

**1992-1995**

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# HIGHLIGHTS

## DURING 1992 ...

*The world economy showed signs of recovery ...*

The world's Gross Domestic Product (GDP) grew by an estimated 1 per cent in real terms. On a regional basis the change in GDP ranged from an estimated increase of 8 per cent for the Middle East to a decrease of about 4 per cent for Europe, the latter being adversely affected by the poor economic performance of the former centrally planned economies in Eastern Europe (see Chapter 1).

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

A growing number of countries were involved world-wide. The European Community (EC) adopted a "third package" of liberalization for application from 1 January 1993. In addition, member States of the EC and, with the exception of Switzerland, those of the European Free Trade Association (EFTA) reached agreement to extend EC air transport rules to the EFTA countries involved (Chapter 2).

*ICAO initiated a review of the economic regulation of air transport ...*

As an outcome of a World-wide Air Transport Colloquium in April, ICAO set up a study group of experts to carry out studies on new regulatory arrangements for international air transport. The results of these studies will be evaluated by an Air Transport Conference to be convened in November/December 1994 (Chapter 2).

*Airline privatization trends continued ...*

By year-end partial or full privatization objectives were made known for some 30 government-owned air carriers, including 16 which had been targeted for privatization in the three previous years but had not yet achieved this aim (Chapter 2).

*... as did foreign ownership ...*

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

*Airline traffic rebounded ...*

Total scheduled air traffic recovered from the first ever annual decline recorded, to reach levels above 1990. Overall passenger/freight/mail tonne-kilometres performed were up by 6 per cent and international tonne-kilometres by 11 per cent (Chapter 2).



*... but not finances ...*

Preliminary estimates indicate that the world's scheduled airlines as a whole experienced an operating loss (of 0.5 per cent of operating revenues) for the third year in a row (Chapter 2).

*... and aircraft orders were down ...*

The number of fixed wing aircraft ordered was 362 against 397 in 1991. The financial commitment for orders placed for turbo-jet aircraft in 1992 is estimated to be about U.S.\$21 billion, somewhat less than the U.S.\$29 billion estimated for 1991 (Chapter 2).

*Airport construction continued ...*

Two new international airports opened (Yaoundé-Nsimaleu in Cameroon and Munich II in Germany), 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).

*Satellite-based navigation systems got the green light ...*

The ICAO Assembly endorsed a blueprint for a global satellite-based Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) concept to replace existing line-of-sight systems (Chapter 3).

*Airspace capacity was enhanced ...*

Air traffic control systems around the world were being updated as part of the evolution process to a global ATM system. The European Air Traffic Control Harmonization and Integration Programme (EATCHIP) was initiated to establish a single, unified ATC system for Europe (Chapter 3).

*Safety remained a top priority ...*

Preliminary information on aircraft accidents involving passenger fatalities in scheduled air services shows there were 29 fatal aircraft accidents involving 1 097 passenger fatalities in 1992 compared to 30 fatal accidents and 653 passenger fatalities in 1991. The number of passenger fatalities per 100 million passenger-kilometres increased from 0.04 in 1991 to 0.06 in 1992. The incidence of aircraft accidents involving controlled flight into terrain (CFIT) became a particular concern (Chapter 4).

*Security was also at the forefront ...*

In 1992 there were nine acts of unlawful interference, a significant decrease compared to 1991 (Chapter 4).



*Automation of passenger and cargo clearance procedures advanced ...*

By year-end over 20 States were issuing machine readable passports, and during the year the ICAO Council approved specifications for machine readable visas to complement its specifications for machine readable passports.

*Environmental protection played an increasing role ...*

The "Earth Summit" led to increased public and governmental awareness of the need to address environmental problems. A wide range of air transport industry initiatives was taken to respond to environmental issues and ICAO's Committee on Aviation Environmental Protection (CAEP) commenced a review of the actions needed to control the effects of aircraft engine emissions around airports and in the upper atmosphere (Chapter 4).

*Smoking restrictions increased ...*

In response to public demand, a number of airlines worldwide increased restrictions on smoking on board aircraft on some or all of their flights. The ICAO Assembly urged all Contracting States to take necessary measures as soon as possible to restrict smoking progressively on all international passenger flights, with the objective of implementing complete smoking bans by 1 July 1996 (Chapter 4).

## **BETWEEN 1992 AND 1995 ...**

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

Total scheduled passenger traffic is expected to grow at about 6 per cent in 1993, 7 per cent in 1994 and just over 7 per cent in 1995 (in terms of passenger-kilometres performed) (Chapter 5).

*Airline finances should improve ...*

Scheduled airline revenues (including revenues from freight, mail and other sources) are expected to increase between 9 and 11 per cent each year, whereas airline expenses are expected to grow between 5 and 8 per cent (Chapter 5).

*Regional disparities in growth will continue ...*

The passenger traffic of airlines of Asia/Pacific is expected to show the highest annual average growth, about 10 per cent. The passenger traffic of airlines of the Middle East, North America and Latin America and the Caribbean regions are expected to grow at about the world average of 7 per cent per year, and that of the airlines of the Africa region at an annual average of some 6 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*, is the first in a new annual series resulting from a rationalization by the ICAO Council in 1991 of the various reviews of civil aviation developments published by the Organization. Part I reviews the main events in or affecting international civil aviation in 1992. Part II analyses trends in the world economy and the air transport industry and presents global forecasts of airline scheduled passenger traffic through to 1995. Part III reviews, on a region-by-region basis, the year 1992 and gives prospects through to 1995.

2. More extensive aviation statistics for the year 1992 may be found in the ICAO statistical yearbook, *Civil Aviation Statistics of the World, 1992* (Doc 9180/18), 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 2001* (Circular 237).

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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

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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 1992 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 (174 at the end of 1992);
- 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. The monetary unit throughout *The World of Civil Aviation* is the United States dollar.



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PART I  
THE WORLD IN 1992

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# Chapter 1

## The Economy

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 1992, which follows in Chapters 2 to 4, this chapter reviews developments in 1992 in world economic output, in inflation, interest rates and currency markets, in international tourism, in world trade and in crude oil and jet fuel availability and prices.

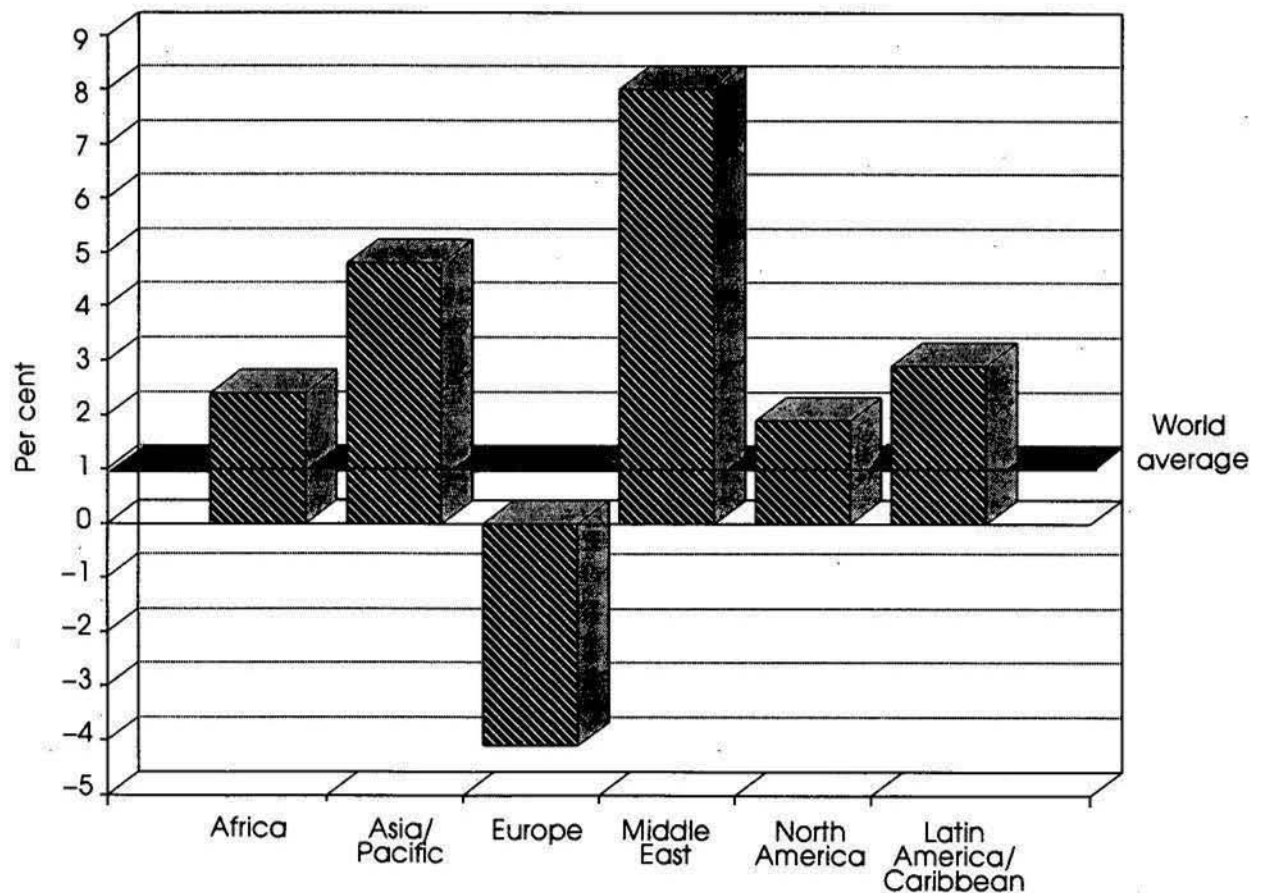
### OUTPUT

4. In 1992 the world's Gross Domestic Product (GDP), which is the broadest available measure of economic activity, grew by an estimated 1 per cent. Developed countries, with a collective expected growth of 1.7 per cent, had a disappointing year, particularly since monetary and fiscal policies had been adopted in a few of the major economies to promote growth. Consumer demand did not materialize as expected, in part due to concern regarding unemployment, which in 1992 continued to rise, and a reduction in property and equity values.
5. For the fourth year in succession economic growth for the least developed countries (LDCs) far exceeded that of developed countries, their collective GDP estimated as increasing by as much as 6 per cent. This growth was in part achieved through a strong recovery of economic activity in the Middle East following the Gulf war and by significant growth in the economies of some Asian countries such as China, Republic of Korea and Singapore. In contrast, in 1992 the former centrally planned economies showed a significant decrease in output. While the rate of decline in Eastern Europe slowed to about 10 per cent, the fall in output in the Commonwealth of Independent States appears to have accelerated, to some 18 per cent between 1991 and 1992. In 1992, economic growth in some countries in Africa continued to be marred by droughts and political unrest.

6. A summary of the estimated economic growth for 1992 giving the average for each ICAO statistical region compared with the world average is shown in Figure 1-1.

### INFLATION, INTEREST RATES AND CURRENCY MARKETS

7. The apparent reduction in consumer demand in 1992 occurred despite a fall in inflation. In the developed countries the average increase in prices was about 3 per cent, almost a percentage point lower than that in 1991. In the less developed countries the rate of inflation appeared to have remained at the same level as in 1991, about 40 per cent. The situation was, however, significantly different in the former centrally planned economies, the structural changes brought about by the ending of tight and artificial price controls causing sharp increases in prices. In 1992 prices in Eastern Europe were estimated to have risen eightfold while in the Commonwealth of Independent States they appeared to have increased thirteenfold.

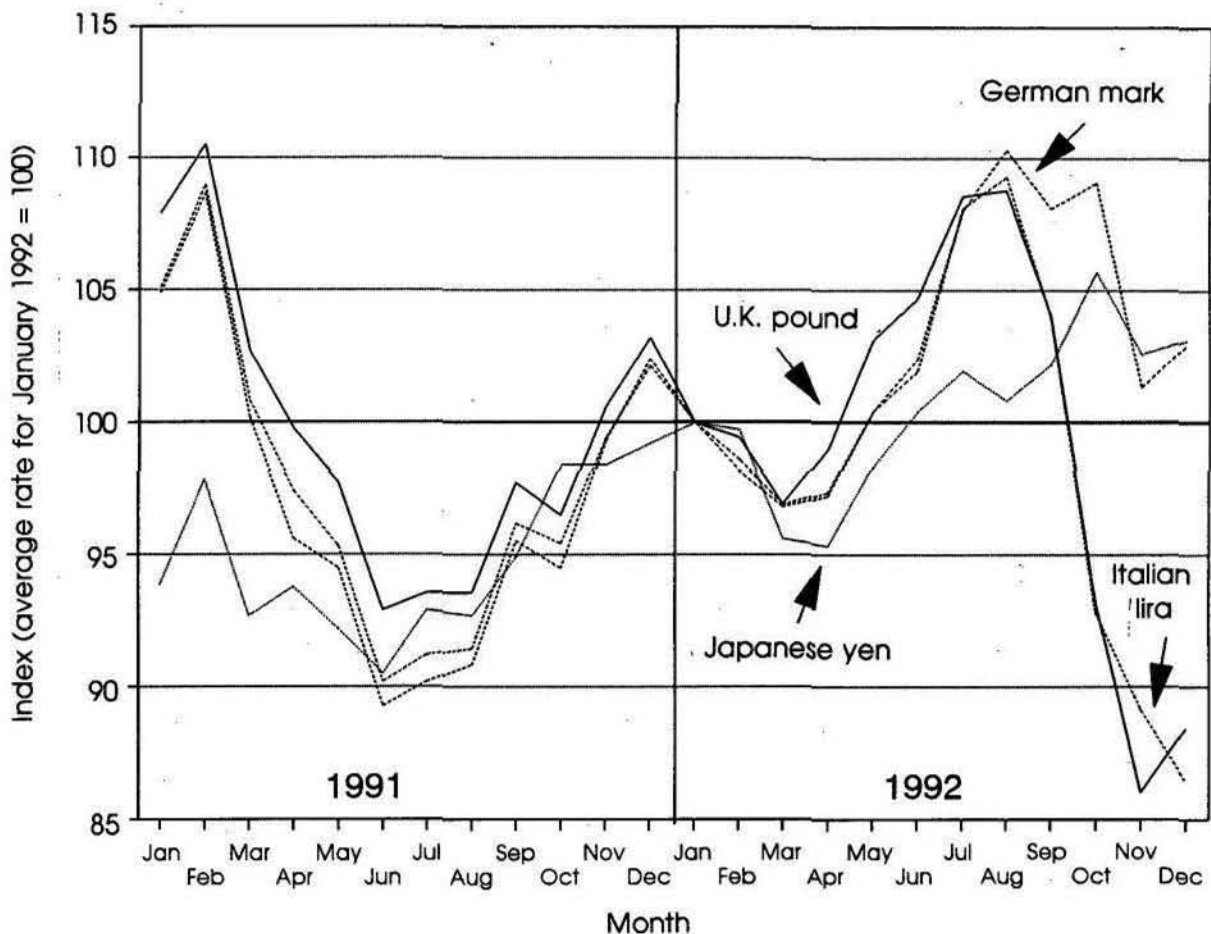


Source: ICAO estimates based on World Bank, International Monetary Fund (IMF), Wharton Econometrics Services and other economic sources.

