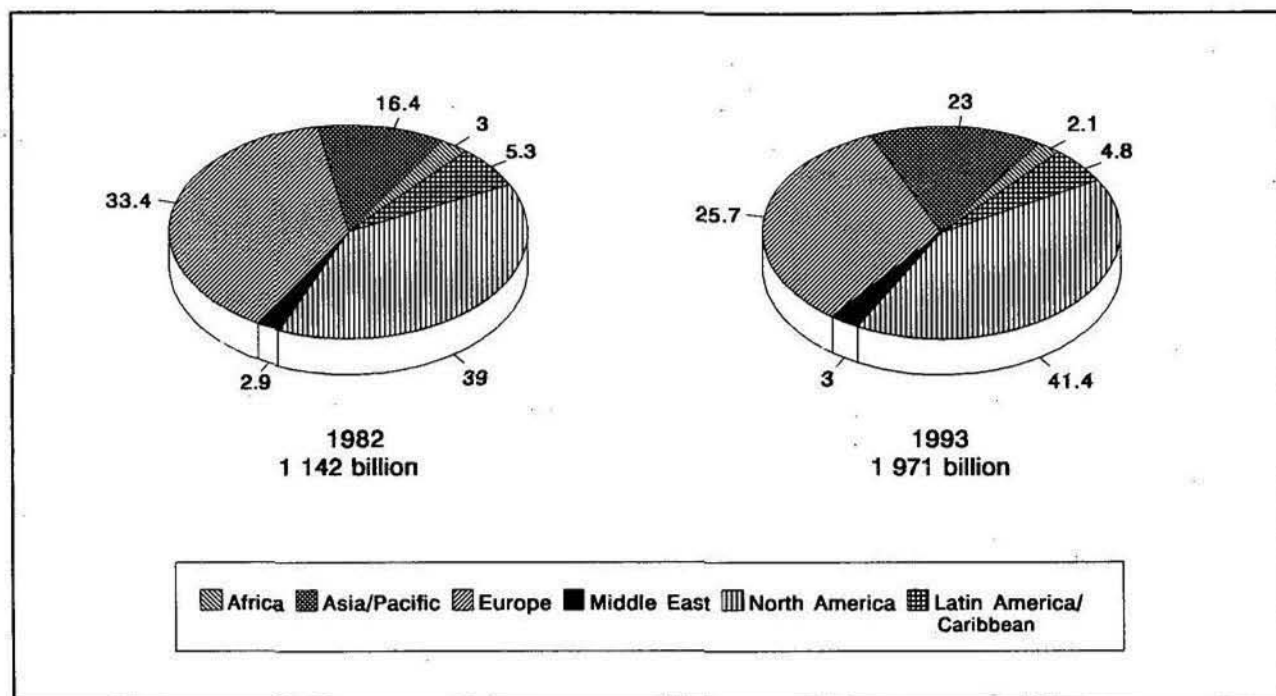
12. In broad terms, the pattern of traffic growth over the 1982-1993 period was a reflection of economic conditions experienced over this period. As depicted in Figure 5-2, the relatively weak air traffic performance in 1982 gave way to a period of rapid growth lasting until 1990. The economic recession in the early 1980s was associated with a more than doubling of aviation fuel prices which was an additional factor depressing air traffic. The current economic downturn which began in the middle of 1990 had a serious effect on 1991 air traffic levels. The recovery in traffic in 1992, which occurred despite continuing poor economic performance, was achieved at a cost of significantly reduced revenue yield.

13. The regional distribution of scheduled passenger traffic for the years 1982 and 1993 is illustrated in Figure 5-3. The airlines of the North American and European regions dominate, contributing 72.4 per cent of the total traffic in 1982 and 67.1 per cent in 1993. Passenger traffic performed by airlines registered in the Asia/Pacific region increased from 16.4 per cent of the total world traffic in 1982 to about 23.0 per cent in 1993. Other regions contributed 11.2 per cent of the traffic in 1982 and 9.9 per cent in 1993.



Source: IMF, ICAO Air Transport Reporting Form A-1.

Figure 5-2. World GDP and scheduled traffic growth



Source: ICAO Air Transport Reporting Form A-1.

Figure 5-3. Percentage regional distribution of scheduled passenger traffic — passenger-kilometres performed

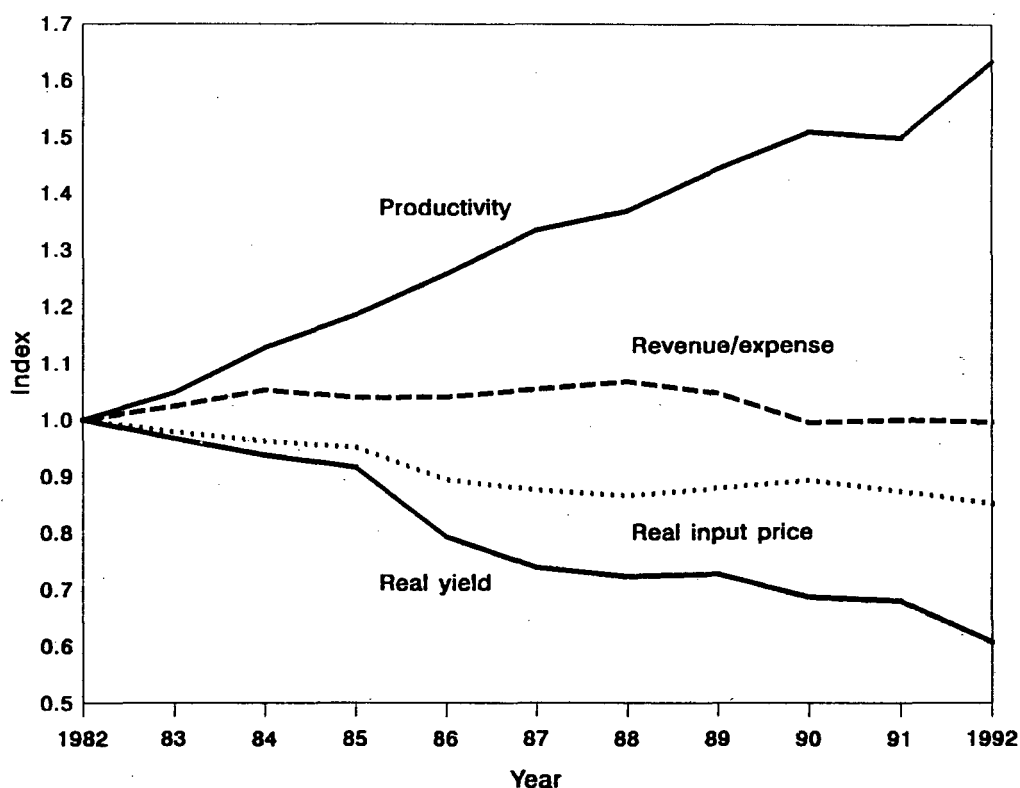
### AIRLINE PRODUCTIVITY, PRICES AND FINANCIAL PERFORMANCE

14. The scheduled airline industry has a long history of improving productivity. As a result, the growth in the output of the industry (traffic volumes, conveniently measured by tonne-kilometres performed or TKP) has been greater than the growth in the various inputs used by the industry (mainly labour, fuel, and aircraft). For the purposes of the present forecasts, separate partial productivity measures for labour (TKP per employee), fuel (TKP per tonne of fuel consumed), and aircraft (TKP per tonne of fleet payload) have been developed. The trend in total productivity, which is a combination of the partial productivities, is shown in Figure 5-4. The average annual growth in productivity since 1982 has been about 5 per cent. The progressive absorption of new technology aircraft into airline fleets has been a major reason for the improvement in productivity. In particular, the new aircraft are more fuel and labour efficient. Improved aircraft utilization and load factors have also made important contributions.

15. Improvements in productivity can, in principle, be used either to reduce the real fares and rates paid by passengers and shippers, or to pay for increases in real input prices (e.g. wage rates, fuel prices), or to provide airlines with improved financial results. The trends in airline yields and input prices, deflated by the Consumer Price Index of industrial countries, are presented in Figure 5-4, together with the trend in the revenue/expense (R/E) ratio representing

the financial performance of the scheduled airline industry. Expenses are defined here as operating expenses, excluding taxes and interest on debt. It is clear that, over the past decade, airline customers have benefitted from lower real yields made possible by the combined impact of productivity growth and declines in the index of real input prices (primarily resulting from falls in fuel prices).

16. Although there has been neither an improvement nor a decline in the long-term trend in the financial performance of scheduled airlines as a whole, there have been relatively large changes in the operating results over the medium term. Table 5-4 shows the annual development over the past 10 years in operating revenues and expenses, the operating result (earnings before interest, other non-operating items and taxes) and the net result (after interest, other non-operating items and taxes). The growth in revenues and expenses over the period reflects an expansion in activity levels and general inflationary pressures, offset by improvements in the efficiency of the industry. However, the impact of these factors has varied considerably over the business cycle. During the buoyant years of the 1980s, rapid growth in demand resulted in a more intensive use of airline resources and strong productivity growth. Airlines were able to improve their operating results, and also offer relatively low fares and rates to their customers. In the early 1990s, market conditions changed as demand weakened



Source: IMF, ICAO Air Transport Reporting Forms A-1 and EF-1.

Figure 5-4. Trends in performance — scheduled airline industry

**Table 5-4. Operating and net results<sup>1</sup>**  
(scheduled airlines of ICAO Contracting States)<sup>2</sup>

Year	Operating result				Net result <sup>3</sup>		Direct subsidies U.S.\$ (millions)	Income taxes U.S.\$ (millions)
	Operating revenues U.S.\$ (millions)	Operating expenses U.S.\$ (millions)	Amount U.S.\$ (millions)	Percentage of operating revenues	Amount U.S.\$ (millions)	Percentage of operating revenues		
1982	93 200	93 400	-160	-0.2	-1 300	-1.4	210	100
1983	98 300	96 200	2 100	2.1	-700	-0.7	380	-340
1984	105 400	100 300	5 100	4.8	2 000	1.9	235	-1 100
1985	112 200	108 100	4 100	3.7	2 100	1.9	220	-660
1986	124 600	120 000	4 600	3.7	1 500	1.2	280	-1 100
1987	147 000	139 800	7 200	4.9	2 500	1.7	290	-1 650
1988	166 200	156 000	10 200	6.1	5 000	3.0	340	-3 260
1989	177 800	170 200	7 600	4.3	3 500	2.0	170	-2 950
1990	199 500	201 000	-1 500	-0.8	-4 500	-2.3	230	-300
1991	205 500	206 000	-500	-0.2	-3 500	-1.7	100	550
1992	217 500	219 000	-1 500	-0.7	-7 700	-3.5	140	750
1993 <sup>4</sup>	227 000	224 500	2 500	1.1				

1. About 14 per cent of revenues and expenses are estimated for non-reporting airlines. Being based on traffic information, these estimates can be considered quite reliable with respect to operating items but are very uncertain with respect to non-operating items and taxes.
2. Excluding operations within the Commonwealth of Independent States.
3. The net result is derived from the operating result by adding (with plus or minus sign as appropriate) non-operating items (such as interest and direct subsidies) and income tax. The operating and net results quoted, particularly the net results, are the small differences between estimates of large figures (revenues and expenses) and are therefore susceptible to substantial uncertainties.
4. Preliminary estimates.

Source: ICAO Air Transport Reporting Form EF-1.

and the utilization of airline resources tended to decline. The emergence of excess capacity and consequent competitive pressures put downward pressure on yields. These factors combined to produce negative operating results in three consecutive years (1990-1992). In 1993, the airline industry started to move towards a more appropriate balance of supply and demand, and achieved a small operating surplus.

17. The change in the structure of operating revenues and expenses over the past decade is illustrated in Table 5-5. The share of "incidental revenues" (which include sales of services and maintenance, and the leasing of aircraft to other airlines) has increased from 4.5 per cent to 9.6 per cent, at the expense of a decline in the share of "revenues from scheduled services". The counterpart of some of these changes on the expense side was an increase in the share of "flight operations — other", which includes rental of aircraft from other companies. This suggests some re-structuring within the airline industry. However, of more fundamental significance is the increase in the share of "indirect" expenses, and especially "general, administrative and other operating expenses", and the corresponding decline in the share of "direct aircraft" expenses which is where most of the productivity improvement in the industry is likely to have occurred.



**Table 5-5. Distribution of operating revenues and expenses in 1982 and 1992**  
(scheduled airlines of ICAO Contracting States<sup>1</sup>,  
total domestic and international services)

Description	Distribution by item (per cent)		Change in per cent share of item 1982 to 1992
	1982	1992	
<b>OPERATING REVENUES</b>			
Scheduled services (total)	92.1	86.7	-5.4
Passenger	80.3	76.3	-4.0
Freight	10.3	9.3	-1.0
Mail	1.6	1.1	-0.5
Non-scheduled operations	3.3	3.7	0.4
Incidental	4.5	9.6	5.1
<b>TOTAL</b>	<b>100.0</b>	<b>100.0</b>	<b>—</b>
<b>OPERATING EXPENSES</b>			
Direct aircraft			
Flight operations (total)	37.0	25.8	11.3
Flight crew	7.3	7.3	0
Fuel and oil	27.2	12.0	-15.2
Other	2.5	6.4	3.9
Maintenance and overhaul	9.8	10.9	1.1
Depreciation and amortization	6.8	7.1	0.3
Sub-total	53.6	43.8	-9.9
Indirect			
User charges and station expenses (total)	15.6	17.2	1.6
Landing and associated airport charges	3.3	4.0	0.7
En-route facility charges	1.5	2.3	0.8
Station expenses	10.8	10.9	0.1
Passenger services	9.1	10.8	1.7
Ticketing, sales, promotion	15.5	16.3	0.8
General, administrative and other	6.2	11.9	5.8
Sub-total	46.4	56.2	9.9
<b>TOTAL</b>	<b>100.0</b>	<b>100.0</b>	<b>—</b>

1. Excludes operations within the Commonwealth of Independent States.

Source: ICAO Air Transport Reporting Form EF-1.

18. The variations in the annual operating result, measured as a per cent of airline revenue, are illustrated graphically for the period since 1982 in Figure 5-5, which also shows the fluctuations in traffic growth over the same period. There appears to be a positive correlation between this measure of financial return and the growth in traffic. However, close examination of the recent annual changes reveals that the recession in financial results began in 1990 when traffic growth was a creditable 5 per cent. Furthermore, traffic rebounded in 1992 after a decline in 1991, while the operating result remained in deficit. Part of the explanation of the financial outcome in 1990 lies in a substantial increase in fuel prices (and hence operating expenses), without compensating increases in yields. In 1992, yields declined significantly in nominal terms, helping to boost traffic but having a depressing effect on financial return. In 1993, yields were firmer and cost efficiency improvements began to bear fruit resulting in an estimated operating profit of 2 500 million dollars.

19. The pattern of investment in aircraft is related to the cycle of financial performance. Annual aircraft orders and deliveries are shown in Figure 5-6, together with the annual financial return of the carriers. The high levels of aircraft deliveries in recent years have been accompanied by increased depreciation and introductory costs and hence increased expense per unit of output. Furthermore, the arrival of large amounts of new capacity, combined with softening demand, has encouraged competitive reductions in fares, and hence reduced revenue per unit of output.

20. The high rates of aircraft deliveries have resulted from very high volumes of aircraft orders in previous years, which were generated by strong traffic growth and a ready availability of finance. Because of the lag between orders and deliveries, the buoyant market conditions which existed at the time of peak order levels had changed by the time the peak deliveries were made, which exacerbated the mismatch between supply and demand in the industry.

### AIRLINE PASSENGER TRAFFIC FORECAST

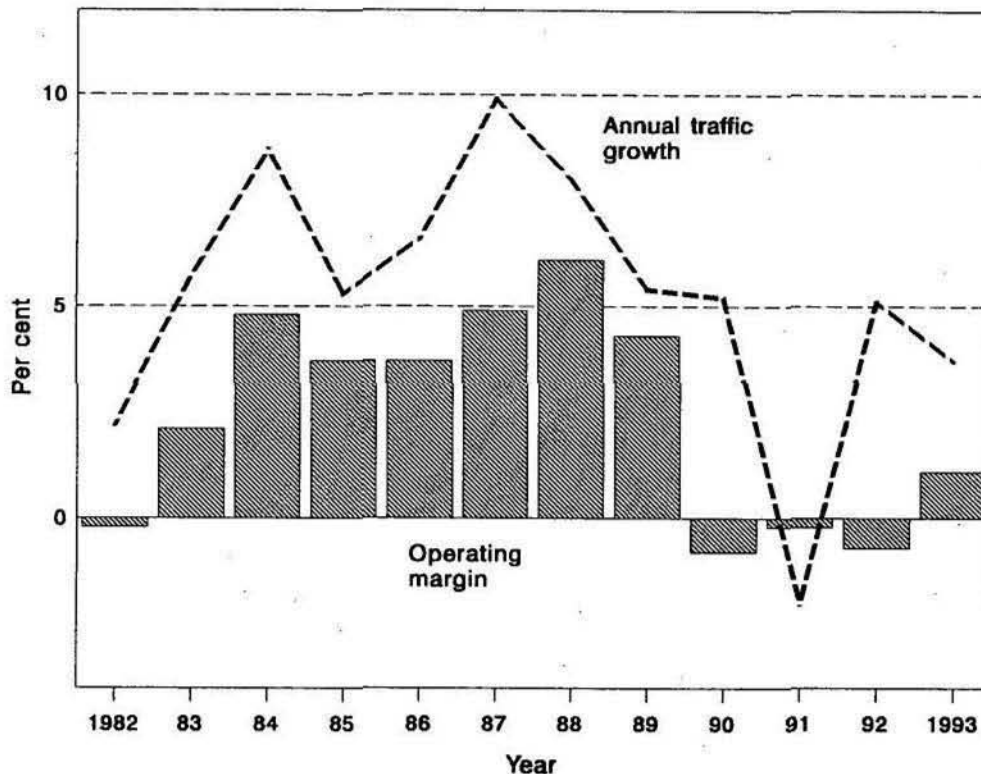
21. As a basis for the traffic forecasts for this study, econometric analyses were carried out to determine the historical relationship between airline passenger traffic, economic cycles and airline yield levels. These analyses were used to translate the expectations of future global economic development and yield levels into annual projections of traffic demand for the years 1994, 1995 and 1996 according to the methodology described in Appendix 2. These forecasts were then reviewed in the light of prospective changes in other relevant factors which could not be incorporated into the econometric models.