**Figure 1-1. Annual change in real GDP, 1991-1992**

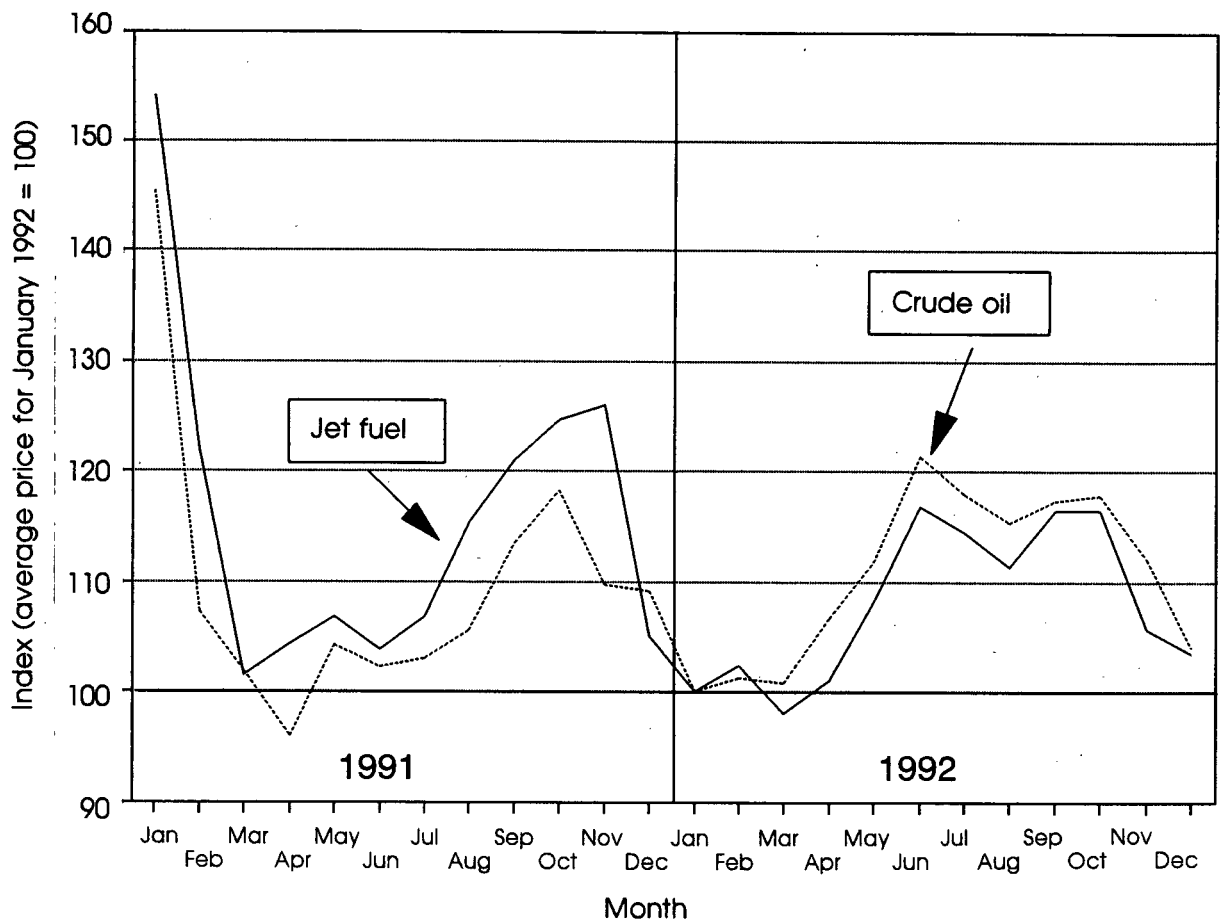
8. In North America and Japan, short-term interest rates were on a downward trend for most of 1992. In Europe, on the other hand, these rates moved slightly upwards because of Germany's high-interest rate policy designed to counter the inflationary tendencies caused in financing the unification of the country. Because currency parities within the European exchange-rate mechanism (ERM) are anchored within very narrow limits, effectively tied to the German mark, this high interest rate policy limited the ability of the other European countries to reduce interest rates to stimulate their economies.

9. In 1992, pressure began to build against some of the weaker currencies in the ERM or those linked to the European Currency Unit (ECU), causing some of them to devalue and for the UK pound and the Italian lira also to leave the ERM. The United States dollar, subject to a low interest rate policy, lost ground against the German mark and the Japanese yen for most of 1992 (Figure 1-2).



Source: IATA Five Day Rates.

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



Source: Petroleum Economist and The Journal of Commerce.

**Figure 1-3. Trends in crude oil and jet fuel prices  
(January 1991 — December 1992)**



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## TOURISM

10. In 1992 international tourism demonstrated resilience world-wide, showing gains in all regions over 1991. Preliminary results published by the World Tourism Organization (WTO) indicate that in 1992 there was an over-all increase of about 5 per cent in tourist arrivals over 1991, whereas tourist receipts are estimated to have increased some 7 per cent. The WTO's East Asia/Pacific region showed the largest increase in tourist arrivals (just over 8 per cent), from a combined increase in intra-regional and long distance travel.

## TRADE

11. After an indifferent performance in 1991, world trade appeared to have achieved a small recovery (plus 4 per cent) in terms of volume in 1992. Although this is comparable to (indeed slightly above) the growth rates achieved in the two preceding years, it is well below the average of 6 per cent per annum seen in the five-year period to 1989.

## CRUDE OIL AND JET FUEL

12. In 1992 there was little change over 1991 in the world-wide demand for oil, and crude oil prices remained stable throughout the year. This resulted in relatively stable jet fuel prices since jet fuel prices closely reflected changes in crude oil prices during 1992 (Figure 1-3), a notable difference when compared with the volatility in the price of jet fuel during the two previous years following the invasion of Kuwait.

# Chapter 2

## AIR CARRIERS AND THEIR FLEETS

1. This chapter reviews developments in 1992 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 1992 is also included.

### ECONOMIC REGULATION

2. Progressive liberalization of air transport services continued in 1992 in and between a growing number of countries. The growth in the number of new or amended bilateral air services agreements continued with about 60 new and 30 amended agreements being reported. About two-thirds of both the new and the amended bilateral agreements were between States in different regions.

3. With about 30 airlines at different stages of preparation for privatization (see paragraphs 16 and 17 below), various States continued, during 1992, to re-examine their policies and legislation regarding foreign ownership and control of national air carriers, generally seeking an acceptable balance between perceived needs to attract foreign investment in these carriers and the desire to ensure that management and control remained with their nationals. In Canada, the Ministerial Task Force on International Air Policy recommended raising the limit on foreign investment in national airlines from 25 to 49 per cent. Following the bid by British Airways for a stake in US Air, this issue came under close scrutiny in the United States where the debate focused on what conditions, if any, should be placed on increased foreign ownership. In Australia, the government opted to retain a 35 per cent limit on foreign investment in Qantas, rejecting a ministerial submission in favour of raising this limit to 49 per cent; it also maintained the maximum holding by a foreign airline at 25 per cent.

4. The Uruguay Round of trade negotiations continued throughout 1992, having under consideration, *inter alia*, a draft annex on air transport services which would apply the provisions of a draft General Agreement on Trade in Services (GATS) to certain aspects of air transport such as repair and maintenance of aircraft, sale and marketing of air transportation, and computer reservation systems.

5. During 1992, the member States of the European Community (EC) concluded their negotiations on a "third package" of liberalization, enabling the measures to come into force on 1 January 1993. Fares and rates, capacity and market access were greatly liberalized for

relations between EC member States, and new EC rules on the licensing of air carriers were introduced. The Community subsequently turned its attention to the issue of aviation relations with third countries. States in other regions initiated or continued efforts to deal with air service matters on a regional basis.

6. An agreement was completed in July 1992 between the EC and Norway and Sweden. This agreement reflected the EC's "second package" of liberalization measures and will be superseded with the establishment of the European Economic Area (EEA) in mid-1993. The EEA agreement, negotiated and signed in 1992, involves all member States of the EC and, with the exception of Switzerland, those of the European Free Trade Association (EFTA). As far as civil aviation is concerned, the agreement will extend EC air transport rules to the EFTA countries involved.

7. World-wide efforts by national postal administrations to increase their competitiveness against independent air express and courier services resulted in 1992 in some important initiatives. For example, the Spanish government decided to end the domestic air mail monopoly of Iberia and to issue a tender to all interested parties, and in the United Kingdom the British Post Office launched a night-time express network to be operated through contracts with eleven domestic air carriers. On the international front, a new joint venture was launched in October 1992 by the Canadian, Dutch, French, German and Swedish postal administrations together with TNT Express Worldwide to handle their international express business.

8. In April 1992, ICAO held a World-wide Air Transport Colloquium at which leading policy-makers and experts debated important aspects of the future of international air transport regulation. Building on the momentum established, an ICAO study group of experts was created to carry out studies on new arrangements, the results of which would be evaluated by an Air Transport Conference to be convened in November/December 1994.

## MARKET ENTRY AND EXIT

### *New and Discontinued Carriers*

9. During 1992, some 218 air carriers were reported to have started operations, and a further 110 to have been constituted but, by the end of the year, to have yet to commence operations. Some 50 air carriers went out of business, including a few that had never commenced operations. 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 1 200 at year-end.

10. 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. About one-quarter of the new entrants was accounted for in Australia, China, India, Mexico, Russian Federation and South Africa, while another quarter was accounted for in the United States and the European Community.

11. Among the estimated 218 new air carriers which became operational during 1992, more than 20 per cent commenced international scheduled passenger services, just over 25 per cent started domestic scheduled passenger services and about 30 per cent started non-scheduled passenger services, the remainder being accounted for by all-freight operations. More than a dozen of the new all-freight carriers, predominantly in Africa and Latin America, set up operations with Soviet-built aircraft wet-leased from airlines and other companies of the Commonwealth of Independent States.

12. Among the 50 or so airlines which ceased operations in 1992 there were some well-known names such as Cruzeiro do Sul (Brazil) formed in 1927, Dan-Air (United Kingdom) formed in 1953 and UTA (France) formed in 1963. Each of these carriers was merged with the major international carriers of their respective countries.

13. It is estimated that at the end of 1992 there were some 326 air carriers world-wide providing international scheduled passenger services and about 49 air carriers operating international scheduled all-freight services. Over a half of all air carriers operating international scheduled services at the end of 1992 were accounted for by two regions, Europe (some 30 per cent) and Latin America/Caribbean (nearly 25 per cent).

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

14. During 1992 the world's airlines continued to restructure their networks. In September 1992 there were some 1 760 new direct (single aircraft) airlinks between international city-pairs, while 1 230 links were eliminated as compared with September 1991, thus bringing about a net increase of 530 in the number of city-pairs with direct airlinks. For the same 12-month period one year earlier there had been a net decrease of about 750 airlinks.

15. As for the previous year, half of the new direct airlinks were established within three route areas: within Europe, within North America and within Asia/Pacific, with various inter-regional links representing about 40 per cent of the new services. Three route groups experienced a net decrease in the number of direct airlinks: within and between Central America and the Caribbean; within Africa; and between Europe and Africa. The second largest air express company of the world, Federal Express, closed its intra-European network, after seven years' presence, deciding to rely instead on its partnership with local forwarders.

## **OWNERSHIP, ALLIANCES AND CO-OPERATION**

### ***Privatization***

16. During 1992 the trend towards partial or full privatization of government-owned airlines continued. CSA Czechoslovak Airlines and MALEV (Hungary) were the first Eastern European carriers to be partially privatized. In the Philippines, a majority stake in PAL was sold to a consortium of local investors with a plan to offer later another 8 per cent to the public. In

Mexico, the government decreased its stake in Mexicana from 40 to 33 per cent with the intention to sell the remainder at a later date. In Germany the government indicated its intention to reduce its shareholding in Lufthansa from 52 to 25 per cent. In Africa the 11 governments which own the multinational airline Air Afrique agreed to decrease their participation from 79 to 51 per cent.

17. Also during 1992 privatization objectives were made known for some 13 government-owned air carriers (Table 2-1), to be added to some 17 other air carriers which had been targeted for privatization in the three previous years but had not achieved this aim by the end of 1992. Some further airlines, notably from the Commonwealth of Independent States, may also be at different stages of preparations for privatization.

### **National Consolidation**

18. In 1992 there was further consolidation in the airline industry at a national level through mergers and takeovers, particularly in Western Europe, Australia, Canada, Mexico and the United States. In a few cases relatively large air carriers were involved, such as in Australia (Qantas and Australian Airlines), Brazil (VARIG and Cruzeiro do Sul), France (Air France and UTA), Sweden (SAS and Linjeflyg), and the United Kingdom (British Airways and Dan-Air). However, most of the mergers took place between relatively small regional air carriers.

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

Targeted during 1992	Targeted prior to 1992 but not yet privatized
Aer Lingus (Ireland)	Aeroperu
Aeroflot Russian International Airlines	Air India
Air Niugini (Papua New Guinea)	Air Jamaica
Alitalia	BWIA (Trinidad and Tobago)
Balkan-Bulgarian Airlines	Ecuatoriana
Hemus Air (Bulgaria)	El Al (Israel)
JAT (Yugoslavia)	Garuda (Indonesia)
LIAT (owned by 11 Caribbean States)	Indian Airlines
LOT-Polish Airlines	Kenya Airways
PLUNA (Uruguay)	LAB (Bolivia)
Solomon Airlines	LAP (Paraguay)
TAROM (Romania)	Nigeria Airways
Tunis Air	Olympic Airways (Greece)
	Royal Jordanian
	Sudan Airways
	TAP-Air Portugal
	Uganda Airlines

### ***Transnational Ownership***

19. A trend to partial foreign ownership of "national" airlines continued in 1992.

20. In Europe, Air France acquired 37.5 per cent of Sabena (Belgium) and led a consortium purchasing one-third of CSA Czechoslovak Airlines. Alitalia led a consortium purchasing one-third of Malev. In addition to its domestic acquisitions, British Airways acquired 49 per cent of Deutsche BA (Germany), 49.9 per cent of TAT (France) and 25 per cent of Qantas (Australia) following the merger of the latter with domestic carrier Australian Airlines, as well as making an offer for 44 per cent of the stock of US Air. Lufthansa (Germany) acquired 13 per cent of Luxair (Luxembourg), while its subsidiary Condor Flugdienst purchased 26.5 per cent of Lauda Air (Austria). The Scandinavian carrier SAS increased its interest in Airlines of Britain (the holding company for British Midland) from 25 to 40 per cent.