22. While at a global level these models appear to provide reasonably robust results, they have been less adequate at a micro or regional level because of the influence of unique factors and uncertainties in the air transport industry in recent years.

23. The economic assumptions, which were presented at the beginning of this chapter, are based on broad business cycle developments, fiscal and monetary policy settings and the international trade environment. These factors are largely external to the aviation sector. The prospects for airline yields, on the other hand, are closely related to cost developments and market conditions in the airline industry.

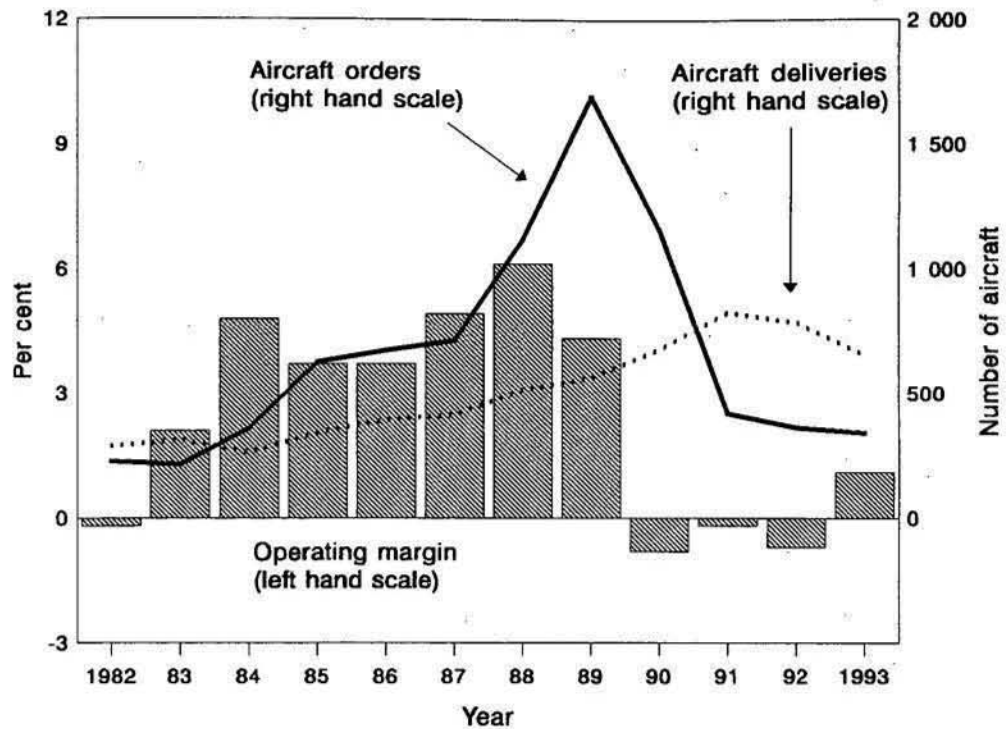
24. Changes in fuel price have had important effects on costs, and hence on both financial returns and airline yields, at certain times in the past. However, fuel prices have been relatively stable since the sharp movements in 1990 and 1991 associated with the Gulf war. In its most recent forecast, the OECD predicts continuing stability in the world crude oil price.

25. Over the last several years, airline yields were probably affected more by excess supply in airline markets than by movements in the prices of fuel, labour, or other inputs used by the industry. Discounted fares helped to increase traffic and offset the effect of a weak economy. As economic recovery proceeds, and as airlines manage their supply towards demand, market conditions will change, and fares are likely to stabilize and then increase at rates slightly below inflation.



Source: ICAO Air Transport Reporting Forms A-1 and EF-1.

**Figure 5-5. Financial return and traffic growth —  
scheduled airline industry**



Source: ICAO Air Transport Reporting Form EF-1 and aircraft manufacturers.

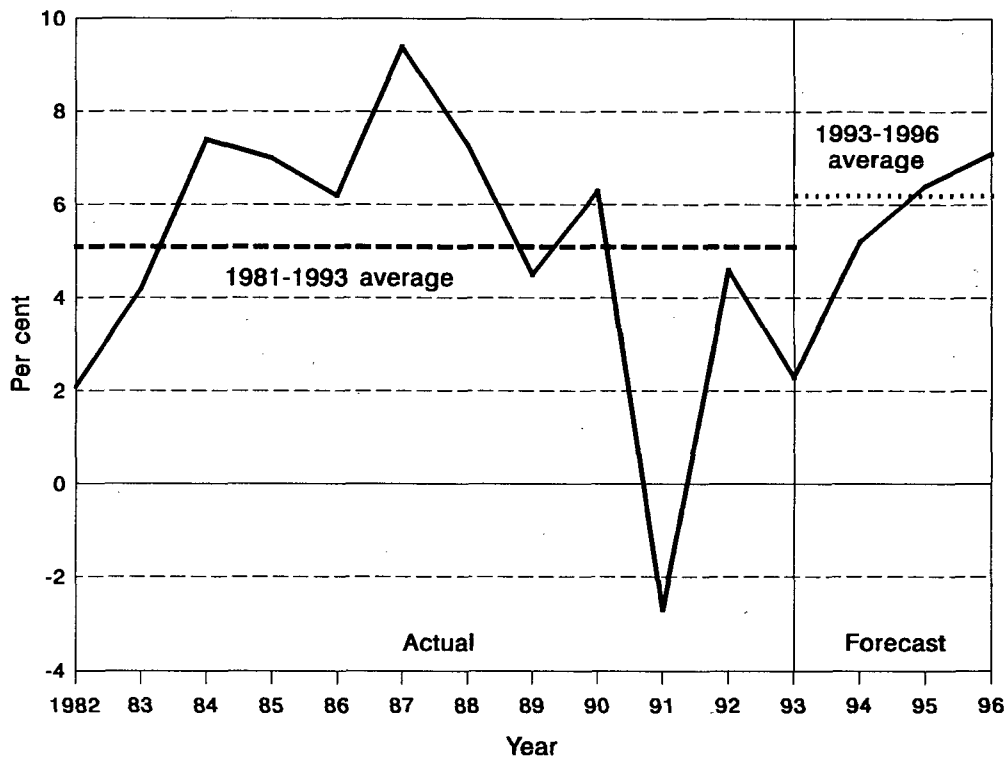
Figure 5-6. Financial return and aircraft supply

26. The global and regional scheduled passenger traffic forecasts for 1994, 1995 and 1996, developed from the economic and yield assumptions and other considerations, are presented in Table 5-6. The stimulus to traffic growth which occurred in 1992 as a result of fare discounting and recovery from the effects of the Gulf war was not generally present in 1993, when global traffic was estimated to have grown by only 2.3 per cent. With improved economic growth, global passenger traffic is expected to grow by 5.2 per cent in 1994. Further improvements to economic growth in 1995 and 1996 are expected to raise traffic growth in these years to 6.4 and 7.1 per cent respectively. The forecast growth rates for total world traffic are illustrated in Figure 5-7, together with the annual growth pattern over the past 10 years.

27. Traffic growth in 1993 varied greatly across geographic regions because of the impact of specific local or regional factors. Along with their general economies, traffic was buoyant in the Asia/Pacific and Middle East regions. Western Europe had surprisingly high traffic growth under the influence of competitive price reductions. However, the very weak performance of the CIS resulted in an over-all decline in traffic for Europe as a whole. Traffic growth in North America was quite slow because of firmer yields.

**Table 5-6. ICAO scheduled passenger traffic forecast for 1994-1996**  
(passenger-kilometres performed)

Region of airline registration	ACTUAL			ESTIMATED		FORECAST					
	1982 (billions)	1992 (billions)	Average annual growth (%)	1993 (billions)	Growth (%)	1994 (billions)	Growth (%)	1995 (billions)	Growth (%)	1996 (billions)	Growth (%)
Africa	33.7	42.9	2.4	41.7	-2.8	43.6	4.5	45.7	4.8	48.0	5.1
Asia/Pacific	186.8	417.1	8.4	452.9	8.6	494.6	9.2	543.9	10.0	599.7	10.3
Europe (excl. CIS)	210.0	374.0	5.9	403.2	7.8	432.6	7.3	465.2	7.5	501.2	7.7
Middle East	33.2	53.4	4.9	58.4	9.4	62.7	7.4	66.8	6.5	71.3	6.7
North America	446.0	806.4	6.1	816.2	1.2	853.9	4.6	901.1	5.5	952.1	5.7
Latin America/Caribbean	60.3	91.9	4.3	94.0	2.3	98.0	4.3	103.4	5.5	110.0	6.3
World (excl. CIS)	970.0	1 785.7	6.3	1 866.4	4.5	1 985.4	6.4	2 126.1	7.1	2 282.3	7.3
Europe (incl. CIS)	382.0	515.5	3.0	507.6	-1.5	521.3	2.7	545.5	4.6	581.5	6.6
World (incl. CIS)	1 142.0	1 927.2	5.4	1 970.8	2.3	2 074.1	5.2	2 206.4	6.4	2 362.6	7.1



**Figure 5-7. World scheduled passenger traffic growth — passenger-kilometres performed**

28. Over the forecast period, the differences in traffic growth should generally be less than in 1993. Asia/Pacific is expected to continue to stand out as the region with the highest growth. European traffic should gradually return to normal as the economies of the region begin to stabilize and recover. Traffic growth in other regions should also progressively increase as economic recovery proceeds. Further details of the trends and forecasts on a region-by-region basis may be found in Chapter 6.

### AIRLINE FINANCIAL FORECAST

29. Financial trends in the airline industry are much more difficult to forecast than traffic trends because they are composed of a number of variables and airlines are able to adjust capacity and manage yields through fare adjustments at relatively short notice to respond to (or to create) changes in demand. In addition, ICAO receives airline financial data only on an annual basis, the period between transaction and reporting is much greater than for traffic data, and there are significant gaps in reporting. Hence, the forecasts are restricted to indicative global trends in financial results (excluding operations within the Commonwealth of Independent States, for which no historic data were available).

30. The forecast for total revenues for scheduled airlines is based on the passenger forecasts and assumptions for real passenger yields presented above, together with further assumptions for general inflation and the trend in the share of airline revenue from sources other than scheduled passengers (i.e. freight, mail, non-scheduled operations and incidental). This produces a growth in total revenues of about 9.5 per cent in 1994, 10.5 per cent in 1995 and 10.5 per cent in 1996.

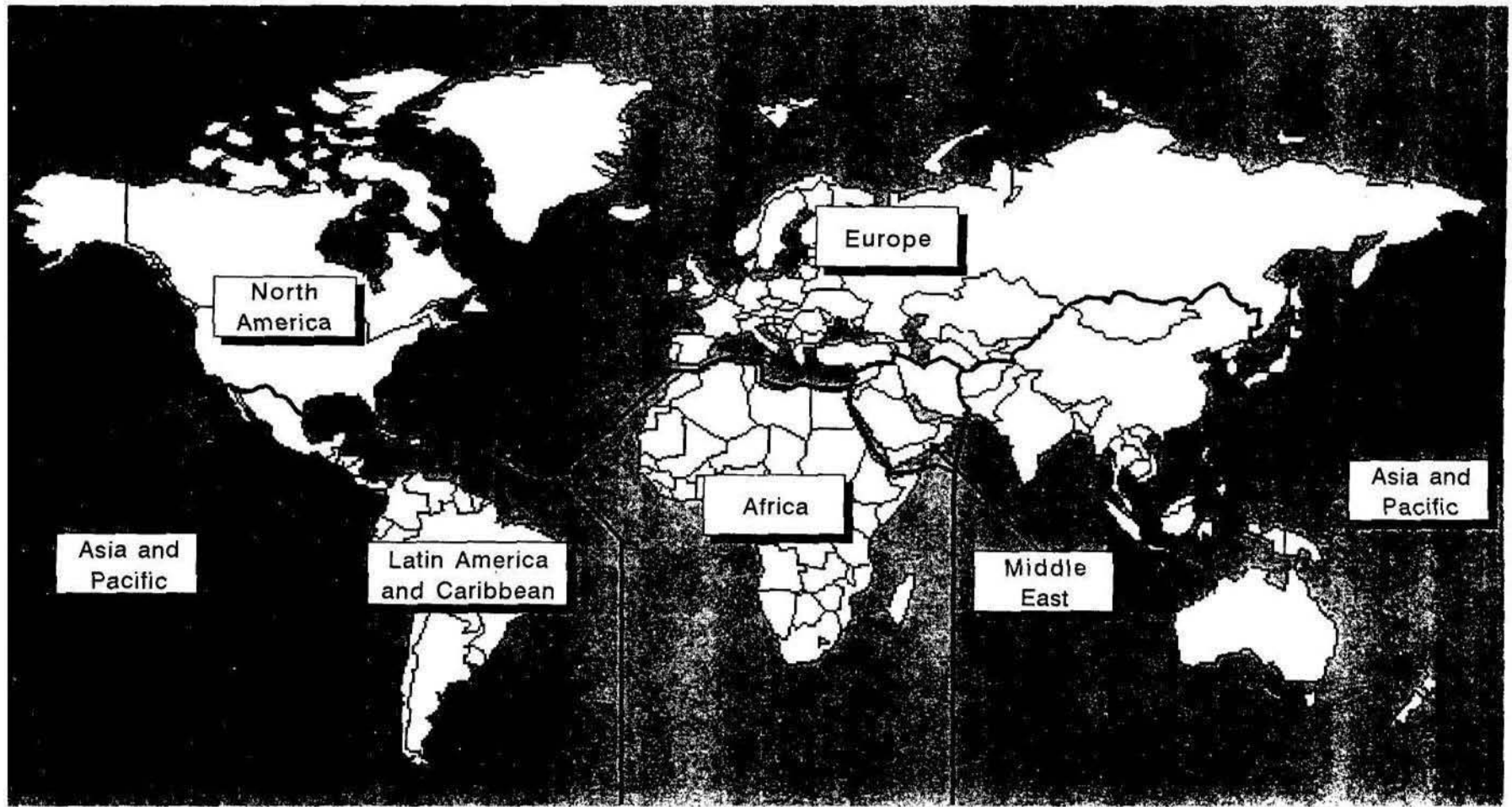
31. The forecast for airline expenses is based on assumptions for the expected trends in quantity of inputs (labour, fuel and aircraft capacity) and the prices of those inputs, the latter being primarily determined by the outlook for general inflation. Current financial difficulties have prompted airlines to take steps to trim employment levels and defer aircraft deliveries and hence improve productivity and contain costs. As a result of these considerations, airline expenses are expected to grow at rates of about 7 per cent in 1994, 8.5 per cent in 1995 and 9.5 per cent in 1996. These compare with an average rate of 8.9 per cent per annum over the past ten years.

32. The operating result for the world's scheduled airlines is the difference between operating revenues and expenses, the forecasts of which have here been made independently and which are both subject to significant margins of error. It is therefore not possible to forecast the operating result with any reasonable degree of certainty. Nevertheless, the above forecasts of operating revenues and expenses imply that the operating result as a per cent of operating revenues will improve from an estimated 1.2 per cent in 1993 to 3 per cent in 1994, 5 per cent in 1995 and 6 per cent in 1996.

PART III

REGIONAL PERSPECTIVES, 1993 TO 1996

## ICAO STATISTICAL REGIONS



International boundaries shown on this map do not imply official endorsement or acceptance by ICAO



# Chapter 6

## Regional Highlights, Trends and Forecasts

1. This chapter reviews, on a region-by-region basis, some key developments affecting air transport in 1993, the economic environment over the period since 1982 and anticipated through to 1996, and airline finances and passenger traffic trends over the period since 1982; and presents scheduled passenger traffic forecasts for the airlines of each region through to 1996. The regional basis is that of the ICAO Statistical Regions (see map), presented as follows: Africa; Asia/Pacific; Europe; Middle East; North America; Latin America/Caribbean.

### AFRICA

#### *The Region in 1993*

**Table 6-1. Scheduled traffic — airlines of Africa**

	INTERNATIONAL			TOTAL		
	1993	Increase over 1992 (%)	Share of world traffic (%)	1993	Increase over 1992 (%)	Share of world traffic (%)
Passengers carried (thousands)	12 370	-3.1	3.9	23 770	-7.0	2.0
Passenger-kilometres performed (millions)	34 600	-1.0	3.3	41 740	-2.6	2.1
Freight and mail tonne-kms performed (millions)	1 200	3.4	2.1	1 280	2.4	1.8

Source: ICAO Air Transport Reporting Form A-1.

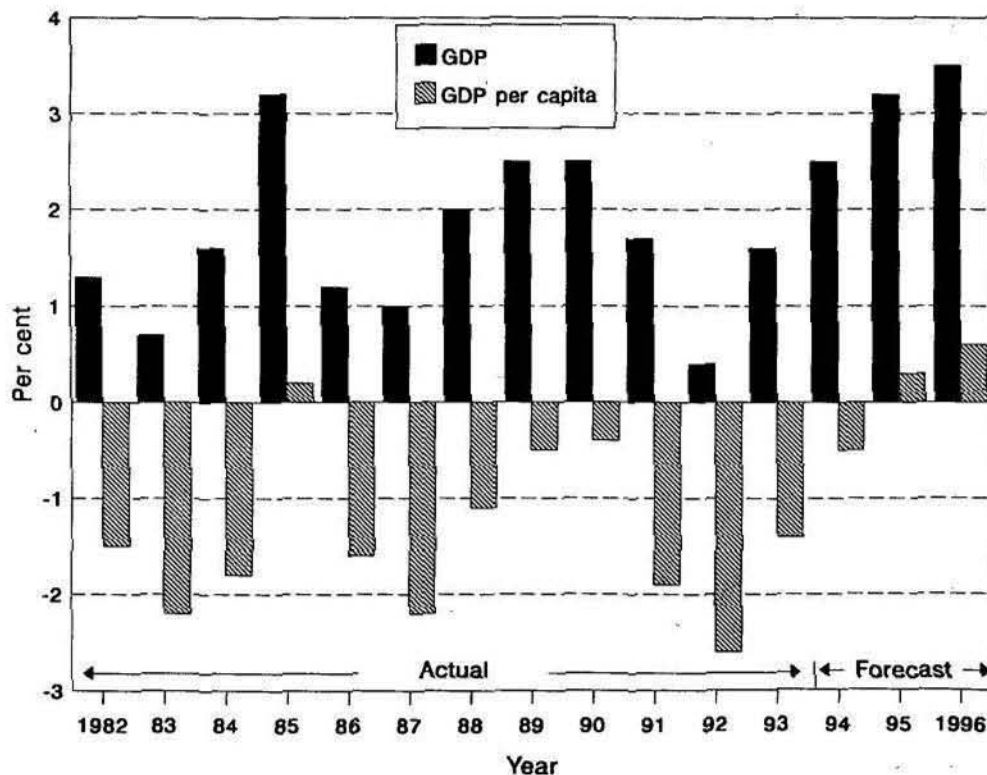
2. In 1993 the economic performance by African States in the region continued to deteriorate. There was continued pressure on governments by the World Bank, the International Monetary Fund (IMF) and the Club of Paris donors to make economic adjustments, and programmes at all levels of the general economy and particularly on major sectors of transportation, civil aviation and national airline activities were reinforced with

consequent cost cutting measures including rationalization of personnel; this resulted in some cases in the breakdown of the political cohesion and social harmony which existed before. Also during the year a number of governments continued to assess the possibilities of privatizing civil aviation authorities or to establish them as para-public companies.