21. In North America, Air Canada formed part of a consortium bidding for Continental Airlines (United States), while Canadian Airlines International received an offer of capital injection from American Airlines in exchange for contracting out computer reservation and other services to the latter. The 5 per cent stakes in DHL Worldwide Express by Japan Airlines and Lufthansa were each increased to 25 per cent.

22. TACA (El Salvador) consolidated its position in Central America by contributing 49 per cent of the capital for a new Nicaraguan carrier, Nica, to replace Aeronica. In previous years TACA had acquired shares in Aviateca (Guatemala), Lacsá (Costa Rica) and Sahsa (Honduras).

### ***Transnational Alliances***

23. The ownership transactions referred to above all involved injection or exchange of equity. Throughout 1992 airlines also continued to expand co-operative ties in other ways.

24. For example, in addition to its acquisition of minority interests in CSA and in Sabena, Air France formed alliances with Air Canada and Aeromexico, and signed an agreement with Vietnam Airlines on close co-operation and assistance with an option to take a stake in the latter in exchange for training its staff and providing technology. KLM, which since 1989 had a 40 per cent equity stake in Northwest Airlines (United States), agreed with the latter to integrate services and to operate as a single entity. In a separate development, KLM signed a commercial co-operation agreement with Mexicana.

25. In addition to its equity interest in Continental Airlines and the alliance with Air France, Air Canada concluded commercial and marketing agreements with Iberia (Spain) and United Airlines (United States).

26. Among other inter-regional arrangements, broad co-operative agreements were concluded between Cathay Pacific Airways (based in Hong Kong) and Virgin Atlantic Airways (United Kingdom), between Delta Airlines (United States) and LOT Polish Airlines, between El Al

(Israel) and Qantas (Australia), and between SAS (Scandinavia) and Varig (Brazil). Agreements were also concluded between Ansett Airlines of Australia and seven major carriers from Asia, Europe and North America.

27. Initiatives on a regional basis included a marketing agreement concluded between long-haul and regional Caribbean carriers BWIA and LIAT; plans on a merger between these two carriers and Air Guyana were also mooted. In Africa, Air Botswana strengthened co-operation with several other regional carriers.

28. Excluding the above cases where there were much broader and comprehensive agreements, about 30 new agreements on code-sharing and joint services were reached during 1992. Unlike previous years, when nearly all such agreements were concluded among airlines of only three regions (Asia/Pacific, Europe and North America), in 1992 they involved also airlines from Latin America and the Caribbean (nearly one-third of all agreements include their participation) and from Africa, where South African Airways was a party to all the agreements concerning that region.

### ***Multilateral Co-operation***

29. The principal vehicles for more general inter-airline co-operation continued to be the airline associations, both regional, where there were particularly significant developments in Asia/Pacific, and at the world-wide level, the International Air Transport Association (IATA).

30. In 1992, the Orient Airlines Association (OAA), studied a new strategic role for itself and considered several joint airline programmes to cut expenses. Within the Association of South East Asian Nations (ASEAN) six OAA members: Garuda Indonesia, Malaysia Airlines, Philippine Airlines, Royal Brunei Airlines, Singapore Airlines and Thai Airways International, agreed to boost their international profile and competitiveness by seeking co-operation in the commercial area and pooling resources for purchasing, sales, marketing and strategy.

31. This initiative was paralleled by plans of nine air carriers (Air India, Air Lanka, Biman Bangladesh Airlines, Druk-Air (Bhutan), Indian Airlines, Maldives Air Services, Pakistan International Airlines, Royal Nepal Airlines and Vayudoot (India)) belonging to seven nations of the South Asian Association for Regional Co-operation (SAARC) to form an Association of South Asian Airlines (ASAA).

32. Also in 1992, a proposal was made to bring together Air Caledonie, Air Marshall Islands, Air Niugini (Papua New Guinea), Air Pacific (Fiji), Air Vanuatu, and Solomon Airlines to combine their fleets and redistribute their capacity to meet demand more efficiently.

### **SERVICE LEVELS**

33. The business travel market remained soft in 1992 after the Gulf war and the associated economic impact. The effect was felt by airlines not only in terms of volume of traffic but also

in terms of down-trading of class of travel (for example first to business, business to economy). Consequently, there was continuing reappraisal by airlines of the classes of travel offered and the number of seats offered in each class. For example, during the year Continental eliminated first class service on all intercontinental flights but upgraded the service level offered to business class travellers. Lufthansa and Swissair followed other European airlines in taking similar action for intra-European services. All Nippon Airways joined those airlines that have introduced a fourth class, "Middle Class", to cater to passengers paying the full normal economy fare.

34. During 1992, a number of major international airlines upgraded the quality of service on their passenger flights, including the offer of integrated on-board entertainment and communication systems, in-flight phones, individual videos and faster check-in or check-out, and one major airline started to offer aerobic videos to passengers on long-haul flights.

35. Also during 1992 a number of European and Asian air carriers introduced their own Frequent Flyer Programmes (FFPs). Many of them had previously participated in the FFPs offered by carriers based in the United States, where such programmes have been widely available for a decade or more.

36. In Europe, the first Frequent Flyer Programme (FFP) was launched by British Airways in April 1992. This was followed by more than a dozen other major European international air carriers. The European Commission initiated a study on FFPs on the basis that they may promote abuse of tax laws and may distort competition.

37. In Asia, Cathay Pacific Airways (based in Hong Kong), Malaysia Airlines and Singapore Airlines negotiated to set up a joint Frequent Flyer Programme (FFP). In Japan, Japan Airlines announced the launch of an FFP for Japanese and European first and business class passengers following the introduction of an FFP by All Nippon Airways.

## FARES AND RATES

### *Tariff Levels*

38. Changes in the average levels of international economy class normal (i.e. unrestricted) fares and under-45 kilogram general cargo rates world-wide and in various geographical areas between September 1991 and September 1992 and over the period 1983-1992 are shown in Tables 2-2 and 2-3.

39. From Table 2-2 it may be seen that normal economy class fares, as expressed in United States dollars, increased by an average of 8 per cent world-wide between September 1991 and September 1992, with changes for individual route groups ranging from an average decrease of 5 per cent for routes across the South Pacific to an average increase of 18 per cent for routes in local Africa and between Europe/Middle East and Africa. These changes reflect both changes



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

Route group	Average city-pair distance (1992) (km)	Average economy class normal fare			Percentage change 1992/1991		Average annual percentage change 1992/1983 (in fares expressed in constant U.S.\$)
		Sept. 1983 (U.S.\$)	Sept. 1991 (U.S.\$)	Sept. 1992 (U.S.\$)	(in fares expressed in U.S.\$)	(in fares expressed in selling currencies)	
I. International average — world	3 200	450	648	697	8	2	1
II. International route groups:							
1. Between North America and Central America/Caribbean	2 200	245	371	402	8	8	2
2. Between and within Central America and the Caribbean	700	142	173	184	6	5	-1
3. Between Canada, Mexico and the United States	1 700	186	303	322	6	8	3
4. Between North America/ Central America/Caribbean and South America	4 200	486	660	669	1	-1	0
5. Local South America	2 100	269	342	352	3	2	-1
6. Local Europe	1 100	224	417	461	11	-4	6
7. Local Middle East	1 400	249	289	289	0	1	-3
8. Local Africa	1 600	235	317	375	18	11	2
9. Between Europe and Middle East	3 300	561	765	847	11	4	1
10. Between Europe/Middle East and Africa	5 300	717	1 014	1 201	18	7	3
11. North Atlantic	7 200	793	1 274	1 402	10	3	3
12. Mid Atlantic	8 200	919	1 373	1 567	14	5	3
13. South Atlantic	10 200	1 162	1 746	1 926	10	2	2
14. Local Asia/Pacific	3 000	378	510	519	2	1	-1
15. Between Europe/Middle East/ Africa and Asia/Pacific	7 200	872	1 105	1 143	3	-1	-1
16. North and Mid Pacific	10 800	972	1 177	1 230	4	3	-2
17. South Pacific	8 800	989	1 572	1 501	-5	-3	1

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

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

Route group	Average city-pair distance (1992) (km)	Average under-45 kg general cargo rate per kilogram			Percentage change 1992/1991		Average annual percentage change 1992/1983 (in rates expressed in constant U.S.\$)
		Sept. 1983 (U.S.\$)	Sept. 1991 (U.S.\$)	Sept. 1992 (U.S.\$)	(in rates expressed in constant U.S.\$)	(in rates expressed in selling currencies)	
I. International average — world	5 000	5.04	6.13	6.35	3	0	-2
II. International route groups:							
1. Between North America and Central America/Caribbean	2 500	2.56	2.99	3.00	0	0	-3
2. Between and within Central America and the Caribbean	800	1.23	1.74	1.55	-10	-11	-2
3. Between Canada, Mexico and the United States	2 200	1.72	1.76	1.72	-2	-1	-6
4. Between North America/Central America/Caribbean and South America	4 700	4.63	5.13	5.07	-1	-1	-4
5. Local South America	2 400	3.17	3.17	3.17	0	0	-6
6. Local Europe	1 200	1.84	2.76	3.25	18	3	3
7. Local Middle East	1 300	1.83	1.99	1.82	-9	14	-6
8. Local Africa	1 800	1.90	2.49	2.80	13	6	1
9. Between Europe and Middle East	3 700	4.68	5.74	6.10	6	5	-1
10. Between Europe/Middle East and Africa	5 600	5.24	7.37	8.31	13	4	2
11. North Atlantic	7 200	6.54	7.72	7.95	3	-4	-2
12. Mid Atlantic	8 200	9.22	10.90	11.68	7	-3	-2
13. South Atlantic	9 700	10.42	12.87	13.82	7	-1	-1
14. Local Asia/Pacific	3 600	3.35	4.22	4.21	0	-1	-2
15. Between Europe/Middle East/Africa and Asia/Pacific	8 000	7.76	8.81	9.10	3	-1	-3
16. North and Mid Pacific	11 200	8.23	9.38	9.79	4	2	-3
17. South Pacific	9 400	8.05	9.97	9.26	-7	-6	-3

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

in fares in local selling currencies and changes in the bankers' exchange rates between these currencies and the United States dollar. Calculated on the basis of selling currencies, average international fares increased by 2 per cent world-wide, with variations for individual route groups ranging from a decrease of 4 per cent to an increase of 11 per cent. With some exceptions, the trends in normal economy fares appear to reflect trends in fares generally.

40. The long-term trend in fare levels is shown by comparing the fares for September 1983 with those for September 1992 (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 1 per cent per annum. On a route group basis, average annual changes ranged from an increase of about 6 per cent for routes within Europe to a decrease of some 3 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.

41. With respect to cargo rates, as will be seen from Table 2-3, the average rate for shipments under 45 kilograms increased world-wide by 3 per cent between September 1991 and September 1992 when expressed in U.S. dollars, however there was no change in the average rate when expressed in terms of selling currencies. The long-term trend in cargo rates shows that between September 1983 and September 1992, the average general cargo rate for shipments under 45 kilograms has, in general, been decreasing in real terms for almost all areas of the world except on routes within Europe, within Africa and between Europe and Africa.

### ***Tariff Establishment***

42. In 1992, the main vehicle for multilateral airline negotiations of international fares and rates continued to be the IATA area tariff co-ordination conferences.

43. Governments' regulatory requirements continued to have a significant impact on the IATA tariff negotiation process. When the United States authorities last granted approval and antitrust immunity to IATA's tariff co-ordination activities, on 6 May 1985, they directed IATA to resubmit the provisions for the conduct of IATA Traffic Conferences five years later. Accordingly, IATA submitted the current provisions, as amended in 1989, to the United States authorities for approval in May 1990. At year end, 1992, the outcome of IATA's submission remained under consideration.

44. In the case of IATA cargo tariff agreements for routes to/from the United States, in March 1992 the Department of Transportation (DOT) issued an Order (92-3-22) in which it approved certain agreements only insofar as they proposed reductions in cargo rates. The Order reiterated that the DOT cannot approve increases without suitable economic justification from carriers. The Order also stated that, in similar situations in the future, IATA cargo tariff agreements could be disapproved in their entirety if they were not accompanied by such justifications.

45. In the case of tariffs between European Community (EC) airports, the Commission of the European Communities allows inter-airline consultations to take place within IATA, provided

that certain conditions are met. The existing regulation covering consultations was due to expire at the end of 1992 and a replacement was under consideration that would allow consultations only for those tariffs that are used in interlining. In response to requests from the Commission, IATA made changes to certain of its cargo resolutions for application in EC States, but was unable to reach agreement on further changes to the application of the IATA currency conversion system for passenger fares within the EC.

46. The electronic filing and approval of fares has been available in Canada, the United States and the United Kingdom for a few years through the system operated by the Airline Tariff Publishing Company (ATPCO). In 1992 several European governments began their evaluation of electronic systems for the filing of fares, and their associated rules and conditions, available from ATPCO, and those which were being developed by the Reed Travel Group (publishers of the ABC World Airways Guide) and the Société Internationale de Télécommunications Aéronautiques (SITA).

### PRODUCT DISTRIBUTION

47. In March 1992 the major airline computer reservation systems of Galileo (Europe) and Covia (Apollo, United States, which is linked with Gemini in Canada) announced their consolidation into Galileo International. All the major systems, increasingly referred to as "Global Distribution Systems", continued to expand their presence in the market-place, notably including new locations in Africa, Asia and South America.

48. In the United States, the Electronic Ticket Delivery Network (ETDN) was introduced, to enable 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 in banks, local shopping centres, etc. The ETDN is expected to become operational in 1993.

49. In December, the United States, after an extensive review of the national regulation on computer reservation systems first adopted in 1984, issued a revised regulation expanded in scope and detail, notably to prohibit a number of restrictions in use of third party (non-CRS vendor supplied) hardware and software. The European Community and the European Civil Aviation Conference continued a review of their codes of conduct on computer reservation systems first adopted in 1989. The ICAO Code of Conduct adopted by the Council in December 1991 was accepted during 1992 by 35 States and tacitly followed by a number of others.