3. At its 25th Annual General Assembly, the African Airlines Association (AFRAA) witnessed once again strong calls for co-operation among its members. The Assembly also noted "the slow and unsatisfactory pace" in implementation of the Yamoussoukro Declaration adopted in 1988.

### **Economic Trends**

4. Over the 1982-1992 period, the aggregate African economy (GDP) grew at an average annual rate of 1.8 per cent in real terms, although GDP per capita fell at 1.3 per cent. The year-to-year changes in the region's GDP and GDP per capita are illustrated in Figure 6-1.



Source: IMF, Wharton Econometrics Services.

**Figure 6-1. Annual change in real GDP and GDP per capita — Africa**

5. Economic conditions in the region have been adversely affected by the external environment, particularly slower growth in export markets and declining terms of trade, and the region has faced increasing difficulties in foreign debt servicing. Civil war and political instability have hindered economic reform.

6. For 1993, the real growth of GDP is estimated to be around 1.6 per cent. In 1994, an improved external environment is expected, reflecting the recovery of world markets, and a slight increase in non-fuel commodity prices. The economy of the African region is projected to increase at 2.5, 3.2 and 3.5 per cent for the years 1994, 1995 and 1996 respectively.

### ***Airline Financial Trends***

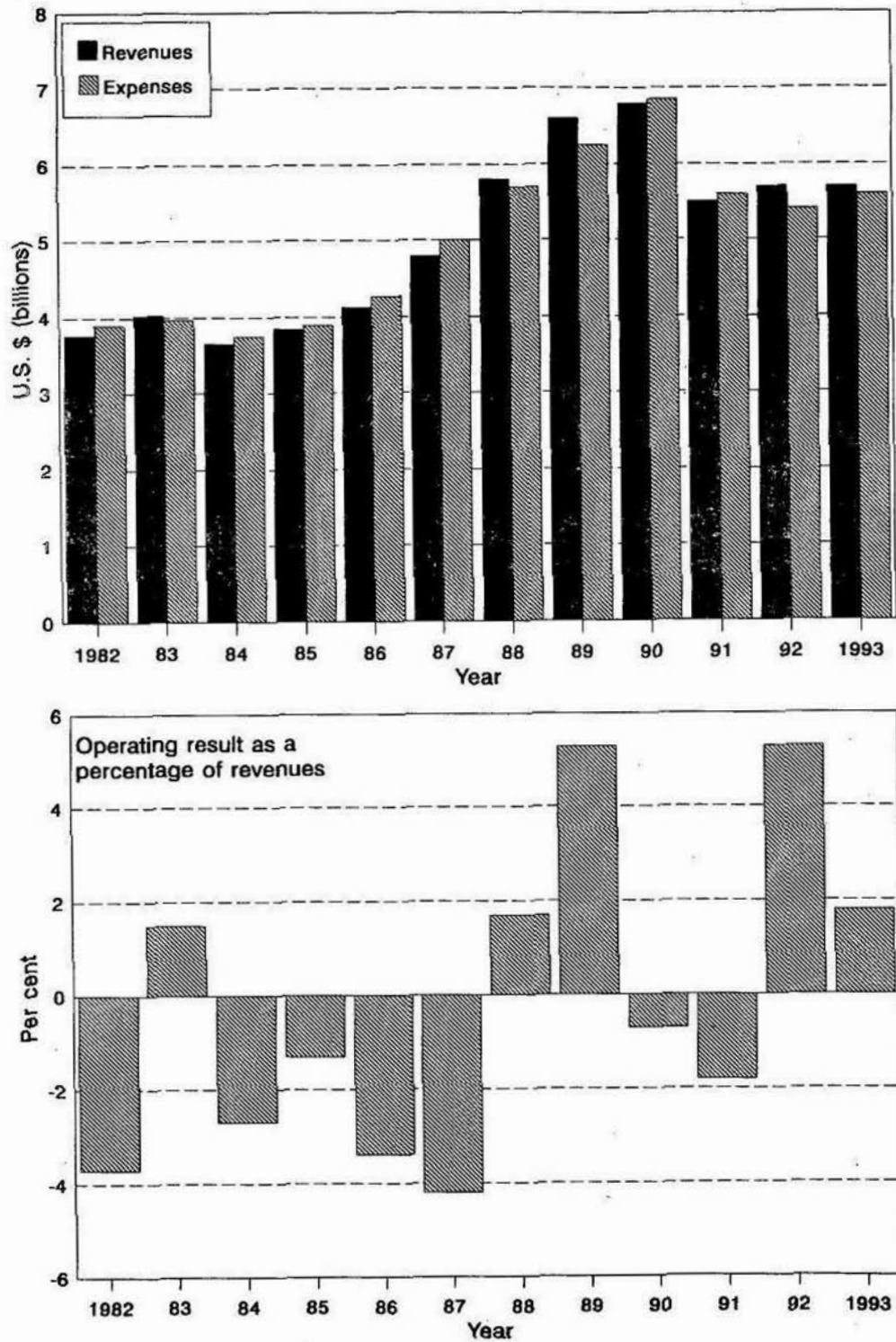
7. Over the 1982-1992 period, operating revenues (in United States dollars) of the scheduled airlines of the African region increased at an average annual rate of 4.3 per cent (compared with the world annual average of 8.8 per cent). Operating expenses for the same period increased by 3.3 per cent per annum. Positive operating results were achieved in 1983, 1988, 1989, 1992 and, according to the latest estimates, 1993 as illustrated in Figure 6-2.

8. For the 1982-1992 period, average scheduled passenger yields for airlines of the region, measured in terms of United States cents per passenger-kilometre performed (PKP), declined at an average annual rate of 2.3 per cent in real terms (compared with a 1.3 per cent decline for the world). The year-to-year comparisons of the changes in real passenger yield of African and world airlines are illustrated in Figure 6-3. Throughout the period concerned, the region's airlines achieved a high average yield level in comparison with the world average.

### ***Airline Passenger Traffic Trends and Forecast***

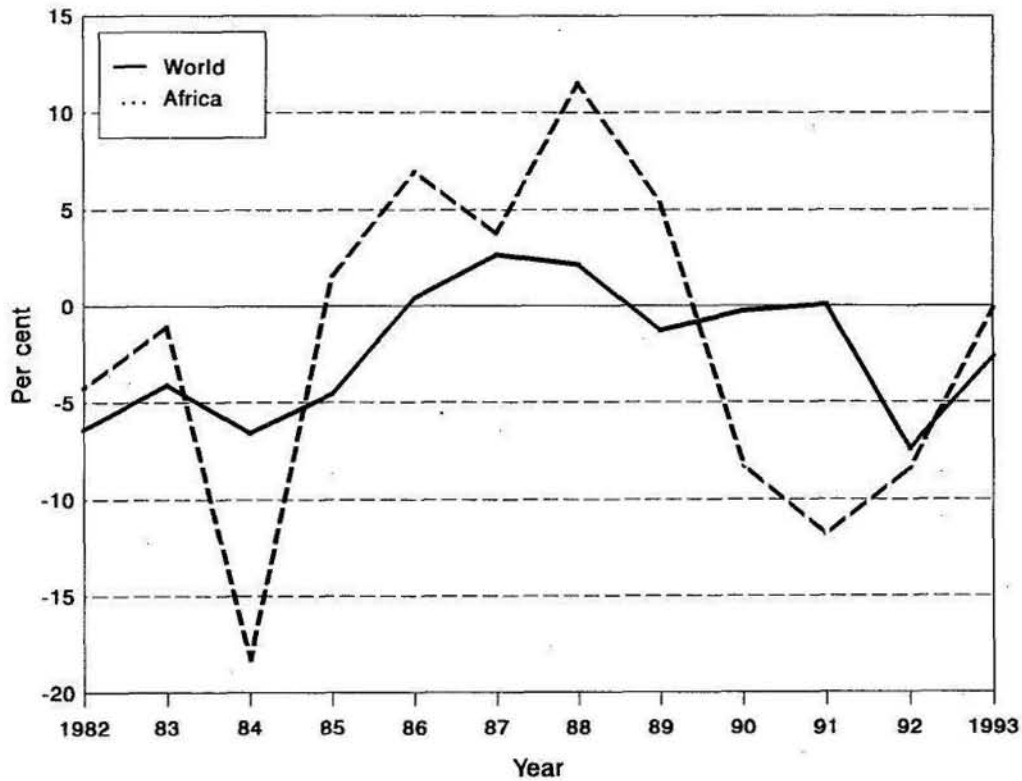
9. Over the 1982-1992 period, scheduled passenger traffic (passenger-kilometres performed) of airlines of the African region increased at an average annual rate of 2.4 per cent (compared with the world annual average of 5.4 per cent). A small decline in traffic was recorded in 1993. The year-to-year traffic growth comparison between world and African airlines is shown in Figure 6-4.

10. As shown in Table 5-6 of Chapter 5 and illustrated in Figure 6-4, scheduled passenger traffic of the airlines of the African region is expected to increase by 4.5, 4.8 and 5.1 per cent for the years 1994, 1995 and 1996 respectively, compared with world airline growth of 5.2, 6.4 and 7.1 per cent. The expectations for relatively buoyant growth for African airlines are based primarily on an improved economic outlook.



Note.— 1993 figures are from estimated data.  
 Source: ICAO Air Transport Reporting Form EF-1.

Figure 6-2. Scheduled airline operating revenues and expenses — Africa



Notes: — 1993 figures are from estimated data.  
 — Real yield for scheduled airlines measured in U.S. cents per PKP deflated by U.S. Consumer Price Index.

Source: ICAO Air Transport Reporting Forms A-1 and EF-1.

**Figure 6-3. Annual change in real scheduled passenger yield — Africa and World**

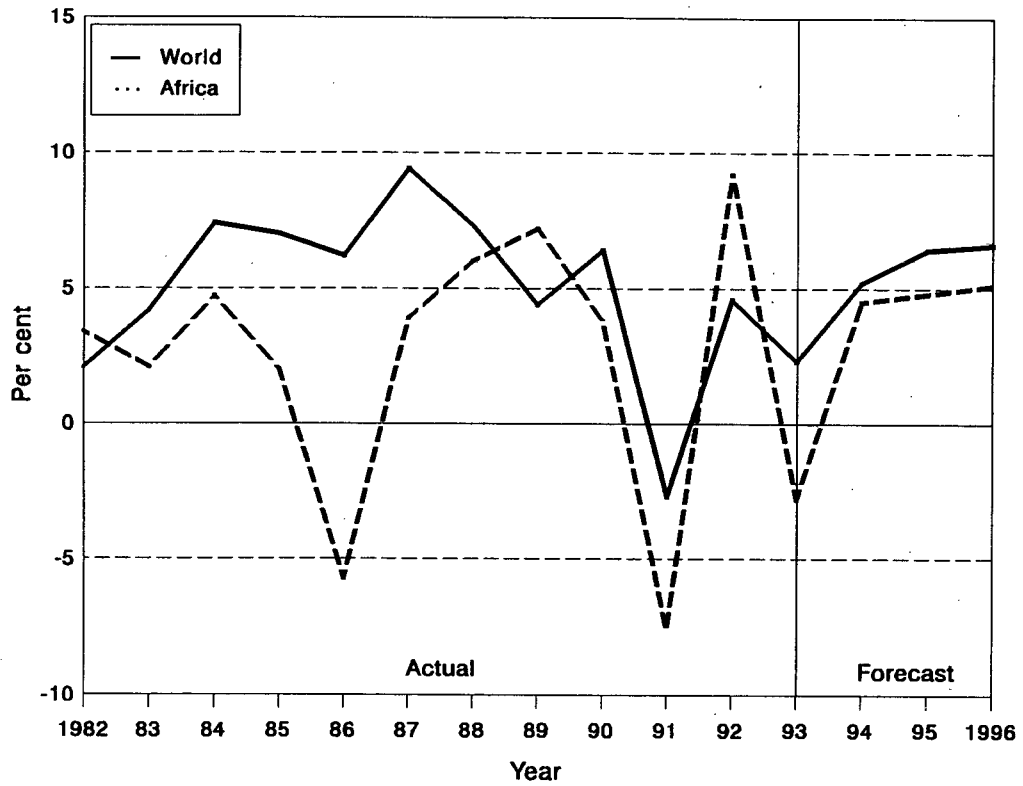


Figure 6-4. Scheduled passenger traffic growth (PKPs) — Africa and World

## ASIA/PACIFIC

*The Region in 1993*

Table 6-2. Scheduled traffic — airlines of Asia/Pacific

	INTERNATIONAL			TOTAL		
	1993	Increase over 1992 (%)	Share of world traffic (%)	1993	Increase over 1992 (%)	Share of world traffic (%)
Passengers carried (thousands)	74 930	8.0	23.4	258 430	5.9	22.1
Passenger-kilometres performed (millions)	300 900	8.7	28.8	452 900	8.6	23.0
Freight and mail tonne-kms performed (millions)	20 880	14.3	36.1	22 890	13.1	31.4

Source: ICAO Air Transport Reporting Form A-1.

11. During 1993, some Asia/Pacific States continued with their policy of liberalizing air transport service in that region. Among others, the Indian government removed restrictions and allowed up to 40 per cent foreign investment in domestic air carriers; the government of China, which had suspended approvals for the establishment of new airlines as a result of concerns over safety standards, later in the year decided to allow foreigners to run joint venture airlines; in the Philippines the government announced a partial open skies policy allowing foreign air carriers to operate to airports outside Manila without demanding reciprocal rights for Philippine Airlines; and the Australian International Air Services Commission granted traffic rights to Ansett airlines to operate international scheduled services to several destinations in Asia in competition with Qantas.

12. As already indicated in Chapter 2, foreign investment in new air carriers and intra-regional alliances between carriers were important features in this region during 1993.

**Economic Trends**

13. Over the 1982-1992 period, the aggregate Asia/Pacific economy (GDP) grew at an average annual rate of 5.4 per cent in real terms, and GDP per capita increased at 3.7 per cent, the highest growth rates of all the regions. The year-to-year changes in the region's GDP and GDP per capita are illustrated in Figure 6-5.

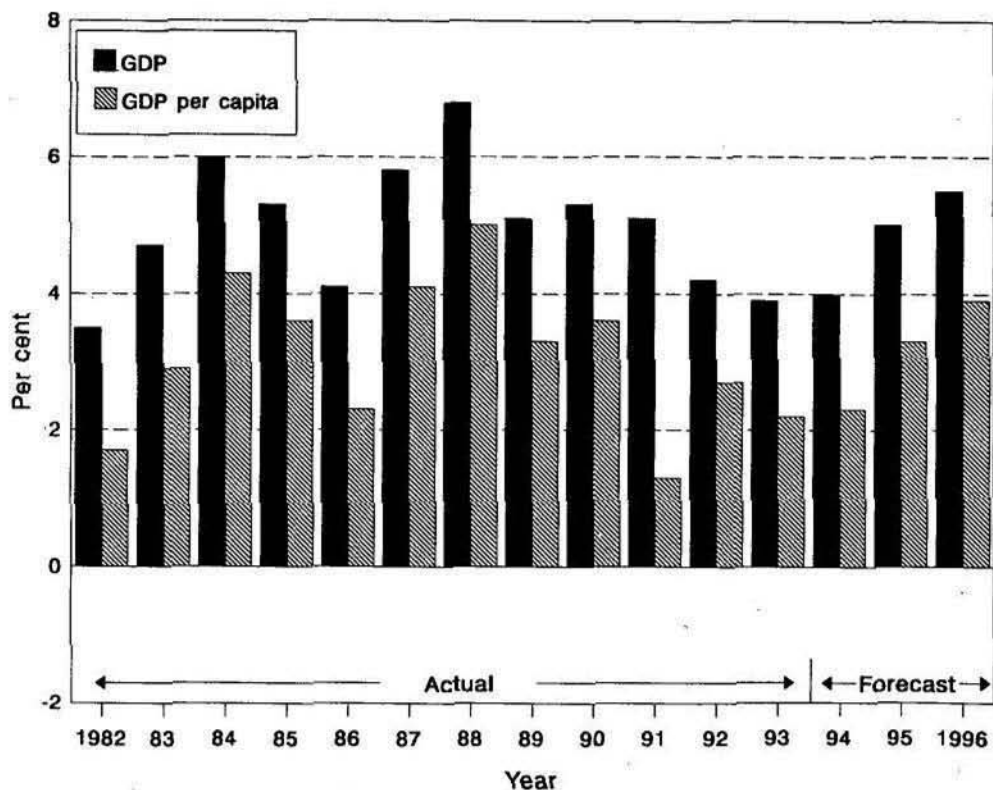
14. Economic growth in the region slowed in the 1991 to 1993 period, primarily because of a substantial slowdown in the Japanese economy. Japanese growth is expected to show a

moderate recovery in 1994 as a result of low interest rates, fiscal stimulus and substantial progress in stock adjustment. The developing economies of the region are expected to grow rapidly, fuelled by domestic infrastructure and private investment. Recoveries in Australia and New Zealand have also gained momentum with growth rates of 1.9 and 3.0 per cent in 1992 and 1993.

15. For the region as a whole, economic growth in 1993 is estimated to be about 3.9 per cent. Real growth in GDP is expected to be 4.0 per cent in 1994, 5.0 per cent in 1995 and 5.5 per cent in 1996.

### **Airline Financial Trends**

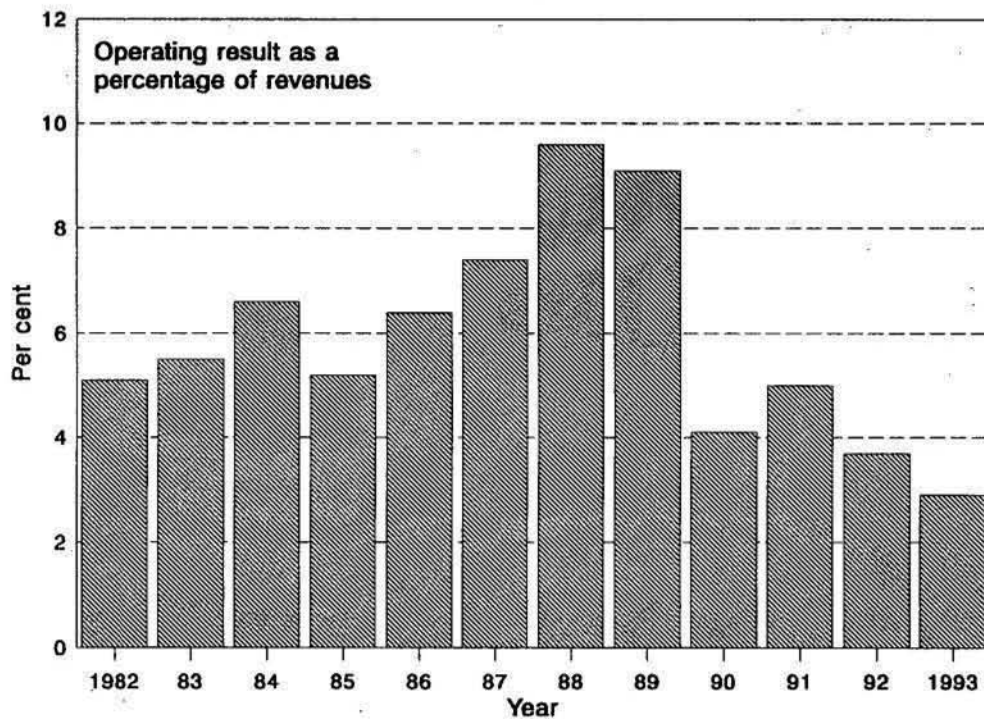
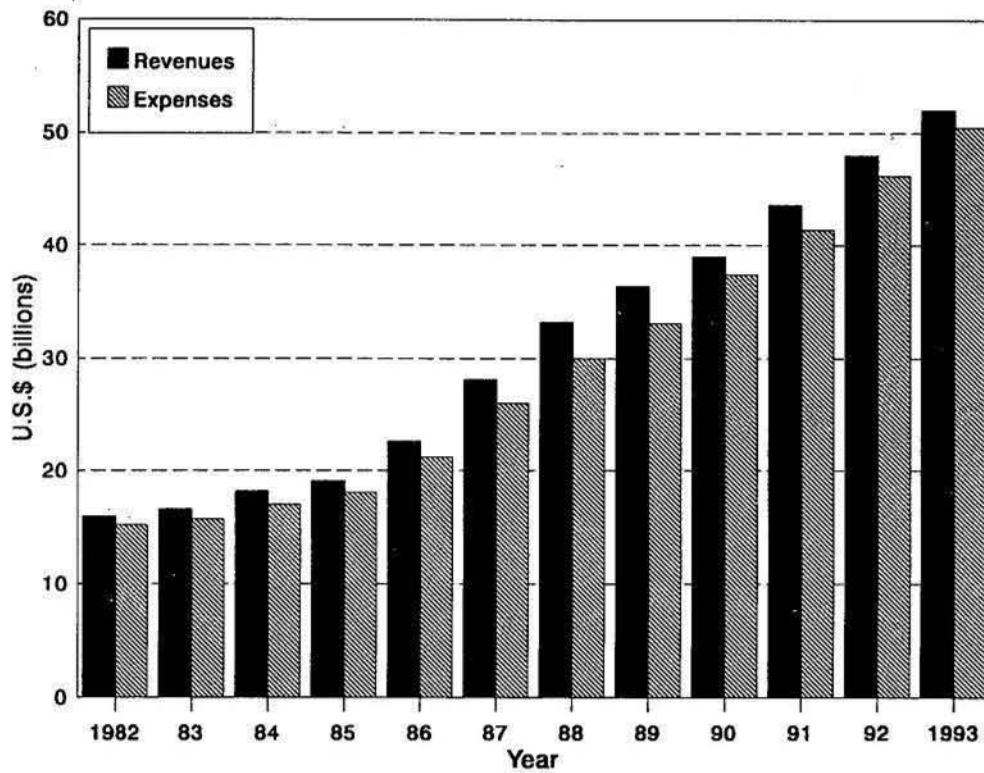
16. Over the 1982-1992 period, operating revenues (in United States dollars) of the scheduled airlines of the Asia/Pacific region increased at an average annual rate of 11.6 per cent (compared with the world annual average growth rate of 8.8 per cent). Operating expenses for the same period increased by 11.8 per cent per annum. Positive operating results were achieved throughout the period 1982 to 1992, as illustrated in Figure 6-6, which also shows an estimated positive result for 1993.



Source: IMF, Wharton Econometrics Services.

**Figure 6-5. Annual change in real GDP and GDP per capita — Asia/Pacific**





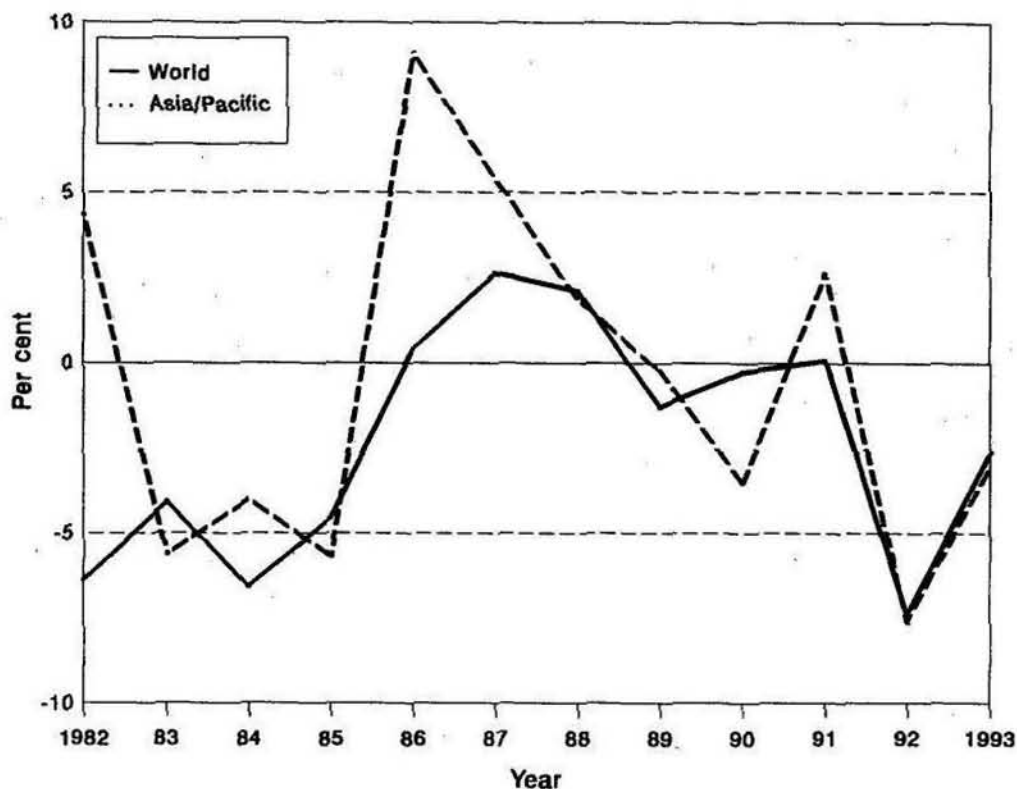
Note.— 1993 figures are from estimated data.  
 Source: ICAO Air Transport Reporting Form EF-1.

Figure 6-6. Scheduled airline operating revenues and expenses — Asia/Pacific

17. For the 1982-1992 period, average scheduled passenger yields for airlines of the region, measured in terms of U.S. cents per passenger-kilometre performed (PKP), declined at an average annual rate of 0.9 per cent in real terms (compared with a 1.3 per cent per annum decline for the world). A further reduction of 3 per cent has been estimated for 1993. The year-to-year comparisons of the changes in real passenger yield of Asia/Pacific and world airlines are illustrated in Figure 6-7.

### ***Airline Passenger Traffic Trends and Forecast***

18. Over the 1982-1992 period, scheduled passenger traffic (passenger-kilometres performed) of airlines of the Asia/Pacific region increased at an average annual rate of 8.4 per cent (compared with the world annual average of 5.4 per cent). Strong positive growth in traffic was estimated for 1993, 8.6 per cent, following a relatively weak performance over the 1989-1991 period and a very strong growth of 13.3 per cent in 1992. The year-to-year traffic growth comparison between world and Asia/Pacific airlines is shown in Figure 6-8.



Notes: — 1993 figures are from estimated data.

— Real yield for scheduled airlines measured in U.S. cents per PKP deflated by U.S. Consumer Price Index.

Source: ICAO Air Transport Reporting Forms A-1 and EF-1.

**Figure 6-7. Annual change in real scheduled passenger yield — Asia/Pacific and World**

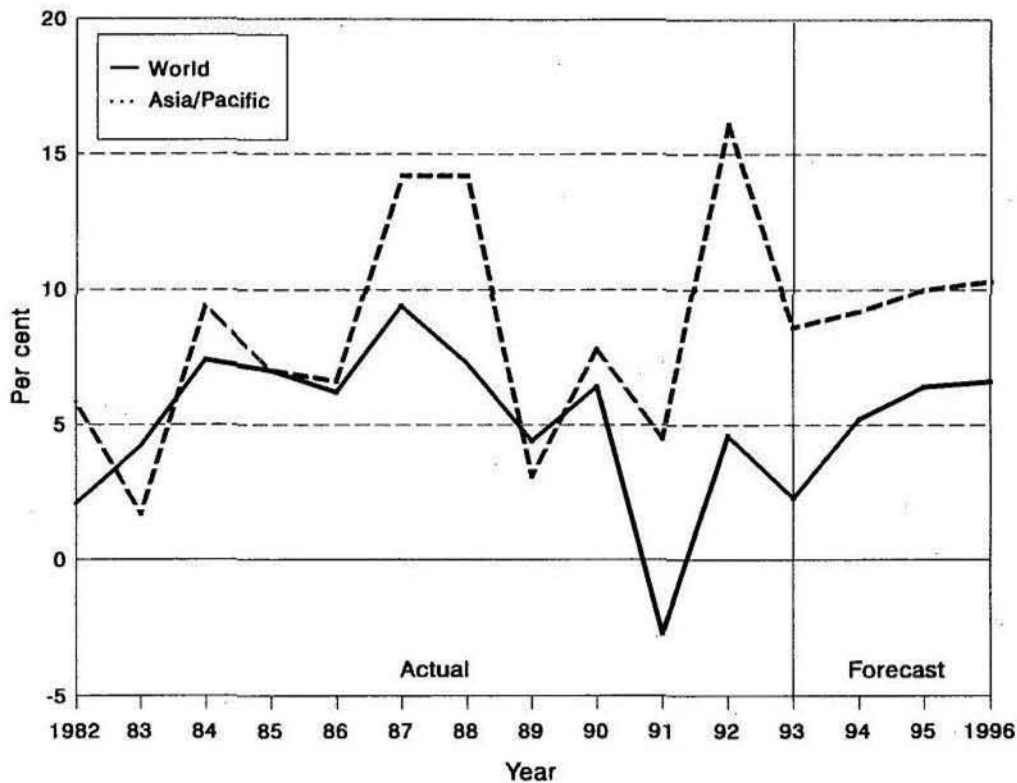


Figure 6-8. Scheduled passenger traffic growth (PKPs) — Asia/Pacific and World

19. As shown in Table 5-5 of Chapter 5 and illustrated in Figure 6-8, scheduled passenger traffic of the airlines of the Asia/Pacific region is expected to increase by 9.2, 10.0 and 10.3 per cent for the years 1994, 1995 and 1996 respectively, compared with world airline growth of 5.2, 6.4 and 7.1 per cent. The outlook for traffic growth of the airlines of the Asia/Pacific region is the strongest of any region.

## EUROPE

*The Region in 1993***Table 6-3. Scheduled traffic — airlines of Europe**

	INTERNATIONAL			TOTAL		
	1993	Increase over 1992 (%)	Share of world traffic (%)	1993	Increase over 1992 (%)	Share of world traffic (%)
Passengers carried (thousands)	134 550	7.5	42.0	302 710	-2.5	25.9
Passenger-kilometres performed (millions)	353 460	7.1	33.8	507 620	-1.5	25.8
Freight and mail tonne-kms performed (millions)	19 540	5.9	33.8	21 260	3.2	29.2

*Source: ICAO Air Transport Reporting Form A-1.*

20. As indicated in Chapter 2, during 1993 the Commission of the European Communities continued efforts to promote competition in air transport and to limit practices such as the provision of state aid to air carriers, which distort competition.

21. Progress was made in implementing several key decisions taken by the Ministers of Transport of the European Civil Aviation Conference (ECAC) with regard to the capacity of the European air traffic system. In particular:

- a) the bringing into effect of a Central Flow Management Unit was advanced; and
- b) the first two phases of the en-route strategy launched in 1990 to harmonize and integrate the operations of European air traffic control systems were completed.

22. In part as a result of the action taken by governments during 1993 there were fewer delays in Europe due to airport and air traffic control congestion despite a significant increase in aircraft movements. Member companies of the Association of European Airlines (AEA) reported that in 1993 the proportion of short/medium haul scheduled flights delayed by more than fifteen minutes because of airport and air traffic control decreased to 7.4 per cent from 12.1 per cent the previous year. They remained, however, the greatest single cause of aircraft delays.

***Economic Trends***

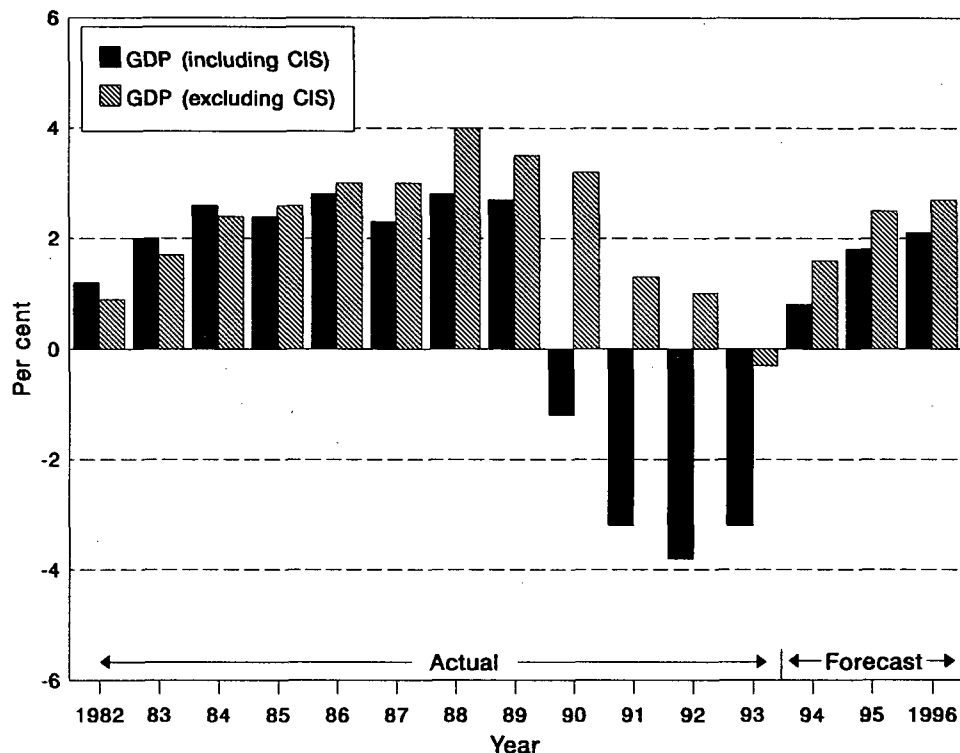
23. Over the 1982-1992 period, the aggregate European economy (GDP) grew at an average annual rate of 0.9 per cent in real terms. Population grew at 0.6 per cent per annum and GDP per capita at 0.3 per cent per annum over the same period. The average growth in GDP has

been less for Europe than for other regions. One reason for this is the relatively low population growth in Europe. However, a more important reason is the serious decline in the economies of eastern Europe and the CIS since 1989. The impact of the CIS is illustrated in Figure 6-9, which shows the annual European GDP growth including and excluding the CIS. The average annual GDP growth for Western Europe over the past decade was 2.6 per cent per annum.

24. Chapters 1 and 5 referred to the recent recession in Western Europe. Recovery is well under way in the United Kingdom, and lower interest rates will help to bring a slow recovery to continental western Europe in 1994 which should continue in 1995 and 1996. Western European GDP growth rates of 1.6 per cent, 2.5 per cent and 2.7 per cent are expected for 1994, 1995 and 1996 respectively. Another difficult year is expected in the CIS before recovery takes hold. Because of the structural changes that are occurring, there is an unusually large element of uncertainty associated with the medium-term economic outlook for the region as a whole.