### TRAFFIC

50. Indicators are given below of the development of airline scheduled traffic in 1992, 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**

51. The total scheduled traffic (domestic plus international) carried by the airlines of the 174 Contracting States of ICAO in 1992 is estimated at 244 billion tonne-kilometres performed, an increase of about 6 per cent over 1991, thereby recovering from the first ever annual decline recorded in 1991 to reach levels above those in 1990. The airlines carried a total of about 1 167 million passengers in 1992, compared with 1 133 million passengers in 1991, and just over 17 million tonnes of freight in each year (Table 2-4). The passenger load factor remained unchanged at 66 per cent, whereas the over-all (weight) load factor decreased from 59 to 58 per cent.

52. In 1992, international scheduled traffic showed stronger growth with increases of about 11 per cent in tonne-kilometres performed, 13 per cent in passengers carried, and 7 per cent in freight tonnes carried. International traffic accounted for 50 per cent of total passenger-kilometres performed, 81 per cent of the freight tonne-kilometres performed and just over 59 per cent of the total tonne-kilometres performed.

53. Domestic traffic declined slightly from 102 billion tonne-kilometres performed in 1991 to 101 billion tonne-kilometres performed in 1992. This small decline is attributed to domestic traffic developments in the two predominant markets: there was a sluggish growth in the United States domestic traffic and a significant drop in traffic within the Commonwealth of Independent States (all such traffic still being classified as domestic for the time being).

**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>								
1991	1 133	1 843 000	66	17.6	58 580	5 090	230 570	59
1992	1 167	1 953 000	66	17.3	62 050	5 180	244 020	58
Percentage change	3.0	5.9	—	-1.7	5.9	1.8	5.8	-1.0
<b>INTERNATIONAL</b>								
1991	266	860 000	66	8.5	46 440	2 210	128 230	61
1992	300	979 000	66	9.1	50 060	2 260	142 780	60
Percentage change	12.8	13.8	—	7.1	7.8	2.3	11.3	-1.0
<b>DOMESTIC</b>								
1991	867	983 000	67	9.1	12 140	2 880	102 340	57
1992	867	974 000	66	8.2	11 990	2 920	101 240	56
Percentage change	0.0	-0.9	-1.0	-9.9	-1.2	1.4	-1.1	-1.0

Source: ICAO Air Transport Reporting Form A-1.

**Scheduled: regional breakdown**

54. Between 1991 and 1992 development in total and international scheduled traffic varied considerably among region of carrier registration with respect to both passengers and freight. The range in terms of *total* passenger-kilometres performed was from status quo for European airlines to a 17 per cent increase for Middle East airlines (Table 2-5). In 1992 all regions showed positive increases for passenger-kilometres performed by *international* scheduled services, with the airlines of the Middle East showing the largest gain (about 22 per cent). Increases in total and international freight tonne-kilometres performed were recorded for all regions.

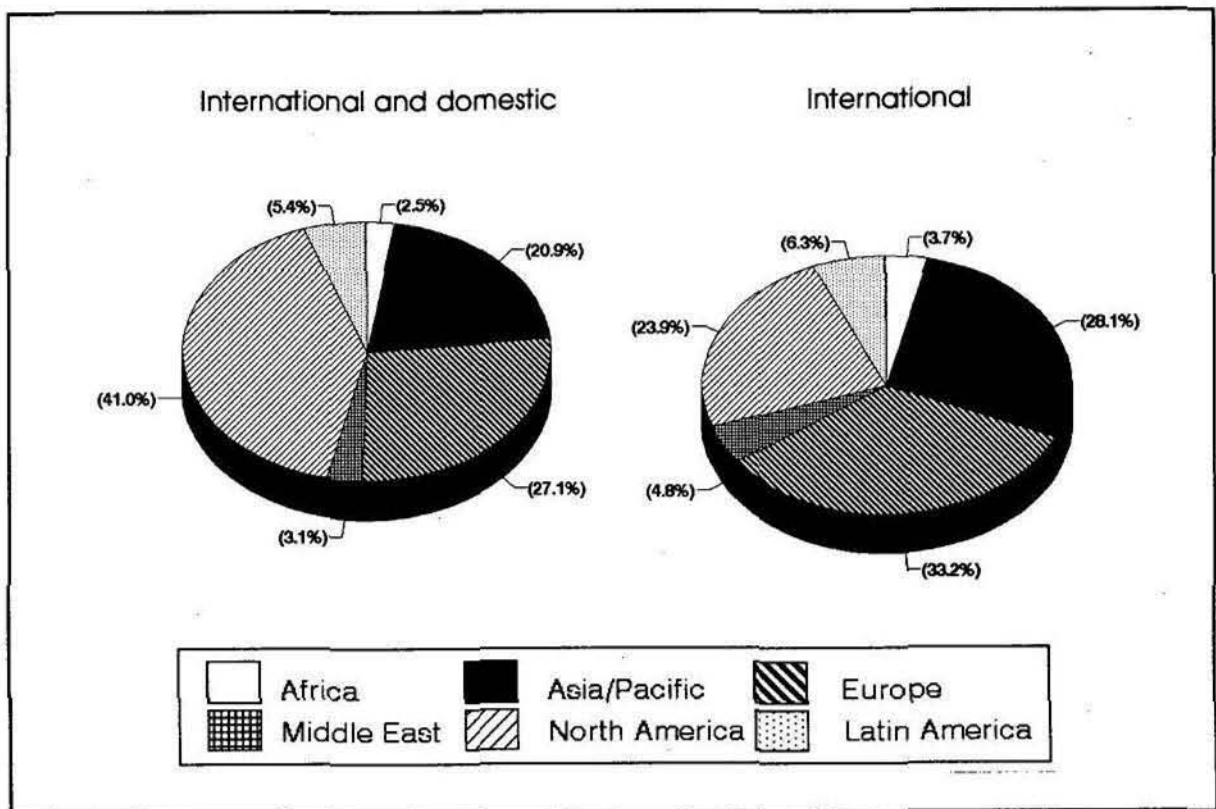
**Table 2-5. Growth of scheduled traffic by region of airline registration: 1991-1992**  
(annual percentage change)

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	4.7	12.1	9.1	-5.8	11.6
Asia and Pacific	11.1	13.2	6.4	1.9	10.6
Europe	-2.3	0.0	2.2	-15.3	0.4
Middle East	9.3	17.0	18.2	0.0	17.3
North America	3.1	6.1	7.2	8.7	6.4
Latin America and Caribbean	-0.7	3.5	10.1	21.0	5.2
Total	3.0	5.9	5.9	1.8	5.8
<b>INTERNATIONAL</b>					
Africa	16.9	16.9	9.9	8.3	15.0
Asia and Pacific	14.0	14.8	6.9	2.5	11.2
Europe	14.5	13.6	5.6	4.5	10.3
Middle East	20.8	21.5	18.9	0.0	20.2
North America	7.6	12.7	9.6	0.8	11.5
Latin America and Caribbean	6.9	8.1	12.3	-6.3	8.9
Total	12.8	13.8	7.8	2.3	11.3

Source: ICAO Air Transport Reporting Form A-1.

55. The differences in the regional traffic development between 1991 and 1992 caused some small changes in the distribution of the regional traffic. The regional distribution for total and for international scheduled traffic in 1992 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 1992 the airlines of North America carried about 41 per cent of the total world traffic. However, the largest share of international scheduled traffic (about 33 per cent) was carried by the airlines of Europe.

56. In 1992 airlines of Asia and the Pacific showed the highest average annual weight load factor on international scheduled services (about 64 per cent), while those in Africa showed the lowest average load factor (some 50 per cent). 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 1 percentage point for the airlines of Europe when compared with 1991, for those of North America it represents a decrease of about 1 percentage point, and for those of Asia/Pacific, Africa and Latin America and the Caribbean the load factors shown represent a decrease of about 2 percentage points. There was no change in the average weight load factor for airlines of the Middle East between 1991 and 1992.



Source: ICAO Air Transport Reporting Form A-1.

**Figure 2-1. Distribution of scheduled traffic in 1992 according to region of registration of airline total tonne-kilometres performed**

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**Scheduled: carrier rankings**

57. Table 2-6 shows the top 30 air carriers in the world in 1992 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 1991 and in 1983. Table 2-7 shows the top 30 air carrier rankings according to the same parameters but in terms of *international* scheduled traffic.

58. 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 1983 Pan American, now defunct, ranked number one in the world in terms of passenger-kilometres performed and second (after JAL) in terms of total traffic carried, while United, ranked fifty-fifth in each case in 1983, rose to second (passenger-kilometres) and fifth (total) by 1992 and American moved from twenty-seventh to fourth in terms of passenger-kilometres and from thirty-fourth to ninth in total over the same period.

**Scheduled: country rankings**

59. Rankings for the top 30 countries or groups of countries by volume of scheduled traffic generated by their airlines in 1992, 1991 and 1983 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. Approximately 44 per cent of the total volume of scheduled passenger, freight and mail traffic on international and domestic services is accounted for by the carriers of two countries, the United States and the Commonwealth of Independent States (36 and 8 per cent, respectively). On international services, about 31 per cent of all traffic is carried by the airlines of two countries, the United States and the United Kingdom (20 and 11 per cent, respectively).

**Scheduled: city-pair rankings**

60. The 25 largest city-pair traffic flows in terms of passengers carried on international scheduled services represented a total of about 35 million passengers in 1991 (Table 2-10; owing to incomplete data it has not been possible to include figures for 1992). 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, five routes were within Europe, and four routes were across the North Atlantic. In terms of cities, Tokyo and London appear most frequently, seven times each. All but two of the city-pairs (New York-Toronto and Chicago-Toronto) involve over-water sectors. In comparing 1991 and 1990 data, the impact of the Gulf conflict and the generally adverse economic climate may be seen in particular for traffic flows involving points in Europe and/or North America which show an over-all decrease of just over 7 per cent compared with an average decrease of about 2 per cent for the city-pairs in Asia.



**Table 2-6. 1992 top 30 scheduled air carriers —  
TOTAL (international plus domestic) scheduled traffic**

PASSENGER-KILOMETRES PERFORMED					FREIGHT AND MAIL TONNE-KILOMETRES PERFORMED					TOTAL TONNE-KILOMETRES PERFORMED				
Carrier	1992	Ranking			Carrier	1992	Ranking			Carrier	1992	Ranking		
	(millions)	1992	1991	1983		(millions)	1992	1991	1983		(millions)	1992	1991	1983
American	156 250	1	3	3	Federal Express	5 876	1	1	26	American	16 426	1	3	3
United	148 811	2	2	2	Lufthansa	4 449	2	2	5	United	16 025	2	2	2
Delta	129 523	3	4	7	Air France	3 434	3	4	4	Delta	13 518	3	4	9
Aeroflot	116 139	4	1	1	JAL	3 426	4	3	3	Aeroflot	12 085	4	1	1
Northwest	93 745	5	5	10	Northwest	3 075	5	5	6	Northwest	11 581	5	5	12
British Airways	72 360	6	7	8	Korean Air Lines	2 696	6	7	10	British Airways	9 398	6	7	11
Continental	69 302	7	6	20	United	2 522	7	10	7	Lufthansa	9 133	7	6	10
USair	56 471	8	8	26	British Airways	2 513	8	9	11	JAL	8 327	8	8	5
JAL	55 090	9	9	9	KLM	2 496	9	8	9	Continental	7 309	9	9	24
Lufthansa	48 661	10	11	12	American	2 248	10	12	12	Air France	7 238	10	10	8
TWA	46 472	11	10	6	SIA	2 233	11	11	13	Federal Express	5 876	11	11	58
All Nippon Airways	38 310	12	12	15	Delta	1 765	12	14	21	SIA	5 783	12	13	15
SIA	37 04	13	14	14	Cathay Pacific	1 738	13	13	18	USair	5 533	13	12	33
Air France	37 03	14	13	11	Aeroflot	1 634	14	6	1	KLM	5 401	14	15	14
KLM	31 695	15	16	16	Alitalia	1 298	15	15	15	TWA	4 951	15	14	6
Qantas	30 568	16	17	22	Qantas	1 291	16	16	19	Korean Air Lines	4 801	16	16	17
Cathay Pacific	27 466	17	18	28	Nippon Cargo <sup>2</sup>	1 125	17	17	—	Cathay Pacific	4 359	17	17	26
Iberia	23 823	18	20	17	Swissair	1 111	18	19	17	Qantas	4 140	18	18	19
Alitalia	23 586	19	26	23	Continental	1 020	19	18	37	All Nippon Airways	3 736	19	19	27
Southwest	22 185	20	22	42	Thai Airways	969	20	20	32	Alitalia	3 421	20	21	21
Korean Air Lines	21 995	21	23	25	VARIG	927	21	22	20	Thai Airways	2 815	21	23	34
Air Canada	21 453	22	21	13	El Al	849	22	21	31	Iberia	2 754	22	24	18
Thai Airways	20 427	23	25	33	Malaysia Airlines	784	23	24	45	Air Canada	2 718	23	22	16
Canadian	19 800	24	24	29	Air Canada	771	24	23	16	Swissair	2 678	24	25	20
America West <sup>1</sup>	18 753	25	19	—	TWA	734	25	25	14	VARIG	2 521	25	26	29
Saudia	17 563	26	30	21	All Nippon Airways	711	26	26	42	Canadian	2 391	26	27	32
VARIG	16 553	27	27	31	Saudia	702	27	32	27	Saudia	2 283	27	31	22
Swissair	16 153	28	29	24	Iberia	610	28	28	25	Malaysia Airlines	2 113	28	29	46
Malaysia Airlines	15 714	29	31	45	Canadian	595	29	29	34	Southwest	2 062	29	32	50
SAS	15 700	30	28	27	United Parcel Service <sup>3</sup>	521	30	39	—	SAS	1 859	30	30	28

1. Started operations in August 1983.
2. Started operations in 1985.
3. Started operations in 1987.

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

Table 2-7. 1992 top 30 scheduled air carriers —  
INTERNATIONAL scheduled traffic