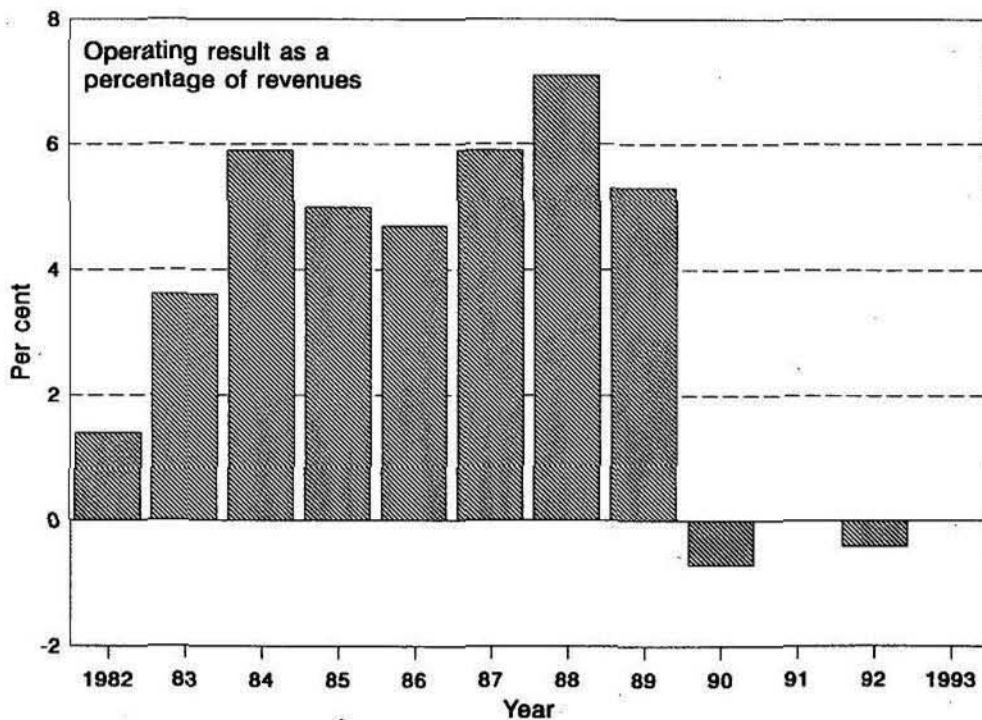
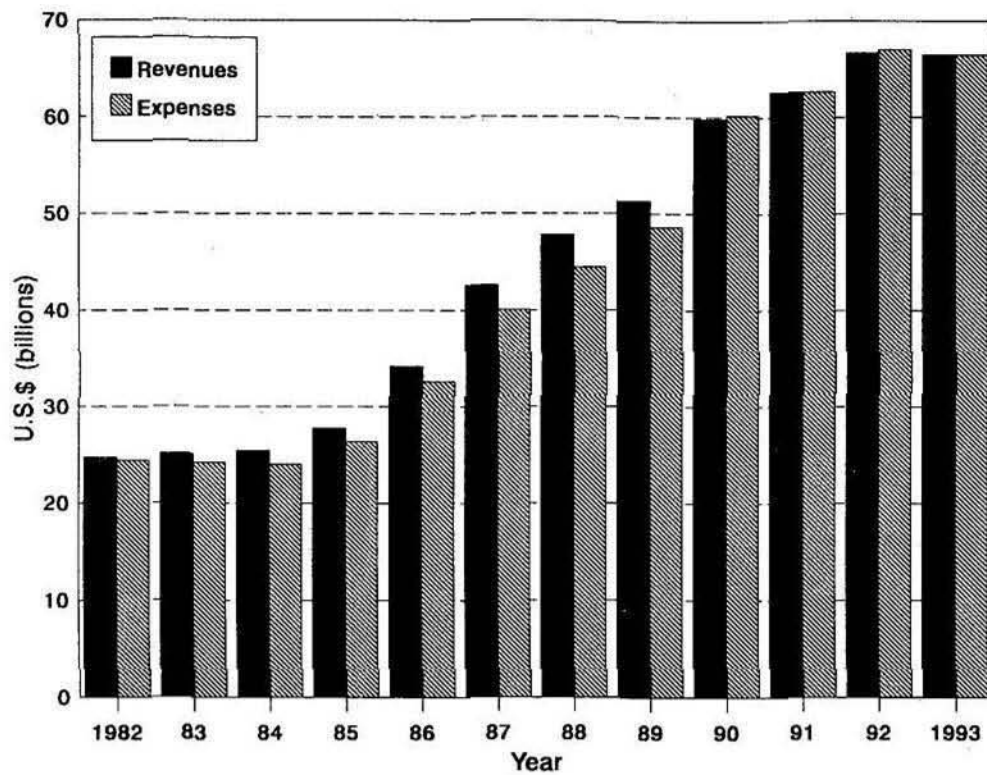
### Airline Financial Trends

25. Over the 1982-1992 period, operating revenues (in United States dollars) of the scheduled airlines of the European region (excluding CIS) increased at an average annual rate of 10.4 per cent (compared with the world annual average of 8.8 per cent). Operating expenses



Source: IMF, Wharton Econometrics Services.

Figure 6-9. Annual change in real GDP — Europe

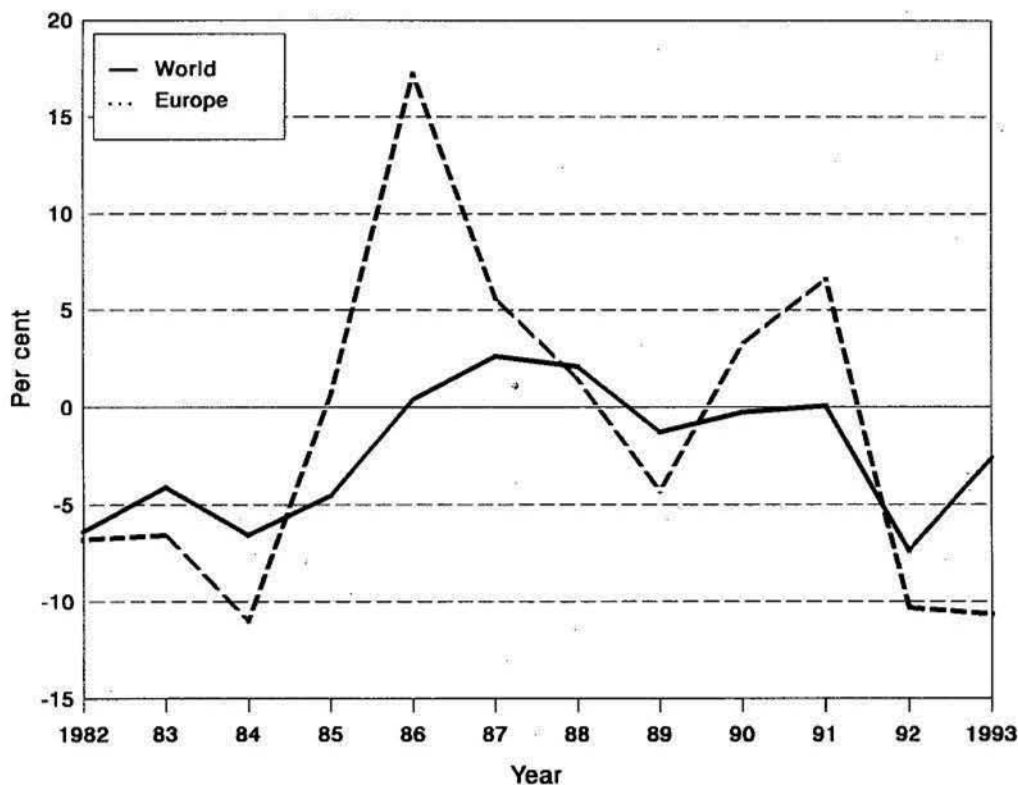


Note.— 1993 figures are from estimated data. CIS excluded.  
Source: ICAO Air Transport Reporting Form EF-1.

Figure 6-10. Scheduled airline operating revenues and expenses — Europe

for the same period increased by 10.6 per cent per annum. Positive operating results were achieved in the years 1982 to 1989 inclusive, while negative results occurred in 1990 and 1992, as illustrated in Figure 6-10.

26. For the 1982-1992 period, average scheduled passenger yields for airlines of the region (excluding CIS), measured in terms of cents per passenger-kilometre performed (PKP), grew at an average annual rate of 2.1 per cent in real terms (compared with a 1.3 per cent decline for the world). However, the yield declined sharply in 1992 and again in 1993 (according to estimates) because of competitive price reductions in an environment of excess capacity. The year-to-year comparisons of the changes in the real passenger yield of European and world airlines are shown in Figure 6-11. The increase of over 17 per cent in European airline yields in 1986 can be largely attributed to an exchange rate difference resulting from the appreciation of European currencies with respect to the U.S. dollar.



Notes: — 1993 figures are from estimated data.

— Real yield for scheduled airlines measured in U.S. cents per PKP deflated by U.S. Consumer Price Index.

Source: ICAO Air Transport Reporting Forms A-1 and EF-1.

**Figure 6-11. Annual change in real scheduled passenger yield — Europe and World**

### Airline Passenger Traffic Trends and Forecast

27. Over the 1982-1992 period, scheduled passenger traffic (passenger-kilometres performed) of the airlines of the European region increased at an average annual rate of 3.0 per cent (compared with the world annual average of 5.4 per cent). If airlines of the CIS are excluded, European traffic grew at 5.9 per cent per annum over the period. As in 1992, a fall in the traffic of the Commonwealth of Independent States in 1993 was not fully offset by significant growth in the traffic of the airlines of Western Europe. The year-to-year traffic growth comparison of the world's and the European airlines is shown in Figure 6-12.

28. As shown in Table 5-6 of Chapter 5 and illustrated in Figure 6-12, scheduled passenger traffic of the airlines of the Western European region is expected to grow quite vigorously over the forecast period. For the region as a whole, recovery is expected with growth rates of 2.7 per cent, 4.6 per cent and 4.9 per cent for the years 1994, 1995 and 1996 respectively (compared with world airline growth of 5.2, 6.4 and 6.6 per cent).

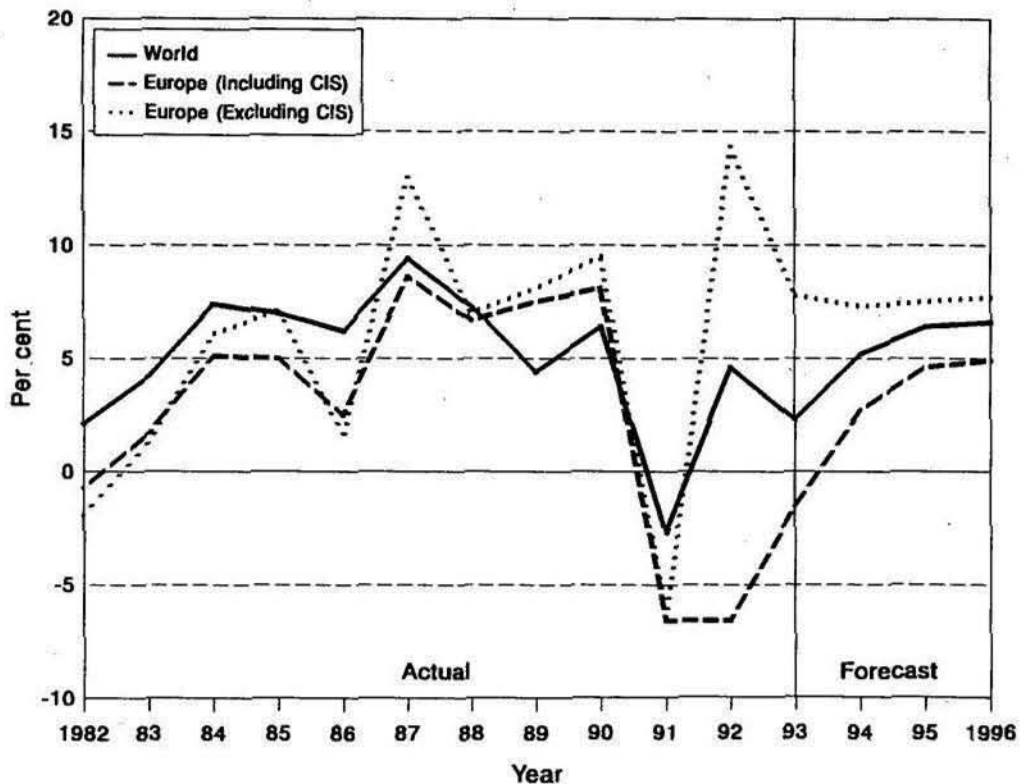


Figure 6-12. Scheduled passenger traffic growth (PKPs) — Europe and World



## MIDDLE EAST

*The Region in 1993***Table 6-4. Scheduled traffic — airlines of the Middle East**

	INTERNATIONAL			TOTAL		
	1993	Increase over 1992 (%)	Share of world traffic (%)	1993	Increase over 1992 (%)	Share of world traffic (%)
Passengers carried (thousands)	16 890	7.2	5.3	30 330	6.4	2.6
Passenger-kilometres performed (millions)	49 020	10.1	4.7	58 440	9.4	3.0
Freight and mail tonne-kms performed (millions)	2 950	13.0	5.1	3 020	11.9	4.1

Source: ICAO Air Transport Reporting Form A-1.

29. During the year efforts continued on the implementation of a decision to establish an Arab Civil Aviation Commission to replace the former Arab Civil Aviation Council. When it is fully functioning this new body will provide member States of the League of Arab States with a forum for co-ordinating and harmonizing their approaches on a range of air transport issues.

***Economic Trends***

30. Over the 1982-1992 period, the aggregate Middle East economy (GDP) grew at an average annual rate of 1.8 per cent in real terms, although GDP per capita fell at 1.7 per cent. The oil-producing countries in the region suffered from declines in crude oil prices during the 1980s. The year-to-year changes in the region's GDP and GDP per capita are illustrated in Figure 6-13.

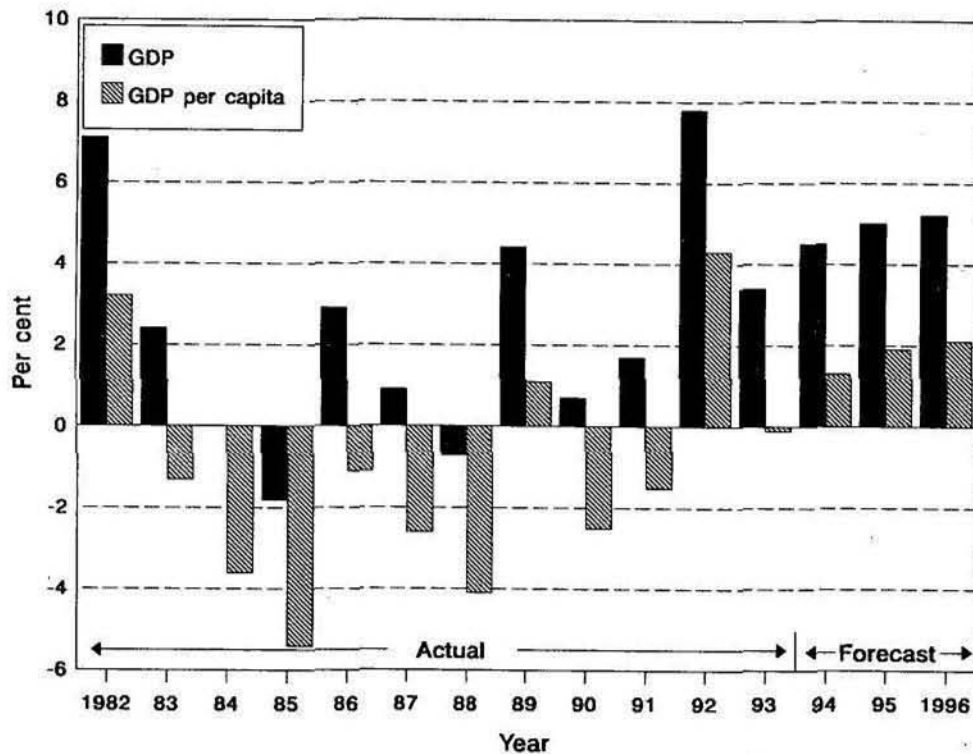
31. With a return to political and economic stability in the region, GDP growth recovered quite strongly in 1992 (around 8 per cent growth) and continued into 1993 (3.4 per cent), and relatively buoyant conditions are expected over the medium term, although lower oil prices have dampened the outlook for the oil exporting countries. GDP growth rates of 4.5 per cent, 5.0 per cent and 5.2 per cent are forecast for 1994, 1995 and 1996 respectively.

***Airline Financial Trends***

32. Over the 1982-1992 period, operating revenues (in United States dollars) of the scheduled airlines of the Middle East region increased at an average annual rate of 4.1 per cent

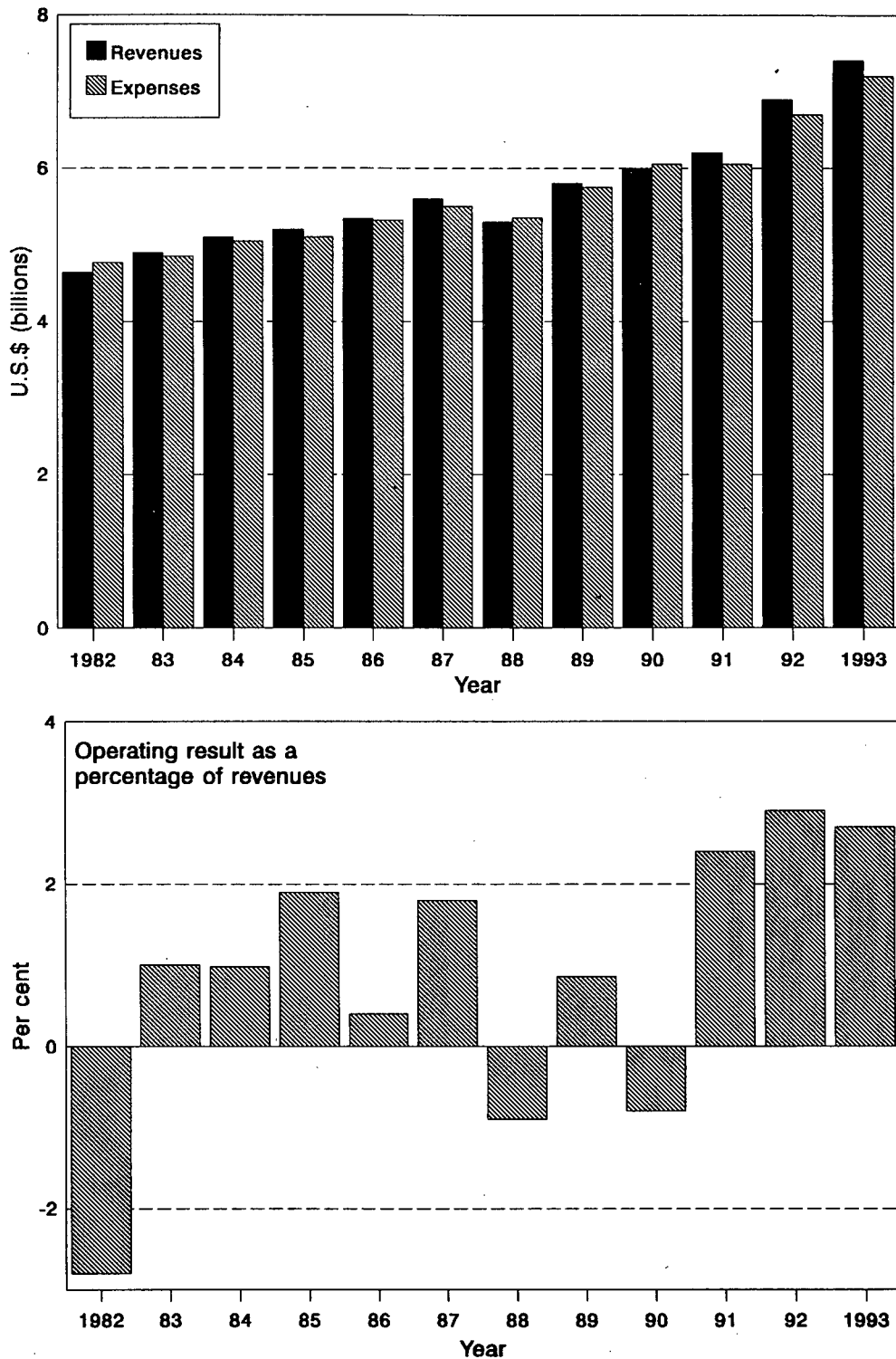
(compared with the world annual average of 8.8 per cent). Operating expenses for the same period increased by 3.5 per cent per annum. As shown in Figure 6-14, the region experienced a mixture of positive and negative operating results over the period.

33. For the 1982-1992 period, average scheduled passenger yields for airlines of the region, measured in terms of cents per passenger-kilometre performed (PKP), declined at an average annual rate of 6.1 per cent in real terms (compared with a 1.3 per cent decline for the world). It is estimated that the real yield declined by nearly 5 per cent in 1993. The year-to-year comparisons of the changes in real passenger yield of Middle East and world airlines are illustrated in Figure 6-15.



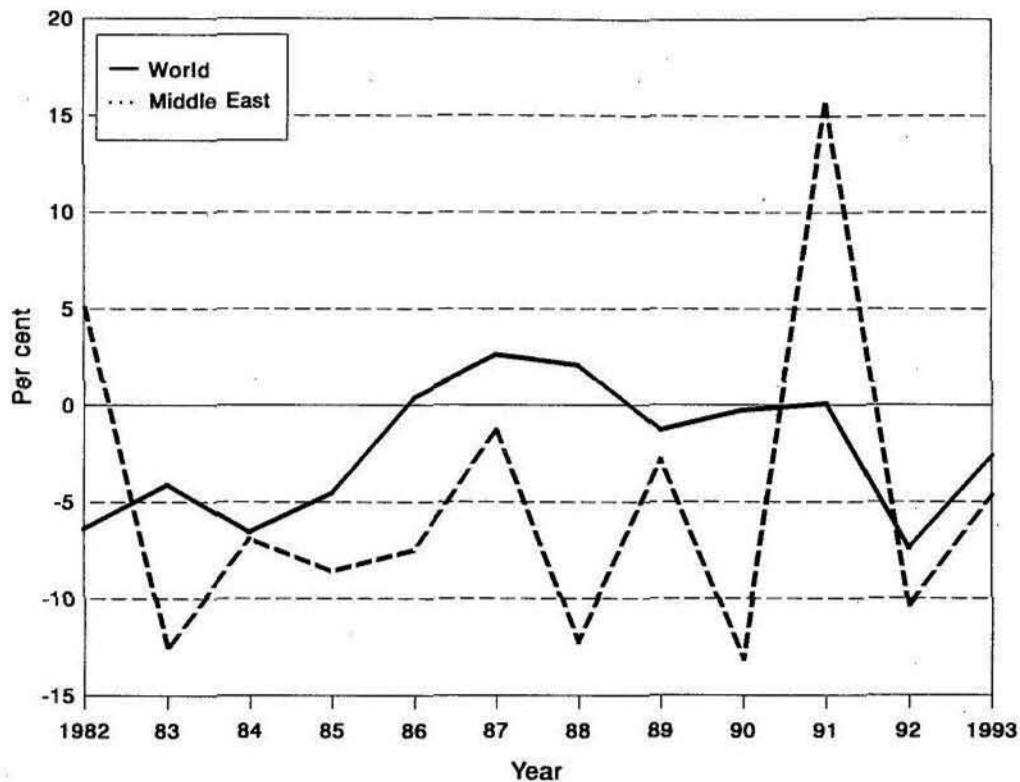
Source: IMF, Wharton Econometrics Services.

Figure 6-13. Annual change in real GDP and GDP per capita — Middle East



Note.— 1993 figures are from estimated data.  
 Source: ICAO Air Transport Reporting Form EF-1.

Figure 6-14. Scheduled airline operating revenues and expenses — Middle East



Notes: — 1993 figures are from estimated data.

— Real yield for scheduled airlines measured in U.S. cents per PKP deflated by U.S. Consumer Price Index.

Source: ICAO Air Transport Reporting Forms A-1 and EF-1.

**Figure 6-15. Annual change in real scheduled passenger yield — Middle East and World**

### ***Airline Passenger Traffic Trends and Forecast***

34. Over the 1982-1992 period, scheduled passenger traffic (passenger-kilometres performed) of the airlines of the Middle East region increased at an average annual rate of 4.9 per cent (compared with the world annual average of 5.4 per cent). After declines in 1990 and 1991 associated primarily with the Gulf war, traffic recovered strongly, growing at 17 per cent in 1992 and 9.4 per cent in 1993. The year-to-year traffic growth comparison between world and Middle East airlines is shown in Figure 6-16.

35. As shown in Table 5-6 of Chapter 5 and illustrated in Figure 6-16, scheduled passenger traffic for the airlines of the Middle East region is expected to increase by 7.4, 6.5 and 6.7 per cent for the years 1994, 1995 and 1996 respectively, compared with world airline growth of 5.2, 6.4 and 7.1 per cent. These regional growth rates are higher than those achieved during most of the 1980s and reflect an improved economic performance.

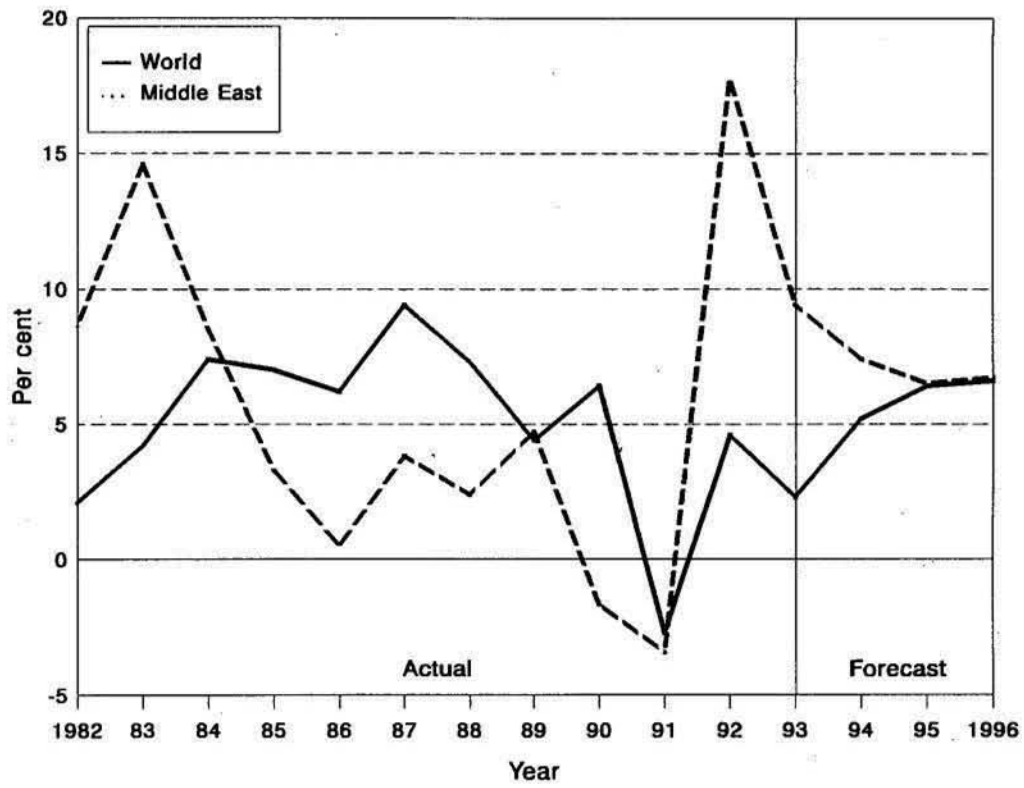


Figure 6-16. Scheduled passenger traffic growth (PKPs) — Middle East and World

## NORTH AMERICA

*The Region in 1993***Table 6-5. Scheduled traffic — airlines of North America**

	INTERNATIONAL			TOTAL		
	1993	Increase over 1992 (%)	Share of world traffic (%)	1993	Increase over 1992 (%)	Share of world traffic (%)
Passengers carried (thousands)	58 040	4.9	18.1	486 790	0.6	41.6
Passenger-kilometres performed (millions)	248 810	4.2	23.8	816 190	1.2	41.4
Freight and mail tonne-kms performed (millions)	10 500	6.5	18.1	20 920	4.8	28.7

Source: ICAO Air Transport Reporting Form A-1.

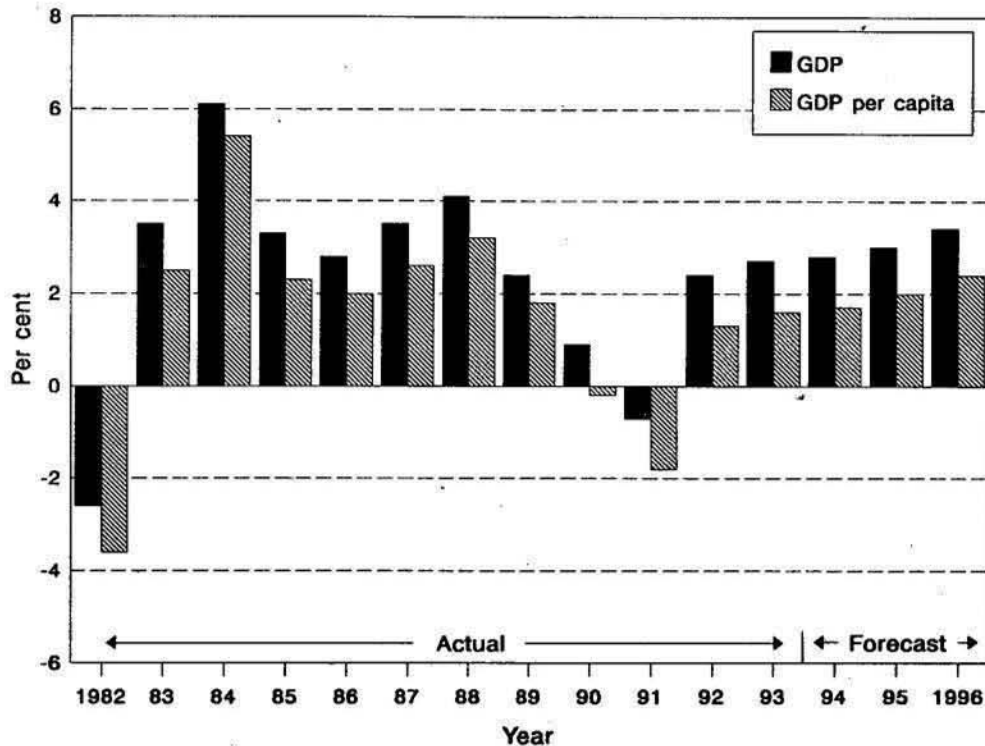
36. Although no formal negotiations were held in 1993, Canada and the United States continued efforts in informal exploratory talks to update their transborder air services arrangements. Some additional new services under an existing agreement on regional air services were approved.

37. As a result of a decision of the Canadian Competition Tribunal the two major Canadian airlines, Air Canada and Canadian Airlines International dissolved their partnership in the Gemini computer reservations system. The withdrawal of Canadian Airlines International from Gemini permitted the completion of an agreement for AMR Corporation, the parent of American Airlines, to make a significant equity infusion in the Canadian air carrier on the basis of a contract for computer reservation systems and other services.

***Economic Trends***

38. Over the 1982-1992 period, the aggregate North American economy (GDP) grew at an average annual rate of 2.7 per cent in real terms, and GDP per capita increased at 1.7 per cent per annum. The year-to-year changes in the region's GDP and GDP per capita are illustrated in Figure 6-17.

39. The recovery from recession in the United States economy began in 1992 and continued in 1993 with GDP increasing at 2.6 and 2.8 per cent per annum respectively. Real growth in the United States economy is expected to be around 3 per cent in 1994. Recovery in the Canadian economy is also gaining momentum. North American GDP is expected to grow at 2.8 per cent, 3.0 per cent and 3.3 per cent in 1994, 1995 and 1996 respectively.



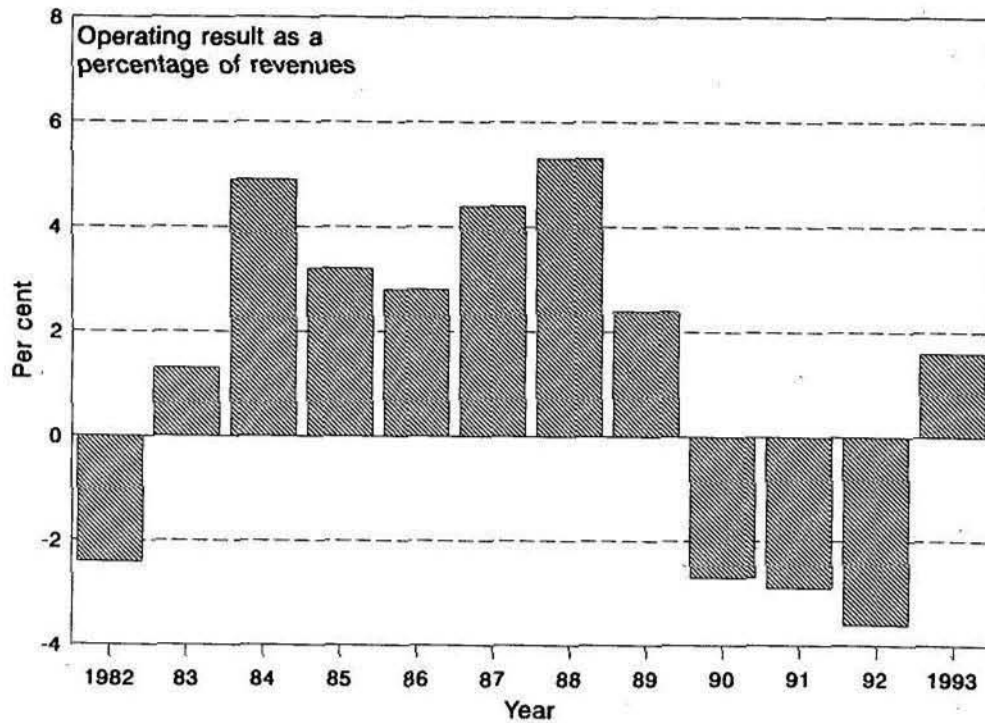
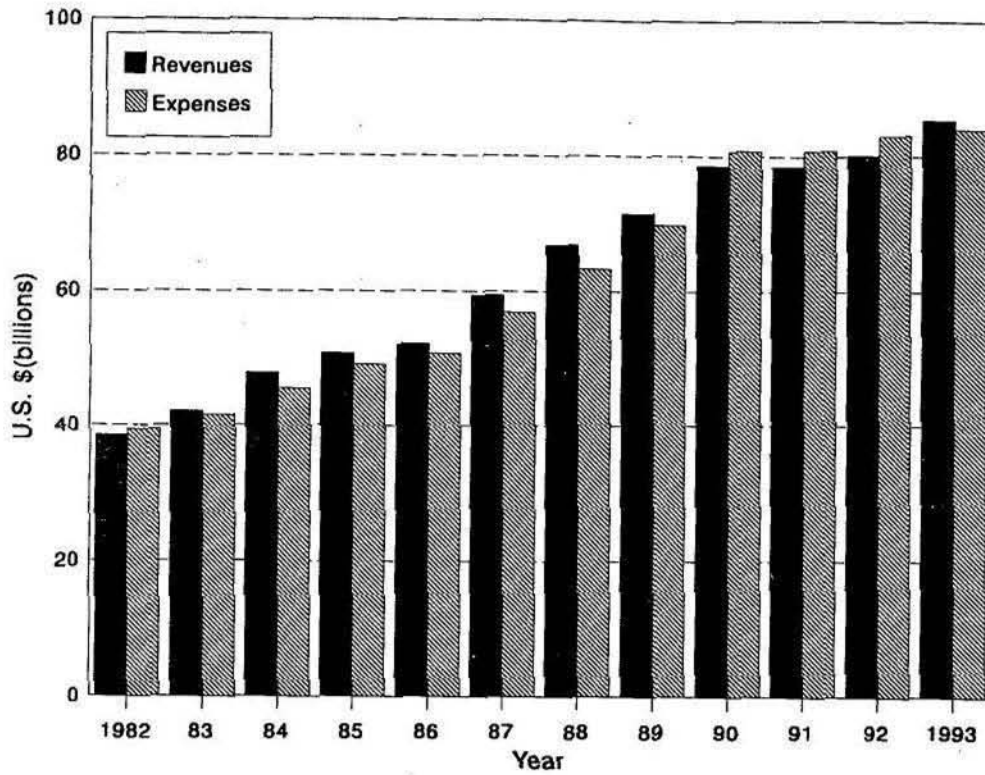
Source: IMF, Wharton Econometrics Services.