PASSENGER-KILOMETRES PERFORMED					FREIGHT AND MAIL TONNE-KILOMETRES PERFORMED					TOTAL TONNE-KILOMETRES PERFORMED				
Carrier	1992 (millions)	Ranking			Carrier	1992 (millions)	Ranking			Carrier	1992 (millions)	Ranking		
		1992	1991	1983			1992	1991	1983			1992	1991	1983
British Airways	70 116	1	1	2	Lufthansa	4 388	1	1	2	British Airways	9 203	1	1	3
United	54 546	2	2	55	Air France	3 312	2	3	3	Lufthansa	8 634	2	2	4
Lufthansa	43 895	3	4	5	JAL	3 138	3	2	1	JAL	7 046	3	3	1
American	42 117	4	7	27	Korean Air Lines	2 646	4	4	6	Air France	6 361	4	4	5
Northwest	41 995	5	5	10	British Airways	2 506	5	7	7	United	6 224	5	7	55
JAL	41 918	6	3	3	KLM	2 496	6	6	5	SIA	5 783	6	6	7
SIA	37 045	7	6	6	Federal Express <sup>1</sup>	2 439	7	5	—	Northwest	5 647	7	5	10
Delta	33 092	8	13	42	SIA	2 233	8	8	9	KLM	5 401	8	8	6
KLM	31 695	9	8	8	Northwest	1 836	9	9	10	American	4 973	9	12	34
Qantas	30 568	10	10	9	Cathay Pacific	1 661	10	10	13	Korean Air Lines	4 447	10	9	8
Air France	29 746	11	9	4	Qantas	1 291	11	12	14	Qantas	4 140	11	11	11
Cathay Pacific	24 994	12	11	16	Alitalia	1 280	12	11	11	Cathay Pacific	4 047	12	10	15
Alitalia	21 320	13	17	14	United	1 275	13	14	53	Delta	3 689	13	18	46
Korean Air Lines	18 664	14	16	13	American	1 151	14	18	44	Alitalia	3 199	14	13	14
Thai Airways	18 616	15	15	20	Nippon Cargo <sup>2</sup>	1 125	15	13	—	Swissair	2 652	15	15	13
Continental	18 142	16	14	50	Swissair	1 103	16	15	12	Thai Airways	2 637	16	16	22
Iberia	17 265	17	21	12	Thai Airways	955	17	16	25	Federal Express <sup>1</sup>	2 439	17	14	—
Swissair	15 967	18	20	11	EI AI	849	18	17	24	Continental	2 143	18	19	51
TWA	15 590	19	18	7	Malaysia Airlines	747	19	19	35	Iberia	2 058	19	20	16
SAS	12 731	20	22	17	VARIG	731	20	20	17	VARIG	1 993	20	21	25
Malaysia Airlines	12 625	21	25	35	Delta	686	21	30	50	Malaysia Airlines	1 824	21	24	33
VARIG	12 616	22	24	24	Saudia	638	22	27	22	TWA	1 751	22	22	9
Canadian	12 330	23	23	31	Air Canada	526	23	22	23	Saudia	1 718	23	29	19
Aeroflot	12 269	24	19	15	United Parcel Service <sup>3</sup>	521	24	37	—	Air Canada	1 600	24	27	21
Saudia	12 003	25	2	18	Iberia	504	25	21	19	EI AI	1 588	25	26	29
Garuda	11 943	26	29	34	Continental	496	26	25	49	SAS	1 574	26	25	18
Air Canada	11 830	27	26	19	UTA	476	27	23	15	Canadian	1 574	26	28	32
PAL	10 918	28	30	22	Canadian	455	28	29	32	Garuda	1 527	28	32	35
Air New Zealand	10 828	29	28	28	SAS	418	29	28	18	Air New Zealand	1 430	29	30	30
All Nippon Airways <sup>1</sup>	10 120	30	31	—	Garuda	409	30	32	37	Aeroflot	1 423	30	23	17

1. Operated only domestic scheduled services in 1983.

2. Started operations in 1985.

3. Started operations in 1987.

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

**Table 2-8. Top 30 countries or groups of countries in 1992 and their ranking in 1991 and 1983 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 1992 (millions)	Ranking			Country or group of countries	Estimated 1992 (millions)	Ranking			Country or group of countries	Estimated 1992 (millions)	Ranking		
		1992	1991	1983			1992	1991	1983			1992	1991	1983
United States	765 183	1	1	1	United States	18 597	1	1	1	United States	88 029	1	1	1
CIS <sup>2</sup>	179 613	2	2	2	Japan	5 499	2	2	3	CIS	18 368	2	2	2
United Kingdom	115 286	3	4	4	United Kingdom	4 909	3	4	6	United Kingdom	15 762	3	4	4
Japan	107 699	4	3	3	Germany	4 453	4	3	5	Japan	14 497	4	3	3
France	54 268	5	5	5	France	3 957	5	5	4	France	9 377	5	6	5
Australia	50 473	6	6	7	Republic of Korea	2 696	6	7	8	Germany	9 175	6	5	6
Germany	49 057	7	7	8	Netherlands	2 497	7	8	7	Australia	6 087	7	7	8
Canada	41 253	8	8	6	Singapore	2 233	8	9	10	Singapore	5 783	8	8	10
China <sup>3</sup>	40 605	9	10	27	CIS <sup>2</sup>	2 205	9	6	2	Netherlands	5 507	9	10	9
Singapore	37 045	10	9	9	Australia	1 420	10	12	12	Canada	5 109	10	9	7
Netherlands	32 839	11	12	11	Canada	1 366	11	10	9	Republic of Korea	4 835	11	11	11
Italy	29 672	12	14	14	China <sup>3</sup>	1 319	12	11	28	China <sup>3</sup>	4 284	12	14	32
Brazil	28 447	13	11	10	Italy	1 301	13	13	13	Italy	3 972	13	13	13
Spain	27 400	14	13	12	Brazil	1 231	14	14	11	Brazil	3 853	14	12	12
Republic of Korea	22 358	15	15	19	Switzerland	1 111	15	15	15	Spain	3 074	15	15	14
Thailand	20 427	16	18	20	Thailand	969	16	16	23	Thailand	2 815	16	16	21
Scandinavia <sup>4</sup>	19 592	17	16	17	Israel	849	17	17	22	Switzerland	2 704	17	17	15
Indonesia	19 331	18	19	23	Malaysia	802	18	18	32	Saudi Arabia	2 283	18	22	17
Mexico	19 037	19	17	13	Saudi Arabia	702	19	23	20	Indonesia	2 262	19	20	25
Saudi Arabia	17 563	20	22	15	Spain	622	20	19	18	Scandinavia <sup>4</sup>	2 244	20	18	18
India	17 237	21	20	16	Colombia	609	21	20	24	Malaysia	2 158	21	19	31
Switzerland	16 472	22	21	18	Chile	603	22	26	34	India	1 970	22	21	16
Malaysia	16 023	23	23	28	Indonesia	515	23	25	29	Mexico	1 802	23	23	19
New Zealand	13 207	24	24	25	Gulf States <sup>5</sup>	497	24	29	39	New Zealand	1 670	24	25	24
Philippines	13 106	25	25	22	Scandinavia <sup>4</sup>	490	25	24	19	Gulf States <sup>5</sup>	1 654	25	27	37
Gulf States <sup>5</sup>	12 064	26	26	37	India	464	26	21	17	Philippines	1 645	26	26	22
Pakistan	10 324	27	28	24	New Zealand	416	27	27	25	Israel	1 630	27	24	27
South Africa	9 995	28	29	21	Pakistan	408	28	28	27	Pakistan	1 351	28	28	26
Argentina	9 001	29	27	26	Belgium	407	29	22	16	South Africa	1 155	29	32	20
Israel	8 720	30	30	31	Philippines	355	30	30	26	Argentina	1 065	30	29	29

1. Most 1992 data are rounded estimates, thus the ranking may change when final data become available.

2. Commonwealth of Independent States.

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 1992 and their ranking in 1991 and 1983 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	1992	Ranking			Country or group of countries	1992	Ranking			Country or group of countries	1992	Ranking		
	(millions)	1992	1991	1983		(millions)	1992	1991	1983		(millions)	1992	1991	1983
United States	214 628	1	1	1	United States	8 878	1	1	1	United States	28 353	1	1	1
United Kingdom	109 127	2	2	2	Japan	4 757	2	2	3	United Kingdom	15 050	2	2	2
Japan	55 324	3	3	4	United Kingdom	4 721	3	3	5	Japan	9 882	3	3	4
Germany	44 077	4	4	5	Germany	4 391	4	4	4	Germany	8 653	4	4	5
Singapore	37 045	5	5	6	France	3 791	5	5	2	France	7 545	5	5	3
France	36 610	6	6	3	Republic of Korea	2 645	6	6	7	Singapore	5 783	6	6	7
Netherlands	32 774	7	7	7	Netherlands	2 497	7	7	6	Netherlands	5 498	7	7	6
Australia	30 568	8	8	8	Singapore	2 234	8	8	8	Republic of Korea	4 447	8	8	8
Canada	24 160	9	9	9	Australia	1 291	9	10	13	Australia	4 140	9	9	9
Italy	21 747	10	12	13	Italy	1 289	10	9	9	Italy	3 246	10	11	12
Republic of Korea	18 634	11	10	12	Switzerland	1 103	11	11	12	Canada	3 173	11	10	10
Thailand	18 616	12	11	17	Canada	981	12	12	11	Switzerland	2 674	12	12	11
Spain	18 198	13	15	11	Thailand	955	13	13	21	Thailand	2 637	13	13	18
Switzerland	16 236	14	14	10	Israel	849	14	14	20	Brazil	2 278	14	14	19
CIS <sup>2</sup>	15 613	15	13	14	China <sup>5</sup>	839	15	17	34	Spain	2 144	15	15	13
Brazil	14 889	16	17	21	Brazil	814	16	16	15	CIS <sup>2</sup>	1 958	16	16	14
Scandinavia <sup>3</sup>	12 918	17	16	15	Malaysia	746	17	15	29	Malaysia	1 824	17	17	28
Malaysia	12 625	18	18	28	Saudi Arabia	638	18	21	19	Saudi Arabia	1 718	18	20	17
Indonesia	12 559	19	21	27	Chile	585	19	23	35	China <sup>5</sup>	1 677	19	27	40
Gulf States <sup>4</sup>	12 064	20	20	32	CIS	554	20	28	23	Gulf States <sup>4</sup>	1 654	20	21	32
Saudi Arabia	12 003	21	19	16	Colombia	517	21	20	25	Israel	1 624	21	19	23
New Zealand	11 486	22	22	23	Spain	506	22	18	18	Scandinavia <sup>3</sup>	1 616	22	18	15
China <sup>5</sup>	11 162	23	29	37	Gulf States <sup>4</sup>	496	23	27	37	Indonesia	1 589	23	23	29
Philippines	11 075	24	23	19	Scandinavia <sup>3</sup>	443	24	22	16	New Zealand	1 494	24	22	24
Mexico	9 144	25	24	20	Indonesia	410	25	25	31	Philippines	1 445	25	24	21
India	8 964	26	25	18	Belgium	407	26	19	14	India	1 175	26	25	16
Israel	8 608	27	26	26	New Zealand	398	27	26	24	Pakistan	1 077	27	28	27
Pakistan	7 651	28	27	24	Pakistan	376	28	29	27	Belgium	965	28	26	20
Argentina	7 202	29	28	35	India	352	29	24	17	Mexico	911	29	29	25
South Africa	6 695	30	33	22	Philippines	312	30	30	26	Argentina	864	30	30	36

1. Most 1992 data are rounded estimates, thus the ranking may change when final data become available.

2. Commonwealth of Independent States.

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

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

5. Not including the Taiwan Province.

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, 1991)

Rank	City-pair	Distance (km)	1991 (thousands)	1990 (thousands)	1991/90 %	1991/83 average
1	London-Paris	346	3 191	3 146	1.4	5.6
2	London-New York	5 539	2 175	2 534	-14.2	4.0
3	Kuala Lumpur-Singapore	335	2 095	1 866	12.3	6.9
4	Hong Kong-Taipei	777	2 066	1 815	13.8	10.9
5	Jakarta-Singapore	906	2 024	1 984	2.0	7.2
6	Hong Kong-Tokyo	2 938	1 972	2 063	-4.4	11.1
7	Honolulu-Tokyo	6 134	1 908	2 106	-9.4	16.5
8	Bangkok-Hong Kong	1 711	1 700	1 680	1.2	8.0
9	Dublin-London	449	1 687	1 917	-12.0	9.8
10	Amsterdam-London	369	1 617	1 661	-2.6	6.4
11	New York-Paris	5 833	1 300	1 235	5.3	6.7
12	Seoul-Tokyo	1 227	1 191	1 965	-39.4	5.4
13	Frankfurt-London	654	1 139	1 330	-14.4	7.1
14	Singapore-Tokyo	5 356	1 117	1 010	10.6	17.2
15	Hong Kong-Manila	1 126	1 040	885	17.5	7.5
16	Hong Kong-Singapore	2 578	1 023	952	7.5	6.4
17	Bangkok-Singapore	1 444	1 020	1 156	-11.8	6.3
18	Taipei-Tokyo	2 182	1 015	1 073	-5.4	3.8
19	Los Angeles-Tokyo	8 752	1 006	1 221	-17.6	5.4
20	London-Zurich	787	898	904	-0.7	7.2
21	Frankfurt-New York	6 188	880	953	-7.7	1.0
22	Bangkok-Tokyo	4 644	862	950	-9.3	17.8
23	New York-Toronto	587	861	964	-10.7	2.3
24	London-Los Angeles	8 759	825	856	-3.6	5.5
25	Chicago-Toronto	700	809	934	-13.4	2.4
	TOTAL		35 421	37 160	-4.7	7.2

Source: ICAO Air Transport Reporting Form B.

61. 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 1983 and 1991. The figures show that there were significant differences in the rate of growth amongst individual city-pairs and between route areas. Between 1983 and 1991 the number of passengers between the 12 city-pairs in eastern Asia increased at an average annual rate of almost 8 per cent, those involving traffic within Europe grew at about 7 per cent, and the ones across the North Atlantic some 4 per cent.

### **Non-scheduled**

62. Total international non-scheduled passenger-kilometres performed throughout the world increased by an estimated 3 per cent in 1992 after a decline of just over 14 per cent in 1991 (Table 2-11). In 1992 the share of international non-scheduled air passenger traffic was just under 15 per cent of over-all international air passenger traffic compared with a share of just over 16 per cent in 1991. According to preliminary estimates in 1992 the shares of charter operators and scheduled airlines in the carriage of the non-scheduled traffic concerned remained the same as in 1990 at 54 per cent and 46 per cent respectively. Non-scheduled traffic in Europe is the largest single component of the world charter market. Domestic non-scheduled passenger traffic represents only 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**

63. The evolution of the commercial air transport fleets summarized 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**

64. In 1992 the number of fixed wing aircraft ordered was 362 compared with 397 in 1991. The financial commitment represented by orders placed in 1992 for turbo-jet aircraft is estimated to be about U.S.\$21 billion, somewhat less than the U.S.\$29 billion estimated for 1991. In 1992, 786 aircraft were delivered compared with 821 aircraft in 1991. The backlog of unfilled orders declined from 3 162 aircraft at the end of 1991 to 2 738 aircraft at the end of 1992. The status of orders and deliveries for the year 1992 is shown in Table A1-2 in Appendix 1, which gives data by manufacturer and model for turbo-jet and turboprop aircraft.

65. The turbo-jet types shown in Table 2-12 were most active in 1992 in terms of orders and deliveries, accounting for about 70 per cent of the orders, for about 70 per cent of the deliveries made, and for 59 per cent of the backlog of unfilled orders in 1992. The number of turboprop aircraft ordered in 1992 was 108, and 201 aircraft were delivered during the year. The backlog of turboprop aircraft was 430 at the end of the year.

66. A number of aircraft orders were cancelled and deliveries deferred in 1992 and, unlike the previous year, vacated delivery positions were seldom taken up by other customers. For three major aircraft manufacturers, Airbus, Boeing and McDonnell Douglas, the value of

**Table 2-11. Estimated international non-scheduled revenue passenger traffic, 1991-1992**

Category	Millions of passenger-kilometres performed		Annual change (%)
	1991	1992	
Scheduled carriers	76 700	77 200	0.7
% of total carriers	47	46	
Non-scheduled carriers	87 800	91 400	4.1
% of total carriers	53	54	
Scheduled traffic	860 300	979 400	13.8
Non-scheduled traffic	164 500	168 600	2.5
Total traffic	1 024 800	1 148 000	12.0
Non-scheduled traffic as percentage of total	16.1	14.7	

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

**Table 2-12. Main aircraft types ordered and delivered in 1992**

Aircraft	Orders	Deliveries	Backlog
Boeing 737	114	218	656
Boeing 757	28	99	297
Douglas MD-80/90	61	84	1 860
Boeing 747	28	61	239
Boeing 767	21	63	151
Airbus A-300	18	22	89

Source: Aircraft manufacturers.

cancelled and delayed deliveries in 1992 exceeded the total price tag of newly-ordered aircraft. As a result, Boeing and McDonnell Douglas planned to reduce their production rates by about 40 per cent from recent peak production rates. In Europe, Airbus reduced its production projections for the coming triennium by about 15 per cent.

### Composition

67. Between 1983 and 1992 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 50 per cent, from 9 123 to 13 790 as shown in Table 2-13. During this period, the number of jet aircraft increased from 6 732 to 10 750 rising from 74 per cent to 78 per cent of the fleet, while turboprop aircraft increased from 1 513 to 2 590, or from 17 to 19 per cent. On the other hand, the number of piston-engined aircraft declined by nearly 50 per cent, from 878 to 450, and now constitutes only about 3 per cent of the total world fleet.

68. It is estimated that at the end of 1992 there were some 1 000 jet aircraft in storage. Around 70 per cent of the stored fleet consisted of aircraft that comply with the ICAO noise standards in Annex 16, Volume I, Chapter 2, but that exceed the noise levels in Chapter 3. Because of the remaining over-capacity the price of used turbo-jet aircraft continued to decrease.

69. In addition to the 13 790 fixed-wing civil aircraft it is estimated that at the end of 1992 there were 130 rotary-wing civil aircraft with a maximum take-off mass of 9 000 kg or more and 29 710 fixed and rotary-wing civil aircraft of lesser mass, for a total of about 43 630 fixed and rotary wing civil aircraft registered with commercial air transport operators in ICAO Contracting States, excluding the CIS and China. The regional distribution of registration of these aircraft is shown in Table 2-14, which illustrates that almost half the aircraft (20 250) were registered in North America.

**Table 2-13. Commercial transport fleet<sup>1</sup>  
at the end of each year — 1983, 1991, 1992<sup>2</sup>**

Year	TURBO-JET		TURBOPROP		PISTON-ENGINE		Total aircraft all types
	Number	Percent-age	Number	Percent-age	Number	Percent-age	
1983	6 732	73.8	1 513	16.6	878	9.6	9 123
1991	10 105	77.4	2 449	19.8	496	3.8	13 050
1992	10 750	78.0	2 590	18.8	450	3.2	13 790

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.



**Table 2-14. Number of civil aircraft<sup>1</sup> on register by region at the end of 1992 — commercial air transport operators<sup>2</sup>**

Region	AIRCRAFT MAXIMUM TAKE-OFF MASS					
	9 000 kg and over				Under 9 000 kg	Total
	Turbo-jet	Turboprop	Piston	Total		
Africa	480	220	40	740	1 550	2 290
Asia and Pacific	1 210	490	30	1 730	4 790	6 520
Europe	2 600	890	10	3 500	5 100	8 600
Middle East	430	40	—	470	150	620
North America	5 290	820	190	6 300	13 950	20 250
Latin America and Caribbean	740	260	180	1 180	4 170	5 350
<b>TOTAL</b>	<b>10 750</b>	<b>2 720</b>	<b>450</b>	<b>13 920</b>	<b>29 710</b>	<b>43 630</b>

1. Includes fixed and rotary-wing aircraft.

2. Preliminary data. Excludes aircraft registered in the CIS and China.

Source: ICAO Air Transport Reporting Form H.

### **Leasing Developments**

70. By the middle of 1992, the over-all share of leased jet aircraft accounted for somewhat over 40 per cent of the total value of the world's jet aircraft fleet, almost twice the level estimated for the early 1980s. It is estimated that in North America, about 60 per cent of the fleet by value is leased, in Europe about 40 per cent, and in Asia/Pacific about 15 per cent. In terms of aircraft types, leased narrow-body aircraft account for about half of the total worldwide fleet by value whereas leased wide-body aircraft represent about a third of the total.

71. At the end of 1992, nearly 50 operating leasing companies owned some 1 800 jet aircraft valued at more than U.S.\$30 billion. More than half of these aircraft were owned by just three companies: Guinness Peat Aviation Group PLC (GPA) and affiliated companies, Ireland (410 aircraft); General Electric Capital Corporation and Polaris Aircraft Leasing Corporation, United States (378 aircraft); and the International Lease Finance Corporation (ILFC), United States (196 aircraft).

72. In 1992, the leasing industry experienced an increase in aircraft surplus, falling lease rates, and a lack of funds to finance orders already made. Before the Gulf war and the economic recession, leasing companies had in store less than 6 per cent of their jet aircraft whereas by the end of 1992 more than 16 per cent of their jet fleet was not leased out. Given the rapid growth of this fleet these percentages translate into about 50 and 300 idle jet aircraft respectively. Also, compared with the previous year, operating lease rates for many passenger

aircraft models dropped by 5 to 20 per cent and for some models rates went even lower. A number of airlines were unable to meet their lease payments in 1992, in some cases resulting in the re-possession of the aircraft by the lessor.

73. Against this background, in June 1992 there was failure in a shares flotation by GPA aimed at raising funds for a total of U.S.\$4.8 billion worth of aircraft deliveries planned during the remaining months of 1992 and in 1993. In the financial restructuring that followed, GPA was able to reduce its U.S.\$11.9 billion worth of aircraft orders up to the year 2000 by U.S.\$3.2 billion with the possibility of future cancellations for a value of U.S.\$3.1 billion. Despite its financial problems, in 1992 GPA leased out 203 aircraft, up from 161 in the previous year, and increased its customer base by 13 per cent.

74. Some of the other operating lease companies were less affected. For example, ILFC had only 6 per cent of its fleet not leased out. Taking advantage of decreasing aircraft prices and expecting continued growth in the leasing business, at the end of the year ILFC ordered 82 aircraft, worth some U.S.\$4.1 billion, in addition to its previous portfolio of orders for 200 aircraft.

75. During 1992, the leasing industry continued to search for new sources and innovative techniques of financing. Those efforts were mainly directed at replacing the loss of Japanese investments which, in the late 1980s, had provided up to 70 per cent of all aircraft financing world-wide.

### AIRCRAFT TECHNOLOGY

76. During 1992, a number of new commercial aircraft reached the final stages of their development. The four-engined Airbus A340 completed its certification programme, with the first deliveries anticipated for early 1993, while the twin-engined Airbus A330 had its maiden flight in November 1992, paving the way for first deliveries in late 1993. Airbus Industrie also started a marketing campaign to secure customers for the launch of the 124-seat twin-jet A319.

77. The Antonov Design Bureau completed first assembly of the first AN-70T, a freighter aircraft with four propfan engines and a 30-tonne payload. At year-end Boeing started assembly of the 747-400 freighter, with first deliveries planned for late 1993, and was completing preparation for the final assembly of the new 777 twin-jet for first deliveries in 1995. The four-engine Ilyushin IL-96-300 received national certification in December. McDonnell Douglas announced a decision to proceed with the MD-12, a four-engine double-deck aircraft for the long-haul market, with a view to entry into service in 1997. Tupolev commenced production of the 200-seat twin-jet medium-range TU-204 with Russian-built PS-90 engines, while a TU-204 with Rolls-Royce RB211-535E4 engines made its maiden flight in August.

78. With regard to aircraft for regional markets, the Bombardier Canadair Regional Jet received certification in July and entered into service in November. British Aerospace announced a family of regional jet aircraft, based on the BAe146. The Ilyushin IL-114 twin turboprop completed its flight test programme and went into production and the Saab 200 had its maiden flight in March.

79. As regards aircraft engines, General Electric, Pratt & Whitney, and Rolls-Royce each continued work in 1992 in developing very large turbo-fan engines aimed at achieving a thrust in excess of 400 kN (kiloNewton; for comparison the most powerful engines presently in service generate thrust in the order of 270 kN). International Aero Engines decided on an upgraded version of its V2500 series, the V2535, with a thrust of around 155 kN for twin-jets with 80 to 90 tonnes maximum take-off mass.

80. Consolidation was a feature of the manufacturing industry in 1992, with joint ventures for both near-term production (notably between Russian and other manufacturers) and in particular for long-term concepts involving unprecedented start-up costs, such as a very large (800-seat plus) subsonic jet aircraft and a new generation of supersonic aircraft.

## PERSONNEL

81. The number of staff employed by the world's scheduled international airlines (excluding those of the Commonwealth of Independent States and China) fell marginally in 1992 for the second year in a row. Employment had peaked at 1.15 million in 1989 and is estimated on a preliminary basis as 1.13 million in 1992. Nevertheless, there was an average annual increase of 1.5 per cent in scheduled international airline employment over the period 1983-1992 (3.1 per cent 1983-1988, -0.4 per cent 1989-1992). Complete figures for airlines operating purely domestic services are not available for 1992, but are estimated to be in the order of 350 000 to 370 000.

82. 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 substantial lay-offs by other airlines which in many instances do not involve the same personnel.

83. In addition to complete layoffs, some airlines introduced shorter working hours or employment of staff on a rotating basis. In view of the financial difficulties of their employers, some labour unions agreed to make concessions in terms of hours, salaries and/or other benefits and some management staff also took voluntary or enforced cuts in remuneration. The year 1992 was also notable for increased involvement of employees in airline management through analysis of and participation in decision-making, the obtaining of seats on the board, share acquisition or even, in a few cases, attempts to buy a controlling interest in the airlines.

## FINANCES

84. Preliminary estimates for 1992 indicate that the world's scheduled airlines as a whole experienced an operating loss of 0.5 per cent of total operating revenues, which compares with a loss of 0.2 per cent in 1991. The operating revenues of scheduled airlines (excluding operations within the Commonwealth of Independent States) are tentatively estimated at

U.S.\$212 billion in 1992, an increase of just under 4 per cent compared with the U.S.\$204.5 billion earned in 1991. Expressed in United States currency, the operating revenues per tonne-kilometre performed decreased by about 4 per cent from 92.8 cents in 1991 to an estimated 88.9 cents in 1992. The operating expenses for the same airlines are tentatively estimated at U.S.\$213 billion in 1992 which is an increase of 4 per cent over the U.S.\$205 billion incurred in 1991. The operating expenses per tonne-kilometre performed fell by just under 4 per cent to 89.3 U.S. cents in 1992 from 93.0 U.S. cents in 1991.

85. 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 1992, the estimated operating loss of about U.S.\$1 billion represents an increase from the 1991 operating loss of U.S.\$500 million. The *net* result, derived from the operating result by taking into account the non-operating items and taxes, cannot yet be estimated for 1992, but in 1991 the world's scheduled airlines showed a net loss of U.S.\$3.5 billion, representing 1.7 per cent of operating revenues. Information on both operating and net results over the period 1981-1991 and distribution of operating revenues and expenses by item in 1981 and 1991 may be found in Tables 5-4 and 5-5 in Chapter 5.