Figure 6-17. Annual change in real GDP and GDP per capita — North America

### Airline Financial Trends

40. Over the 1982-1992 period, operating revenues (in United States dollars) of the scheduled airlines of the North American region increased at an average annual rate of 7.6 per cent (compared with the world annual average of 8.8 per cent). Operating expenses for the same period increased by 7.8 per cent per annum. The string of operating surpluses in the 1983 to 1989 period gave way to serious deficits in 1990, 1991 and 1992 as illustrated in Figure 6-18. An operating surplus was expected in 1993.

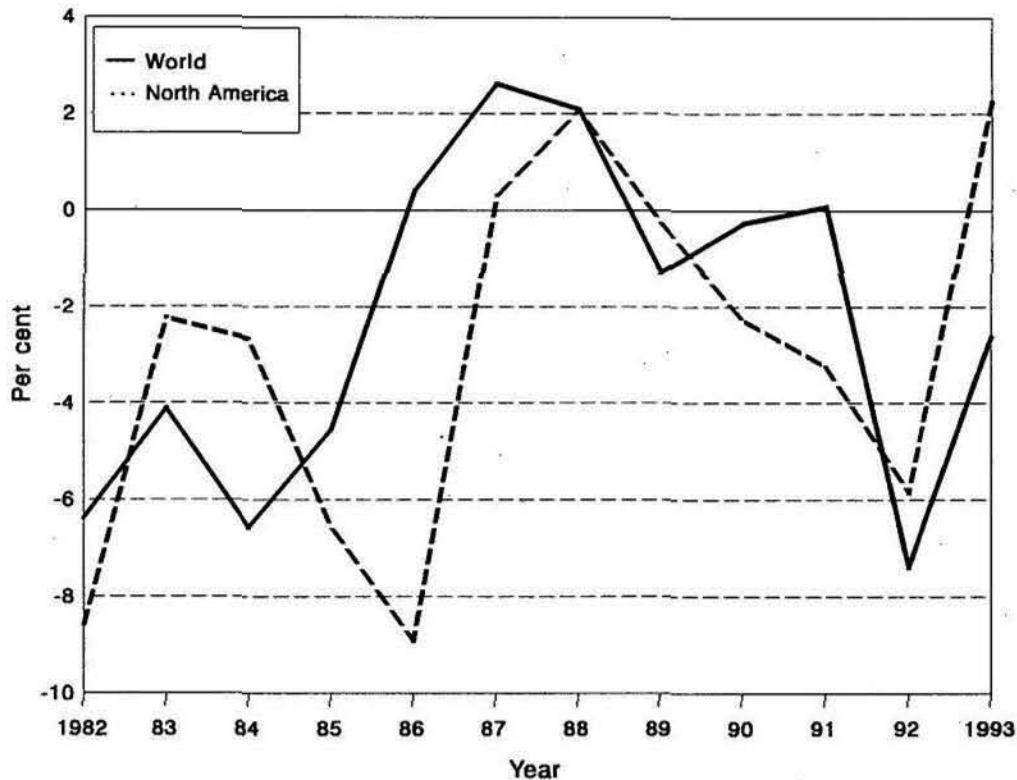
41. For the 1982-1992 period, average scheduled passenger yields for airlines of the region, measured in terms of cents per passenger-kilometre performed (PKP), declined at an average annual rate of 3.0 per cent in real terms (compared with a 1.3 per cent decline for the world). However, the real yield is estimated to have increased by about 2 per cent in 1993 (in contrast to the decline of 6 per cent in 1992). The year-to-year comparisons of the changes in real passenger yield of North American and world airlines are illustrated in Figure 6-19. In general, the passenger yields achieved by the region's airlines were lower than the world average.



Note.— 1993 figures are from estimated data.  
 Source: ICAO Air Transport Reporting Form EF-1.

Figure 6-18. Scheduled airline operating revenues and expenses — North America





Notes: — 1993 figures are from estimated data.

— Real yield for scheduled airlines measured in U.S. cents per PKP deflated by U.S. Consumer Price Index.

Source: ICAO Air Transport Reporting Forms A-1 and EF-1.

**Figure 6-19. Annual change in real scheduled passenger yield — North America and World**

### ***Airline Passenger Traffic Trends and Forecast***

42. Over the 1982-1992 period, scheduled passenger traffic (passenger-kilometres performed) of the airlines of the North American region increased at an average annual rate of 6.1 per cent (compared with the world average of 5.4 per cent). After the decline in traffic in 1991, significant growth was recorded in 1992. However, this was in part the result of sharp competitive declines in yield, and therefore did not lead to a positive financial result. Traffic growth has been estimated to be much less in 1993 because of the turnaround in fares and yield. The year-to-year traffic growth comparison between world and North American airlines is shown in Figure 6-20.

43. As shown in Table 5-6 of Chapter 5 and illustrated in Figure 6-20, scheduled passenger traffic for the airlines of the North American region is expected to increase by 4.6, 5.5 and 5.7 per cent for the years 1994, 1995 and 1996 respectively, slightly below the expected growth pattern for the world as a whole (5.2, 6.4 and 7.1 per cent).

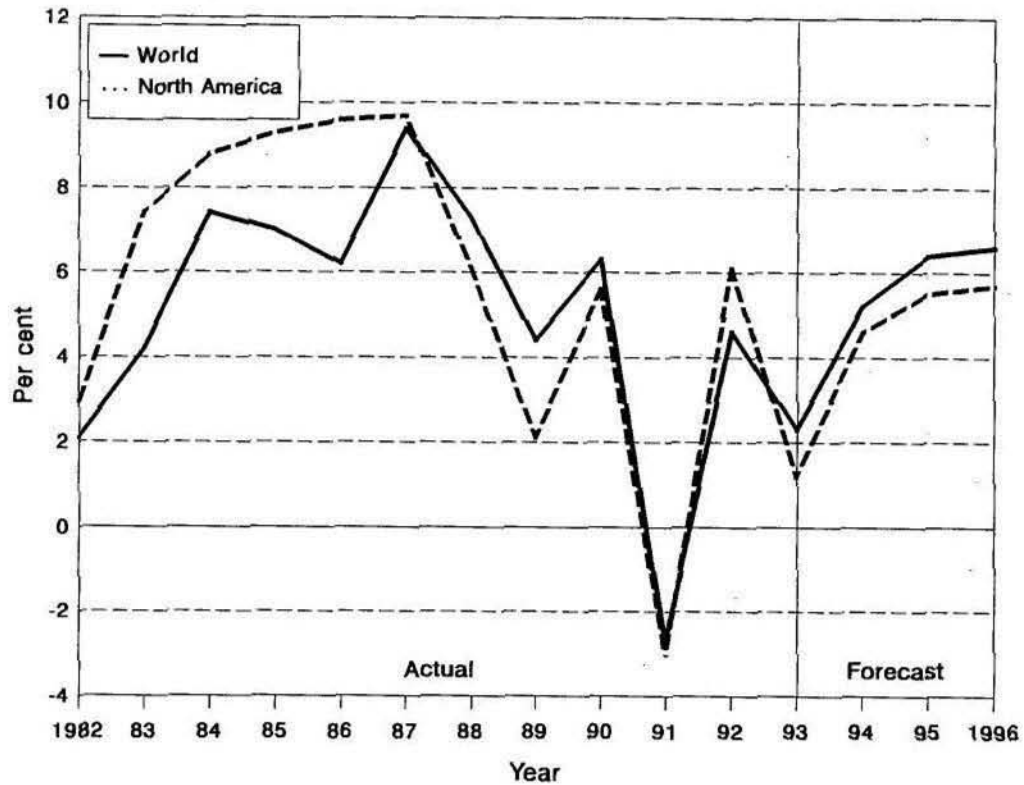


Figure 6-20. Scheduled passenger traffic growth (PKPs) — North America and World

## LATIN AMERICA AND THE CARIBBEAN

### The Region in 1993

**Table 6-6. Scheduled traffic — airlines of Latin America and the Caribbean**

	INTERNATIONAL			TOTAL		
	1993	Increase over 1992 (%)	Share of world traffic (%)	1993	Increase over 1992 (%)	Share of world traffic (%)
Passengers carried (thousands)	23 570	1.5	7.4	68 950	1.1	5.9
Passenger-kilometres performed (millions)	58 840	2.4	5.6	93 950	2.3	4.8
Freight and mail tonne-kms performed (millions)	2 820	8.5	4.9	3 520	10.7	4.8

Source: ICAO Air Transport Reporting Form A-1.

44. During 1993 several States in Latin America, and in particular those which are members of the Andean Pact, continued a policy of liberalization of air transport for services between and within their territories.

### Economic Trends

45. Over the 1982-1992 period, the aggregate Latin America/Caribbean economy (GDP) grew at an average annual rate of 1.7 per cent in real terms, although GDP per capita fell at 0.4 per cent. The economy in this region was severely affected by the recessions in the early 1980s and (to a lesser extent) the late 1980s. The year-to-year changes in the region's GDP and GDP per capita are illustrated in Figure 6-21.

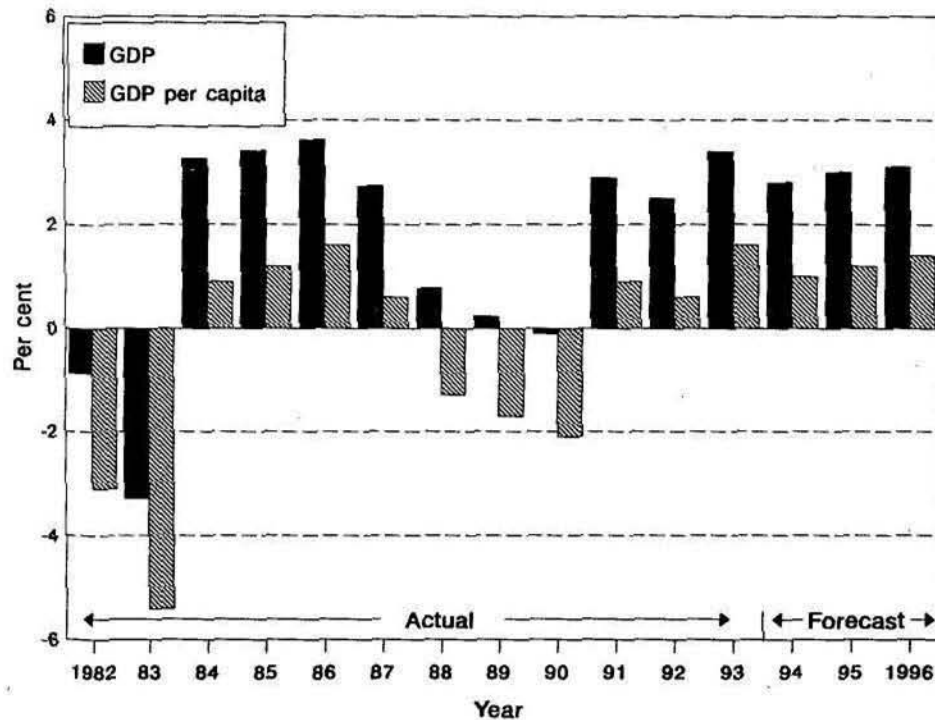
46. Economic stabilization, trade liberalization, and fiscal and structural reforms in the region have brought about a reduction in inflation and improved economic growth in the last three years. Further progress is anticipated over the medium term, and GDP is forecast to grow at 2.8 per cent, 3.0 per cent and 3.1 per cent in 1994, 1995 and 1996 respectively.

### Airline Financial Trends

47. Over the 1982-1992 period, operating revenues (in United States dollars) of the scheduled airlines of the Latin America/Caribbean region increased at an average annual rate

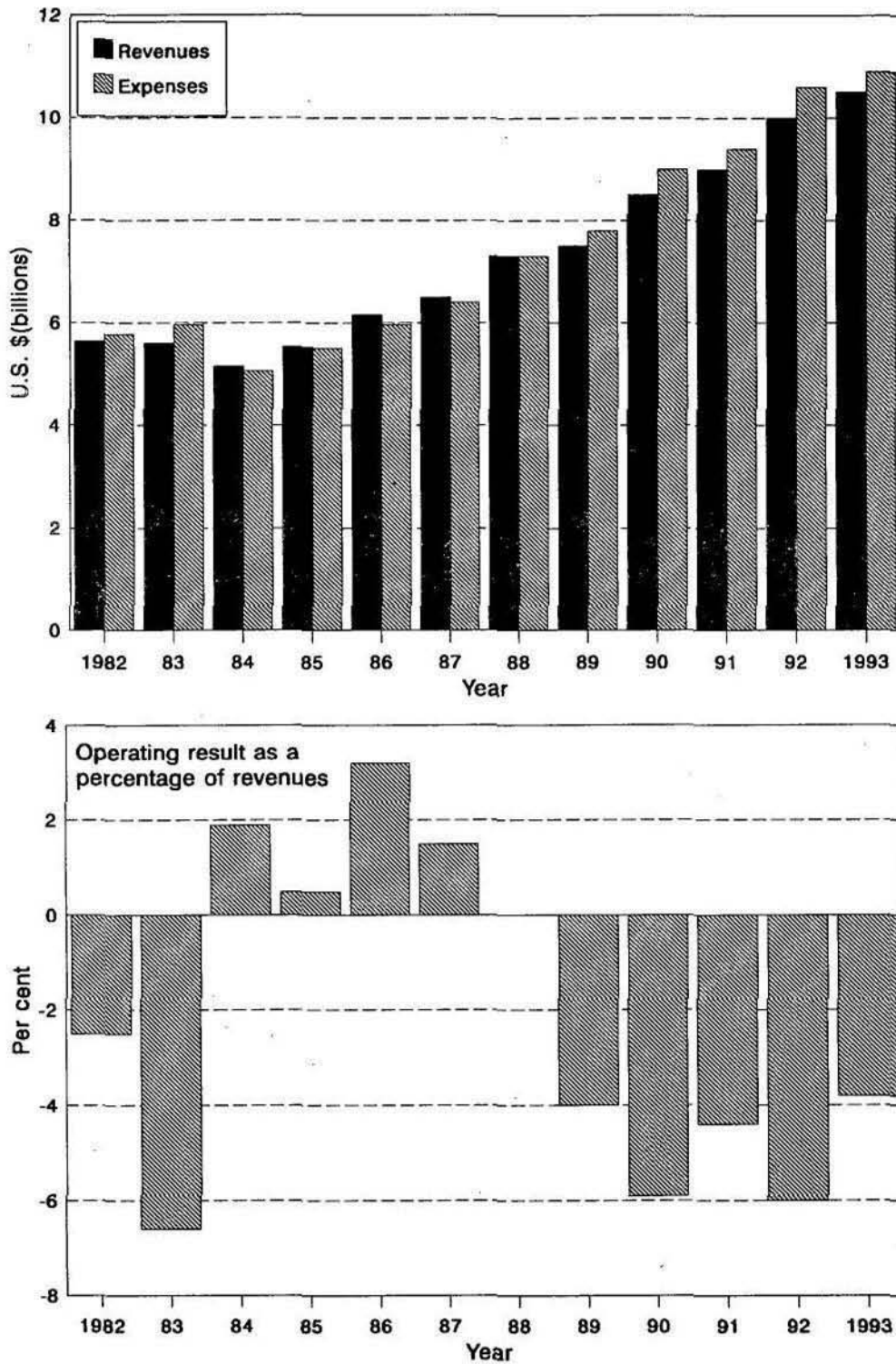
of 5.9 per cent (compared with the world annual average of 8.8 per cent). Operating expenses for the same period increased by 3.9 per cent per annum. In six of the 11 years, operating losses were incurred, with modest operating surpluses being achieved in the mid-1980s when general economic conditions were relatively buoyant, as illustrated in Figure 6-22. It is estimated that the losses continued into 1993.

48. For the 1982-1992 period, average scheduled passenger yields for airlines of the region, measured in terms of cents per passenger-kilometre performed (PKP), declined at an average annual rate of 2.1 per cent in real terms (compared with a 1.3 per cent decline for the world). The year-to-year comparisons of the changes in real passenger yield of Latin America/Caribbean and world airlines are illustrated in Figure 6-23.



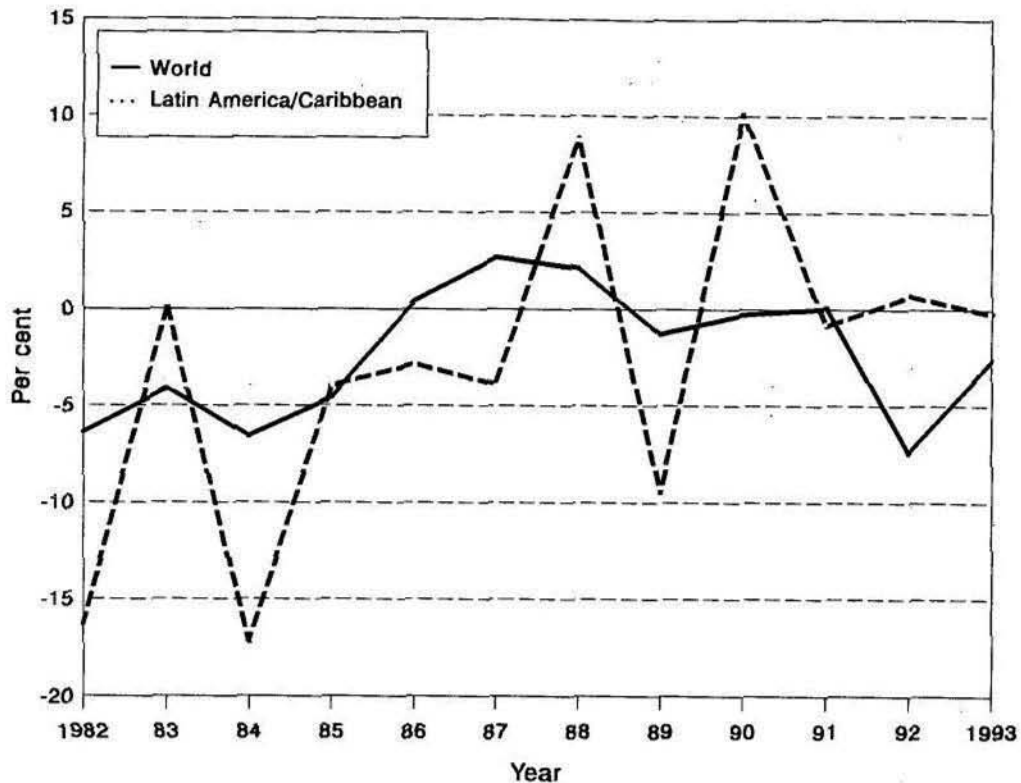
Source: IMF, Wharton Econometrics Services.