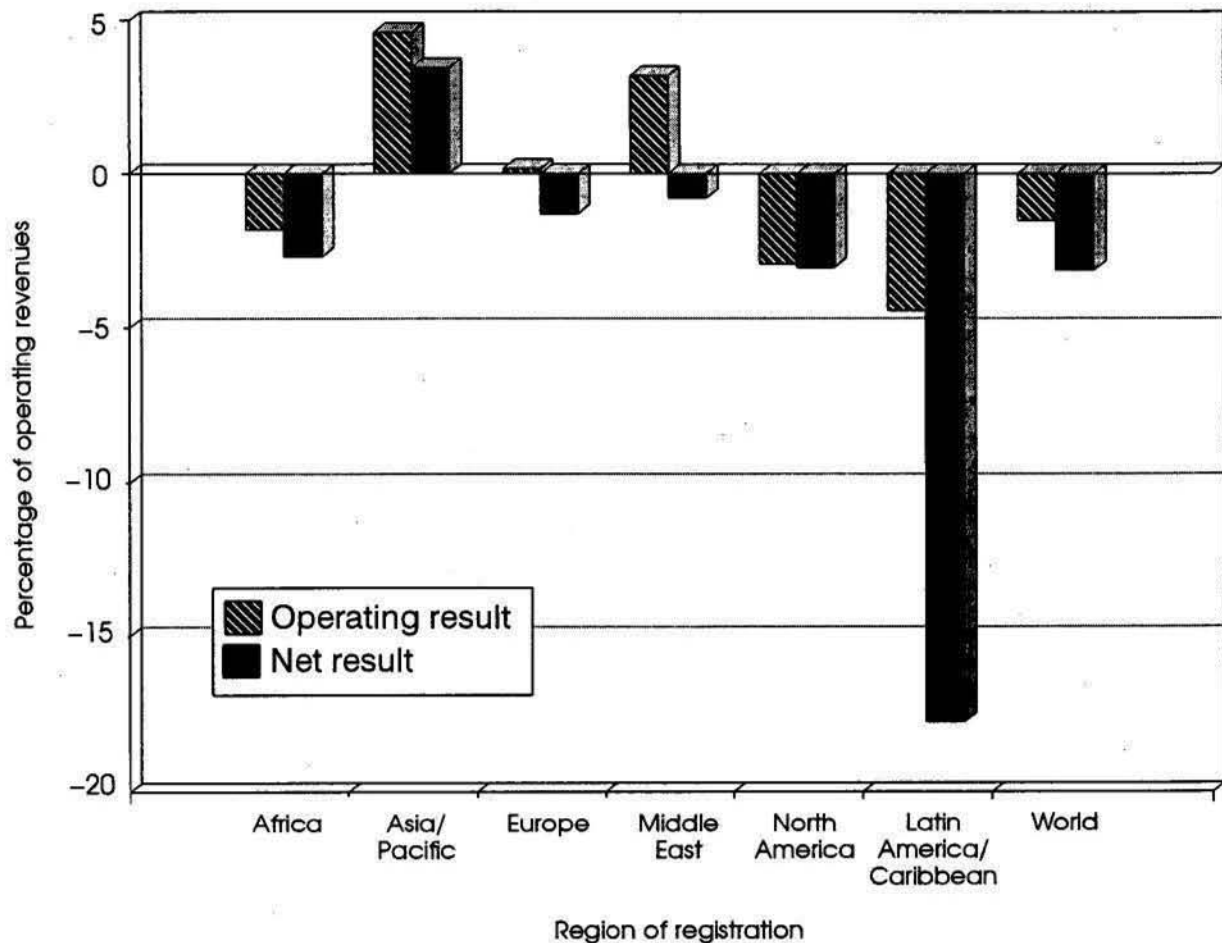
86. The estimates of the world's scheduled airlines as a whole do not portray the considerable difference in results achieved by individual airlines. In 1991 about 45 per cent of airlines experienced operating profits, with 55 per cent reporting operating losses. On a regional basis, in 1991 the operating result expressed as a percentage of operating revenues ranged from an operating profit of almost 5 per cent for the airlines in Asia/Pacific to an operating loss of about 4 per cent for those based in Latin America and the Caribbean. Net results ranged from a surplus of just over 3 per cent of operating revenues for the airlines based in Asia/Pacific to a net loss of almost 18 per cent of operating revenues for those in Latin America and the Caribbean (Figure 2-2).

87. In 1992, 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 1992 was a loss of U.S.\$2.2 billion, a somewhat greater loss than the U.S.\$2 billion experienced in 1991. For the airlines of the rest of the world combined (excluding operations within the CIS), the preliminary estimated operating profit in 1992 was U.S.\$1.2 billion compared with an operating profit in 1991 of U.S.\$1.5 billion.

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

## GENERAL AVIATION

89. 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 1991 and available 1992 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 1992. The number of



Source: ICAO Air Transport Reporting Form EF-1.

**Figure 2-2. Financial results by region in 1991 — scheduled airlines**

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.

90. General aviation flying in ICAO Contracting States (excluding China and the CIS) is estimated to have decreased somewhat in 1992 from the 1991 estimate of about 46 million hours, to about 45 million hours (Table 2-15). Of this total for 1992, an estimated 10.5 million hours (23 per cent) were flown in instructional flying, 25.0 million hours (56 per cent) in business and pleasure flying and 9.5 million hours (21 per cent) in aerial work and other flying. The total of 45 million general aviation flying hours compares with a total of about 24 million hours flown on scheduled services by the airlines of the same Contracting States in 1992.

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

Type of flying	Millions of hours	
	1991	1992
Instructional	10.8	10.5
Business/pleasure	25.6	25.0
Aerial work/other	10.0	9.5
TOTAL	46.4	45.0

*Source: ICAO survey on aviation activities.*

91. 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, decreased slightly from 336 450 at the end of 1991 to an estimated 335 750 at the end of 1992. During the same period, the number of fixed-wing aircraft also decreased, from 321 790 to an estimated 321 060; 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.

92. The number of valid private pilot licences at the end of 1992 in ICAO Contracting States, excluding the CIS and China, was estimated at about 565 000 compared with some 568 000 in 1991, an estimated decrease of about 1 per cent.

# Chapter 3

## Airports and Air Navigation

1. This chapter discusses developments in 1992 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. A trend towards governments establishing autonomous authorities to operate airports and air navigation facilities continued in 1992. For example, on 1 November a State-run trading company "Airports Malaysia" took over the management of the country's airports from the Department of Civil Aviation; air traffic control services will remain under the Transport Ministry. In Venezuela, the central government decided to transfer the responsibility of operation and management of many airports to the individual state governments; Maracaibo, Santa Barbara and Oro Negro have already been handed over to the state government of Zulia. And five of Canada's major airports were transferred from federal government operation to four independent management groups, known as local airport authorities: Vancouver, Calgary, Edmonton and the two Montreal airports — Dorval and Mirabel.

3. In New Zealand a civil aviation authority was established to take over the functions of the air transport division (which had a number of functions related to air carriers as well as some related to airports and route facilities). New Zealand had previously established publicly-owned corporations to operate a number of airports and a State-owned enterprise to assume control of airways services on a commercial basis.

4. In April, Vienna Airport Authority (Austria) was transformed into a joint stock company in which 27 per cent of the shares were sold to private interests in order to provide capital for airport expansion. In Europe only the British Airports Authority (primarily London area airports), with 100 per cent of the share capital privately owned, previously had such extensive private involvement; in the case of the few other major international airports organized as stock companies the shares are essentially 100 per cent government-owned.

5. In Germany preparations were finalized for the establishment of a new government-owned, autonomous (and financially independent) authority that was to be responsible for the provision of air traffic services effective 1 January 1993; the new authority was to take over the functions of the former Federal Administration of Air Navigation Services.

### MAJOR AIRPORT PROJECTS

6. There were 1 050 airports in the world at the end of 1992 serving international operations. During 1992, new international airports were opened at Yaoundé-Nsimaleu (Cameroon) and Munich (Germany). Construction continued on a number of other new airports, notably in the Asia/Pacific region, where they included the offshore Kansai International at Osaka (Japan), due to open in 1994; Kuala Lumpur International (Malaysia), Islamabad International (Pakistan) and Seoul International (Republic of Korea), due to open in the year 2000; and Macao International, due to open in 1995. Planning and preliminary work continued for Chek Lap Kok in Hong Kong, due to open in 1997. In North America, the new Denver International airport (United States) is due to open in December 1993. In Europe, the Norwegian government gave approval in 1992 for a new Oslo airport at Gardermoen, to open in 1999. In the Middle East, the Imam Khomeini International airport at Tehran (Islamic Republic of Iran) is due to open in 1995.

7. Major airport expansion projects were under way in all regions in 1992. Projects completed during the year included: a new arrivals terminal for Mohammed V International at Casablanca (Morocco); second passenger terminals for Sukarno-Hatta International at Jakarta (Indonesia) and for Tokyo International Narita (Japan); a new terminal for Quaid-e-Azam International at Karachi (Pakistan); new terminals for Marseille, Nice-Côte d'Azur and Toulouse-Blagnac and a new module for Terminal 2 at Charles-de-Gaulle in Paris (all in France); a new terminal for Malta International (Malta) and a second terminal for Manchester (United Kingdom); and a major redevelopment project including a new midfield terminal at Pittsburgh International (United States).

### AIRPORT TRAFFIC

8. The 25 largest airports in the world in terms of passenger throughput, 17 of which are located in the United States, handled a combined total of 711 million passengers in 1991 (Table 3-1; owing to incomplete information it has not been possible to include data for 1992). This represents about 29 per cent of the world total of scheduled and non-scheduled passengers or an average per airport of 78 thousand passengers every twenty-four hours. These 25 airports also handled a combined total of about 8.9 million aircraft movements in 1991, corresponding to an average per airport of one take-off or landing every one minute and twenty-nine seconds.

9. There are significant differences between the rankings of airports by passengers and by movements. For example, Tokyo-Haneda ranks fourth in terms of passengers handled but thirty-sixth in terms of aircraft movements, New York-Kennedy ninth by passengers but twenty-fifth by movements, and Osaka twelfth by passengers but ninety-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 Charlotte (10), Pittsburgh (13), Philadelphia (18), Seattle (16), Toronto (21), and Houston (24).



**Table 3-1. Scheduled and non-scheduled traffic at world's major airports**  
(top 25 airports ranked by TOTAL passengers, 1991)

Rank No.	Airport (ranking by total commercial aircraft movements given in brackets)	Passengers embarked and disembarked				Aircraft movements			
		1991 (thousands)	1990 (thousands)	Change 1991/90 (%)	Average change per annum 1991/83 (%)	1991 (thousands)	1990 (thousands)	Change 1991/90 (%)	Average change per annum 1991/83 (%)
1	Chicago (1)	59 852	59 936	-0.1	4.8	794.6	781.3	1.7	3.5
2	Dallas/Ft. Worth (2)	48 198	48 515	-0.7	7.6	720.0	730.1	-1.4	7.4
3	Los Angeles (3)	45 668	45 810	-0.3	4.0	590.4	621.4	-5.0	3.6
4	Tokyo-Haneda (36)	41 981	40 143	4.6	7.9	179.2	168.2	6.5	2.4
5	London-Heathrow (12)	40 245	42 635	-5.6	5.2	362.0	368.4	-1.7	4.0
6	Atlanta (4)	37 915	48 025	-21.1	0.0	566.7	767.6	-26.2	-0.1
7	San Francisco (8)	31 197	31 060	0.4	3.8	391.1	397.5	-1.6	1.9
8	Denver (5)	28 285	27 433	3.1	1.4	447.4	430.0	4.0	1.9
9	New York-Kennedy (25)	27 442	29 787	-7.9	-0.2	259.0	280.6	-7.7	-0.2
10	Frankfurt (20)	27 272	28 713	-5.0	6.1	301.2	308.5	-2.4	5.0
11	Miami (9)	26 591	25 837	2.9	4.1	380.4	336.0	13.2	3.8
12	Osaka (51)	23 450	23 458	0.0	4.6	129.8	129.6	0.2	0.6
13	Paris-Orly (35)	23 196	24 330	-4.7	4.5	193.1	191.4	0.9	3.0
14	New York-Newark (14)	23 056	22 255	3.6	4.1	356.0	356.7	-0.2	5.9
15	Honolulu (23)	22 225	23 368	-4.9	4.8	261.4	251.9	3.8	2.5
16	Phoenix (11)	22 140	21 718	1.9	12.5	373.5	374.0	-0.1	8.3
17	Paris-Charles de Gaulle (26)	21 612	22 506	-4.0	6.1	251.9	233.0	8.1	8.5
18	Boston (6)	21 547	22 936	-6.1	2.4	406.6	399.6	1.8	4.4
19	Detroit (15)	21 309	22 585	-5.6	11.1	344.8	334.1	3.2	5.7
20	Minneapolis (17)	20 601	20 381	1.1	10.8	327.6	322.2	1.7	6.1
21	New York-La Guardia (19)	20 545	22 754	-9.7	1.1	308.7	331.4	-6.8	1.2
22	Las Vegas (22)	20 172	19 090	5.7	9.1	292.0	284.8	2.5	6.4
23	Hong Kong (59)	19 158	18 688	2.5	10.1	109.9	106.1	3.6	9.0
24	St. Louis-Lambert (7)	19 151	20 066	-4.6	2.1	368.0	391.5	-6.0	2.7
25	London-Gatwick (38)	18 690	21 043	-11.2	5.2	162.9	189.4	-14.0	2.2
	TOTAL	711 498	733 072	-2.9	4.8	8 878.2	9 085.3	-2.3	3.6

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

10. In comparing 1991 and 1990 data, the impact of the Gulf conflict and the generally adverse economic climate may be seen, notably for airports in Europe and North America, leading to an average traffic decline at these airports of 3 per cent in terms of passengers handled and just over 2 per cent in terms of aircraft movements.

11. Table 3-1 also includes 1983 data to illustrate the longer term rate of growth of airport traffic. Passengers handled at the large airports concerned increased by about 5 per cent per annum on average over the 1983-1991 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.

12. 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 4 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 308 million passengers in 1991, or about 47 per cent of the world total of international scheduled and non-scheduled passengers.

13. The number of international passengers handled and the number of international aircraft movements at these airports each increased at about 6 per cent per annum over the 1983-1991 period. Over this period, the highest annual growth rates recorded in terms of international passengers were for airports in the Asia/Pacific region (Tokyo-Narita 11 per cent, Hong Kong 10 per cent, Bangkok 10 per cent), while Brussels achieved the highest annual growth rate in terms of international aircraft movements (12 per cent, followed by Hong Kong, Bangkok, Manchester and Paris Charles-de-Gaulle, each at 9 per cent).

### AIRPORT FINANCES

14. Reporting of airport financial data to ICAO was inadequate to draw general conclusions for either 1991 or 1992. However, as in earlier years, results appeared to be mixed, with a number of major airports and airport authorities reporting profits (some of them increased in 1992), while the majority of airports continued with operating losses.

15. Landing and associated airport charges cost scheduled airlines U.S.\$8.21 billion in 1991, or 4.0 per cent of their total operating expenses (over the 1983-1991 period this proportion ranged from 3.0 per cent in 1984 to the 4.0 per cent recorded for 1991).