Figure 6-21. Annual change in real GDP and GDP per capita — Latin America/Caribbean



Note.— 1993 figures are from estimated data.  
 Source: ICAO Air Transport Reporting Form EF-1.

Figure 6-22. Scheduled airline operating revenues and expenses — Latin America/Caribbean



Notes: — 1993 figures are from estimated data.

— Real yield for scheduled airlines measured in U.S. cents per PKP deflated by U.S. Consumer Price Index.

Source: ICAO Air Transport Reporting Forms A-1 and EF-1.

**Figure 6-23. Annual change in real scheduled passenger yield — Latin America/Caribbean and World**

### ***Airline Passenger Traffic Trends and Forecast***

49. Over the 1982-1992 period, scheduled passenger traffic (passenger-kilometres performed) of airlines of the Latin America/Caribbean region increased at an average annual rate of 4.3 per cent (compared with the world annual average of 5.4 per cent). Traffic grew by 3.6 per cent in 1992 followed by an estimated 2.3 per cent growth in 1993. The year-to-year traffic growth comparison between world and Latin America/Caribbean airlines is shown in Figure 6-24.

50. As shown in Table 5-6 of Chapter 5 and illustrated in Figure 6-24, and in response to expectations of improved economic performance, scheduled passenger traffic of the airlines of the Latin America/Caribbean region is forecast to increase at 4.3 per cent, 5.5 per cent and 6.3 per cent in 1994, 1995 and 1996 respectively, which is a little below the expected growth pattern for the world as a whole (5.2, 6.4 and 7.1 per cent).

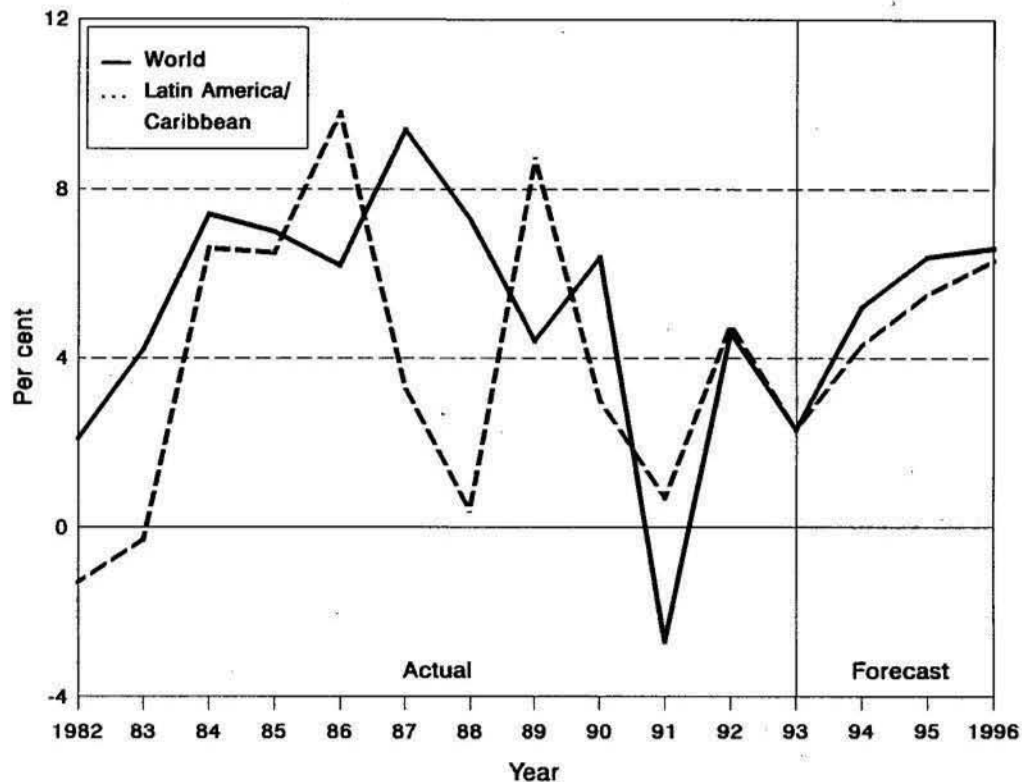


Figure 6-24. Scheduled passenger traffic growth (PKPs) — Latin America/Caribbean and World

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## APPENDICES

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# Appendix 1

## Statistical Tables

Table A1-1. Regional distribution of scheduled traffic — 1993

By ICAO statistical region of airline registration	Aircraft kilometres (millions)	Aircraft departures (thousands)	Passengers carried (thousands)	Passenger- kilometres performed (millions)	Passenger load factor (%)	Tonne-kilometres performed		Tonne- kilometres available (millions)	Weight load factor (%)
						Freight (millions)	Total (millions)		
<b>Total (international and domestic) services of airlines of ICAO Contracting States</b>									
Europe (including CIS*)	—	—	302 706	507 620	67	20 298	68 262	112 950	60
Percentage of world traffic			25.9	25.8		30.0	27.2	26.0	
Europe (not including CIS)	3 370	3 623	237 706	403 220	66	18 948	57 392	91 058	63
Percentage of world traffic			20.3	20.5		28.0	22.8	21.0	
Africa	411	408	23 773	41 739	60	1 242	5 014	10 278	49
Percentage of world traffic			2.0	2.1		1.8	2.0	2.4	
Middle East	428	323	30 328	58 438	65	2 942	8 378	14 544	58
Percentage of world traffic			2.6	3.0		4.3	3.3	3.3	
Asia and Pacific	2 875	2 514	258 430	452 903	71	22 083	62 320	99 104	63
Percentage of world traffic			22.1	23.0		32.6	24.8	22.8	
North America	7 820	6 913	486 788	816 190	64	17 674	95 103	175 073	54
Percentage of world traffic			41.6	41.4		26.1	37.9	40.3	
Latin America and Caribbean	1 087	1 351	68 950	93 950	60	3 411	12 143	22 330	54
Percentage of world traffic			5.9	4.8		5.0	4.8	5.1	
Total (including CIS)	—	—	1 170 975	1 970 840	66	67 650	251 220	434 279	58
<b>International services of airlines of ICAO Contracting States</b>									
Europe (including CIS)	2 806	1 989	134 545	353 460	66	18 793	52 719	82 927	64
Percentage of world traffic	39.0	53.2	42.0	33.8		33.8	34.1	32.7	
Europe (not including CIS)	2 700	1 953	132 195	344 000	66	18 553	51 617	80 695	64
Percentage of world traffic	37.6	52.2	41.3	32.9		33.3	33.3	31.8	
Africa	310	181	12 373	34 600	60	1 167	4 305	8 927	48
Percentage of world traffic	4.3	4.8	3.9	3.3		2.1	2.8	3.5	
Middle East	350	179	16 888	49 020	64	2 867	7 454	12 874	58
Percentage of world traffic	4.9	4.8	5.3	4.7		5.2	4.8	5.1	
Asia and Pacific	1 575	492	74 925	300 900	68	20 318	48 663	74 630	65
Percentage of world traffic	21.9	13.2	23.4	28.8		36.5	31.4	29.4	
North America	1 610	544	58 036	248 810	67	9 749	33 178	59 240	56
Percentage of world traffic	22.4	14.5	18.1	23.8		17.5	21.4	23.3	
Latin America and Caribbean	537	356	23 567	58 840	61	2 766	8 471	15 110	56
Percentage of world traffic	7.5	9.5	7.4	5.6		5.0	5.5	6.0	
Total (including CIS)	7 188	3 741	320 334	1 045 630	66	55 660	154 790	253 708	61

\* Commonwealth of Independent States

Source: ICAO Air Transport Reporting Form A-1.

**Table A1-2. Number of turbo-jet and turboprop aircraft delivered, ordered and remaining to be delivered up to 31 December 1993<sup>1</sup>**  
(commercial operators of ICAO Contracting States)

Type of aircraft	Before 1993	Delivered during 1993	Total as of 31/12/93	Ordered during 1993 <sup>2</sup>	Remaining to be delivered as of 31/12/93 <sup>3</sup>
<b>TURBO-JETS</b>					
Airbus Industrie A-300	384	22	406	4	71
Airbus Industrie A-310	223	22	245	—	15
Airbus Industrie A-319	—	—	—	—	6
Airbus Industrie A-320	362	71	433	—	210
Airbus Industrie A-321	—	—	—	—	153
Airbus Industrie A-330	—	1	1	—	117
Airbus Industrie A-340	—	21	21	5	94
Boeing 737	2 386	152	2 538	110	465
Boeing 747	935	56	991	2	156
Boeing 757	510	71	581	40	246
Boeing 767	468	51	519	66	141
Boeing 777	—	—	—	29	147
British Aerospace — 146/RJ 85/100	198	22	220	11	33
Canadair Regional Jet	3	22	25	22	33
Fokker 100	159	66	225	29	37
Fokker 70	—	—	—	23	23
McDonnell-Douglas MD-80/90	1 047	42	1 089	—	143
McDonnell-Douglas MD-11	76	36	112	—	60
Total of aircraft in production	6 751	655	7 406	341	2 150
Total of aircraft not in production <sup>4</sup>	5 963	—	5 963	—	—
Total turbo-jets	12 714	655	13 369	341	2 150
<b>TURBOPROPS</b>					
Aerospatale/Aeritalia ATR-42/72	315	47	362	61	60
British Aerospace ATP	50	2	52	3	6
British Aerospace Jet Stream 41	—	17	17	2	10
DeHavilland Canada DHC-8	325	35	360	11	33
Dornier DO-328	—	3	3	—	36
Embraer EMB-120 Brasilia	263	15	278	18	40
Fokker 50	150	20	170	2	12
SAAB SF-340	324	27	351	11	52
SAAB 2000	—	—	—	—	36
Total of aircraft in production	1 427	166	1 593	108	285
Total of aircraft not in production <sup>4</sup>	2 560	—	2 560	—	—
Total turboprops	3 987	166	4 153	108	285

1. The numbers given are estimated on the basis of information supplied by aircraft manufacturers; in many instances, numbers for past years have been revised; owing to lack of information, the aircraft manufactured in the CIS are not included in this table.
2. The numbers do not include options by commercial operators for transport aircraft.
3. The numbers in this column take into account cancellations during the year.
4. These figures are the cumulative totals of deliveries for aircraft types no longer in production after 1992.

**Table A1-3. Aircraft accidents involving passenger fatalities on scheduled air services, 1974-1993**

Year	Aircraft accidents	Passengers killed	Passenger fatalities per 100 million		Fatal accidents per 100 million		Fatal accidents per 100 000		
			passenger-km	passenger-miles	km flown	miles flown	aircraft hours	aircraft landings	
<b>Excluding the Commonwealth of Independent States</b>									
1974	29	1 299	0.24	0.38	0.39	0.63	0.23	0.30	
1975	21	467	0.08	0.13	0.28	0.45	0.17	0.22	
1976	20 <sup>1</sup>	734	0.12	0.19	0.26	0.41	0.15	0.20	
1977	24	516	0.07	0.12	0.30	0.48	0.18	0.24	
1978	25	754	0.09	0.15	0.29	0.47	0.18	0.24	
1979	31	877	0.10	0.16	0.34	0.55	0.21	0.29	
1980	22	814	0.09	0.14	0.24	0.38	0.15	0.21	
1981	21	362	0.04	0.06	0.23	0.37	0.14	0.20	
1982	26	764	0.08	0.13	0.28	0.46	0.18	0.25	
1983	20 <sup>2</sup>	809	0.08	0.13	0.21	0.34	0.13	0.18	
1984	16	223	0.02	0.03	0.16	0.26	0.10	0.14	
1985	22	1 066	0.09	0.15	0.21	0.34	0.13	0.19	
1986	17	331	0.03	0.04	0.15	0.24	0.09	0.14	
1987	24	890	0.06	0.10	0.20	0.32	0.12	0.18	
1988	25	699	0.05	0.08	0.19	0.31	0.12	0.18	
1989	27	817	0.05	0.08	0.20	0.32	0.12	0.19	
1990	22	440	0.03	0.04	0.15	0.25	0.09	0.15	
1991	25 <sup>3</sup>	510	0.03	0.05	0.18	0.28	0.11	0.18	
1992	25	990	0.06	0.09	0.16	0.26	0.10	0.17	
1993	31	801	0.04	0.07	0.19	0.31	0.12	0.20	
<b>Including the Commonwealth of Independent States</b>									
1986	22	546	0.04	0.06	na	na	na	na	
1987	26	901	0.06	0.09	na	na	na	na	
1988	28	729	0.04	0.07	na	na	na	na	
1989	27	817	0.05	0.07	na	na	na	na	
1990	25	495	0.03	0.04	na	na	na	na	
1991	30 <sup>3</sup>	653	0.04	0.06	na	na	na	na	
1992	29	1 097	0.06	0.09	na	na	na	na	
1993	34	936	0.05	0.08	na	na	na	na	

1. Includes one mid-air collision shown here as one accident.
2. Includes one collision on the ground shown here as one accident.
3. Includes one collision on the ground shown here as two accidents.

na not available

Source: ICAO Air Transport Reporting Form G and other reports.

Table A1-4. Aviation security

Year	Number of acts of unlawful interference	Number of acts of unlawful seizure		Number of acts of sabotage	Other acts*	Number of persons injured or killed during acts of unlawful interference	
		Attempted seizures	Actual seizures			Injured	Killed
1974	47	13	14	20	—	51	178
1975	47	11	12	24	—	217	92
1976	54	13	13	28	—	215	218
1977	65	16	18	31	—	71	133
1978	37	13	13	11	—	22	59
1979	37	10	16	11	—	194	64
1980	54	17	29	8	—	39	72
1981	53	14	24	15	—	39	8
1982	36	11	19	6	—	119	14
1983	45	17	21	7	—	70	15
1984	41	7	21	13	—	249	68
1985	40	7	20	13	—	243	473
1986	14	6	5	3	—	235	112
1987	13	6	4	3	—	121	166
1988	12	3	7	2	—	21	300
1989	14	4	8	2	—	38	278
1990	36	12	20	1	3	145	137
1991	15	5	7	0	3	2	0
1992	10	2	6	0	2	123	10
1993	29	4	21	0	4	2	28

\* Includes missile and facility attacks.

# Appendix 2

## Methodology for Traffic Forecasts

1. Short- or medium-term air transport forecasting methods depend heavily on careful analysis of recent trends in the aviation industry and of the operating environment as well as economic and demographic factors affecting air travel and the cost of air travel itself.
2. As a basis for the development of traffic forecasts, econometric analyses were carried out which established a relationship between passenger traffic demand, GDP, GDP/capita and airline yields. Several econometric models were developed at global and regional levels. While at a global level, these models appear to provide reasonably robust results, they have been less adequate at the regional level.
3. Based on forecasts of economic developments and expectations of yield, traffic forecasts for the years 1994, 1995 and 1996 were estimated using the econometric models. The forecast traffic growth rates were then reviewed in the light of recent trends in the airline operating environment and prospective changes in other factors which could not be accommodated in the econometric analyses.
4. The basic model form used for the global analysis is described below:

$$y = a \cdot x_1^{b_1} \cdot x_2^{b_2}$$

where:

$y$  = passenger-kilometres performed (PKP)

$x_1$  = gross domestic product in real terms (GDP)

$x_2$  = passenger revenue per passenger-kilometre in real terms (PYIELD)

5. The  $a$ ,  $b_1$  and  $b_2$  are constant coefficients whose values were obtained by statistical estimation procedures using econometric analysis;  $b_1$  and  $b_2$  are equal to the elasticities of demand with respect to corresponding  $x_1$  (GDP) and  $x_2$  (PYIELD), i.e. elasticities of income and price.
6. Using logarithmics, the above relationship was transformed into the equivalent linear relationship  $\ln y = a + b_1 \ln x_1 + b_2 \ln x_2$ . Annual data covering a period of 32 years were used in the subsequent econometric (least squares regression) analysis, with the following results at the global level.

---

$$\ln PKP = 1.14 + 2.11 \ln GDP - 0.62 \ln PYIELD$$

(27.8)                      (6.7)

$$R^2 = 0.999$$
$$S.E. = .025$$

R = coefficient of correlation

S.E. = standard error of the estimate

( ) = "t" values of the corresponding coefficient estimates

-- END --



## **ICAO PUBLICATIONS IN THE AIR TRANSPORT FIELD**

The following summary gives the status and also describes in general terms the contents of the various series of publications in the air transport field issued by the International Civil Aviation Organization:

**International Standards and Recommended Practices on Facilitation** (*designated as Annex 9 to the Convention*) which are adopted by the Council in accordance with Articles 37, 54 and 90 of the Convention on International Civil Aviation. The uniform observance of the specifications contained in the International Standards on Facilitation is recognized as practicable and as necessary to facilitate and improve some aspect of international air navigation, while the observance of any specification contained in the Recommended Practices is recognized as generally practicable and as highly desirable to facilitate and improve some aspect of international air navigation. Any differences between the national regulations and practices of a State and those established by an International Standard must be notified to the Council in accordance with Article 38 of the Convention. The Council has also invited Contracting States to notify differences from the provisions of the Recommended Practices;

**Council Statements** on policy relating to air transport questions, such as the economics of airports and en-route air navigation facilities, taxation and aims in the field of facilitation;

**Digests of Statistics** which are issued on a regular basis, presenting the statistical information received from Contracting States on their civil aviation activities;

**Circulars** providing specialized information of interest to Contracting States. They include regional studies on the development of international air passenger, freight and mail traffic and specialized studies of a world-wide nature;

**Manuals** providing information or guidance to Contracting States on such questions as airport and air navigation facility tariffs, air traffic forecasting techniques and air transport statistics.

Also of interest to Contracting States are reports of meetings in the air transport field, such as sessions of the Facilitation Division and the Statistics Division and conferences on the economics of airports and air navigation facilities. Supplements to these reports are issued, indicating the action taken by the Council on the meeting recommendations, many of which are addressed to Contracting States.

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*50th anniversary year edition*