### AIR NAVIGATION FACILITIES AND SERVICES

16. The year 1992 was notable for the endorsement by the ICAO Assembly of a blueprint for a global satellite-based Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) concept to replace existing line-of-sight systems. The focus

**Table 3-2. Scheduled and non-scheduled traffic at world's major airports**  
(top 25 airports ranked by INTERNATIONAL passengers, 1991)

Rank No.	Airport (ranking by International commercial aircraft movements given in brackets)	International passengers embarked and disembarked				International aircraft movements			
		1991 (thousands)	1990 (thousands)	Change 1991/90 (%)	Average change per annum 1991/83 (%)	1991 (thousands)	1990 (thousands)	Change 1991/90 (%)	Average change per annum 1991/83 (%)
1	London-Heathrow (1)	33 531	35 296	-5.0	5.2	278.8	279.9	-0.4	4.8
2	Frankfurt (3)	20 861	21 860	-4.6	6.8	218.0	223.3	-2.4	5.7
3	Paris-Charles de Gaulle (2)	19 384	20 875	-7.1	6.5	222.9	209.3	6.5	8.6
4	Hong Kong (12)	19 158	18 688	2.5	10.1	109.7	105.8	3.7	9.2
5	Tokyo-Narita (11)	17 743	18 312	-3.1	10.9	112.6	111.3	1.2	7.8
6	London-Gatwick (8)	17 679	19 668	-10.1	5.6	141.4	161.0	-12.2	4.2
7	New York-Kennedy (14)	16 670	18 100	-7.9	1.6	99.7	108.6	-8.2	2.1
8	Amsterdam-Schiphol (4)	16 082	16 096	-0.1	6.7	198.5	196.2	1.2	4.9
9	Singapore (13)	14 983	14 406	4.0	8.7	108.7	98.1	10.8	7.4
10	Zurich (6)	11 185	11 585	-3.5	4.6	158.0	153.3	3.1	4.8
11	Miami (10)	10 895	10 100	7.9	5.5	123.7	123.6	0.1	5.6
12	Bangkok (16)	10 378	10 906	-4.8	9.8	86.5	80.8	7.1	8.8
13	Los Angeles (25)	9 971	10 000	-0.3	9.3	65.6	69.1	-5.1	7.0
14	Toronto (9)	9 052	10 120	-10.6	4.8	115.0	128.5	-10.5	6.9
15	Copenhagen (7)	8 742	9 268	-5.7	3.6	146.7	151.6	-3.2	3.7
16	Brussels (5)	7 422	7 148	3.8	5.2	187.1	176.9	5.8	11.7
17	Paris-Orly (24)	8 609	9 210	-6.5	2.9	71.2	73.6	-3.3	1.6
18	Manchester (21)	8 195	8 041	1.9	9.4	81.1	76.5	6.0	8.7
19	Dusseldorf (15)	8 191	8 625	-5.0	5.7	88.7	89.5	-0.9	7.1
20	Rome-Fiumicino (19)	7 987	8 748	-8.7	2.6	83.0	88.6	-6.3	2.4
21	Palma de Mallorca (27)	7 676	7 966	-3.6	1.4	54.3	51.5	5.4	0.6
22	Madrid (22)	6 465	7 330	-11.8	4.8	78.6	74.8	5.1	5.9
23	Munich (18)	6 319	6 792	-7.0	7.9	83.1	87.0	-4.5	7.3
24	Stockholm (17)	5 978	6 555	-8.8	7.6	83.8	87.6	-4.3	6.9
25	Vienna (20)	5 317	5 310	0.1	7.6	91.4	82.2	11.2	8.2
	TOTAL	308 473	321 005	-3.9	6.1	3 088.1	3 088.6	0.0	6.0

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

consequently moved to implementation of CNS/ATM systems and a wide range of activities was in motion at year end in various ICAO global and regional groups as well as in regional organizations and individual States.

17. During the year, improved international relations led to the opening up of new routes which enabled significant reductions in flight time. For example, a new routing through eastern airspace of the Russian Federation is saving airlines up to 35 minutes of flight time between Tokyo and New York and up to 75 minutes between Seoul and Detroit. Similarly, the use of a more direct route through Chinese airspace permits European carriers to cut flight times between Hong Kong and Europe by some 90 minutes.

18. Route facility charges cost scheduled airlines U.S.\$3.9 billion in 1991, or 1.9 per cent of their total operating expenses. The latter proportion is the highest annual one during the 1983-1991 period (the lowest being 1.4 per cent in 1983 and 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.

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

### ***Aeronautical Telecommunications***

20. A Pacific Engineering Trials (PET) project was established to co-ordinate the progress of tests and trials carried out in the Pacific rim areas by individual States and other participants. Included in the project are the testing of automatic position reports and data link messages on very high frequency (VHF) and satellite links.

21. The United States approved the use of data link to send oceanic progress reports by United Airlines. Furthermore, it allowed the conduct of a global demonstration of flexible tracks between Sydney and Los Angeles.

22. Aeronautical Radio, Inc. (ARINC) indicated that, as of October 1992, over 500 000 data link messages have been handled in both the Atlantic and Pacific Ocean areas. Of the messages received, more than 5 000 way-point message reports have been sent via satellite data link instead of high frequency (HF) voice and all were received complete, correct and free of errors.

23. The United Kingdom initiated a demonstration programme to investigate the application of satellite communications systems as part of activities to ensure an adequate future means of surveillance and communications to handle anticipated growth of air traffic over the North Atlantic.

24. France, Japan, United Kingdom, United States, EUROCONTROL and INMARSAT embarked on a comprehensive aeronautical mobile-satellite service (AMSS) validation programme that includes hardware testing, computer simulation and analysis and flight testing.

### ***Air Traffic Services***

25. Automatic dependent surveillance (ADS) was being tested during the year in the Pacific Engineering Trials, in which aircraft outfitted with satellite communications avionics report their position every five minutes on Pacific crossings, making use of information from the aircraft's flight management system.

26. 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 initiated. This programme was joined by five eastern European States. In a project known as the Four-States/EUROCONTROL Integration Project, air traffic control centres and certain military centres will obtain access to each other's radar data and flight information processing.

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 implementation of advanced surveillance radar equipment, including monopulse and Mode-S secondary surveillance radar (SSR), multi-radar data processing and raster scan displays, and improved communications.

28. The administrations of France, Iceland and the United Kingdom continued with programmes of upgrading 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.

29. 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.

30. Replacement or implementation of radar data processing and flight data processing systems were initiated in Antigua, Bolivia, Czechoslovakia, Greece, Indonesia, Ireland, Malta, Norway and Sweden. In New Zealand the final stage of its new ATC system which networks the three new area control centres and integrates equipment at ten domestic towers was brought on line.

### ***Search and Rescue***

31. The satellite-based COSPAS-SARSAT<sup>1</sup> system continued to have an important role in detecting emergency locator transmitters (ELTs) and in locating aviation distress sites.

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

32. The system also 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, 28 LUTs and 16 MCCs were in operation or under test.

33. 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.

34. To date, the COSPAS-SARSAT system has contributed to the rescue of over 2 700 persons in aeronautical, maritime and terrestrial incidents since it began trial operations in September 1982.

### ***Aeronautical Meteorology***

35. States continued the expansion and acceleration of programmes for the automation of meteorological observing, reporting and forecasting. These programmes included the 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.

36. A tendency towards the centralization of meteorological forecast services became increasingly evident in 1992, and in a number of States the meteorological services were commercialized to varying degrees.

37. Developments also continued towards computer preparation by the world area forecast centres (WAFCs) of global forecasts of significant weather. In preparing their products, these centres started to benefit from the increasing number of air-reports from automatic air-reporting systems being installed on aircraft.

38. Considerable progress was reported during the year by the United States in the development of a terminal Doppler weather radar to monitor low-level wind shear near aerodromes. A programme for the installation of the radars at a large number of airports continued.

39. Aiming at an improvement of the International Airways Volcano Watch (IAVW), certain States are developing the capability to monitor volcanic ash clouds by meteorological satellites.

# Chapter 4

## User and Public Interest

1. This chapter reviews the levels of safety and security in air transport in 1992, 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

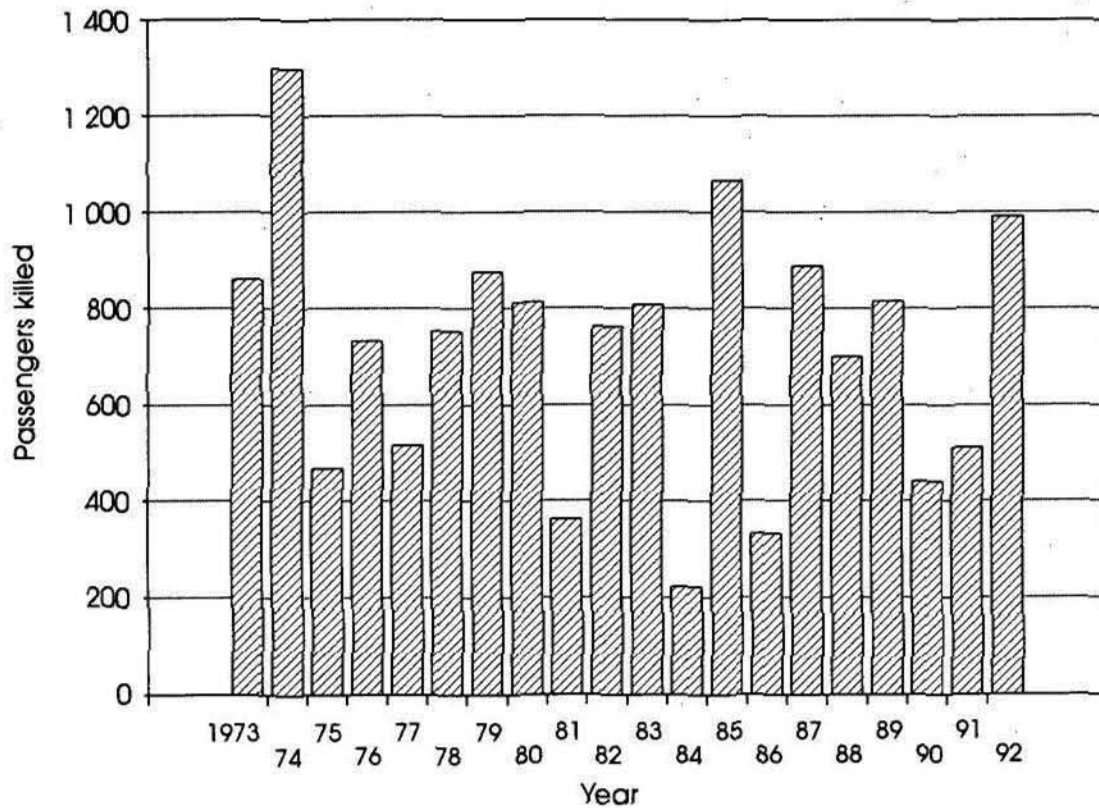
#### *Scheduled Operations*

2. Preliminary information on aircraft accidents involving passenger fatalities in scheduled air services for ICAO Contracting States shows that there were 29 fatal aircraft accidents in 1992 involving 1 097 passenger fatalities compared to 30 fatal accidents and 653 passenger fatalities in 1991 (see Figure 4-1 below and Table A1-3 in Appendix 1). Relating passenger fatalities to the volume of traffic, the number of passenger fatalities per 100 million passenger-kilometres increased from 0.04 in 1991 to 0.06 in 1992 (Figure 4-2). 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 decreased to 0.10 in 1992 from 0.11 in 1991, and the number of fatal aircraft accidents per 100 000 landings also decreased, to 0.16 in 1992 from the previous rate of 0.18 in 1991 (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 (in terms of passenger-kilometres performed), there were 10 accidents in 1992 with 887 passenger fatalities; in turboprop and piston-engined aircraft operations, which account for about 5 per cent of the scheduled traffic volume, there were 19 accidents with 210 passenger fatalities. The 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 1992 there were 44 fatal accidents with 366 passenger fatalities, compared to 26 fatal accidents with 385 passenger fatalities in 1991.



Note.— Excludes data from the CIS as some information was not available.  
Source: ICAO Air Transport Reporting Form G and other reports.

**Figure 4-1. Number of passengers killed 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 12 fatal accidents with 224 passenger fatalities in 1992, compared to 8 accidents with 299 passenger fatalities in 1991.

### **General Aviation**

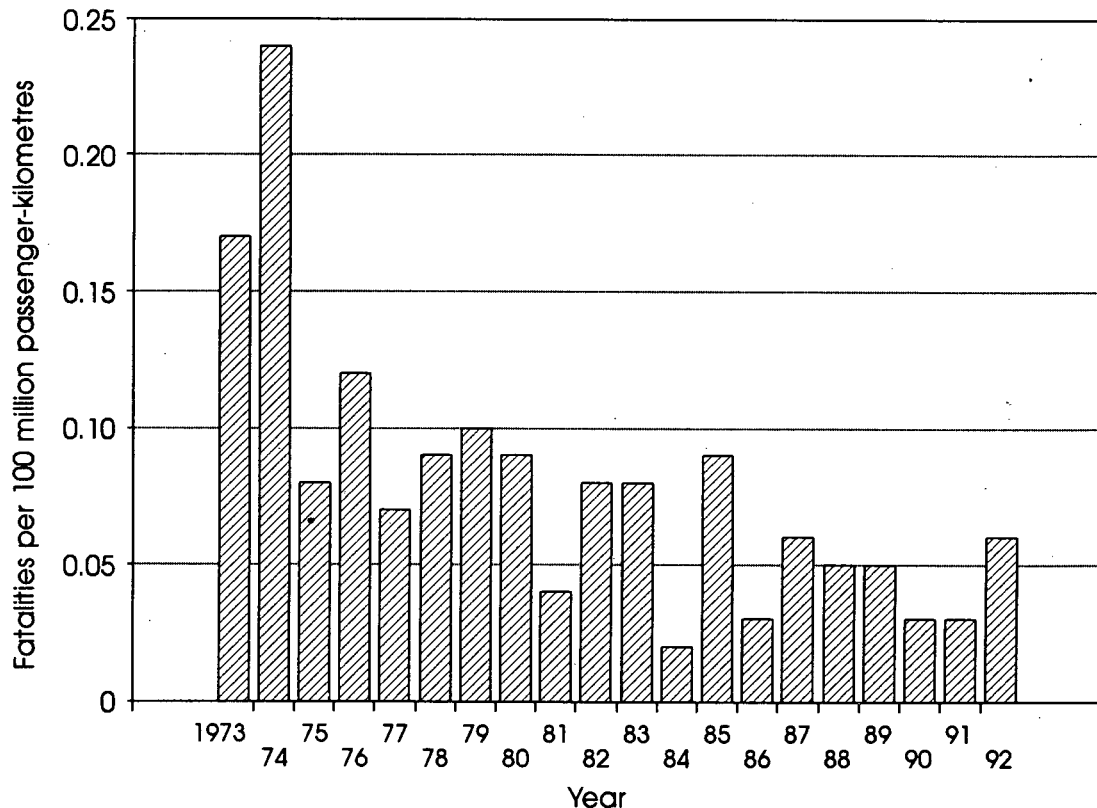
6. Complete statistical information is not available on safety in general aviation operations. In 1991, it is estimated that general aviation aircraft were involved in about 750 fatal accidents and that the number of fatalities in these accidents was about 1 550. The number of fatal accidents per 100 000 aircraft hours flown was about 1.62 in 1991. In the United States, which accounts for about 65 per cent of all general aviation activities in the world (excluding China and the CIS) there were 408 fatal accidents in 1992 resulting in 812 fatalities, according to preliminary information. The corresponding numbers for 1991 were 414 fatal accidents and 746 fatalities. For the United States, the rate of fatal general aviation accidents per 100 000 aircraft hours flown was about 1.50 in 1992, compared to 1.52 in 1991.



### Planning for Safety

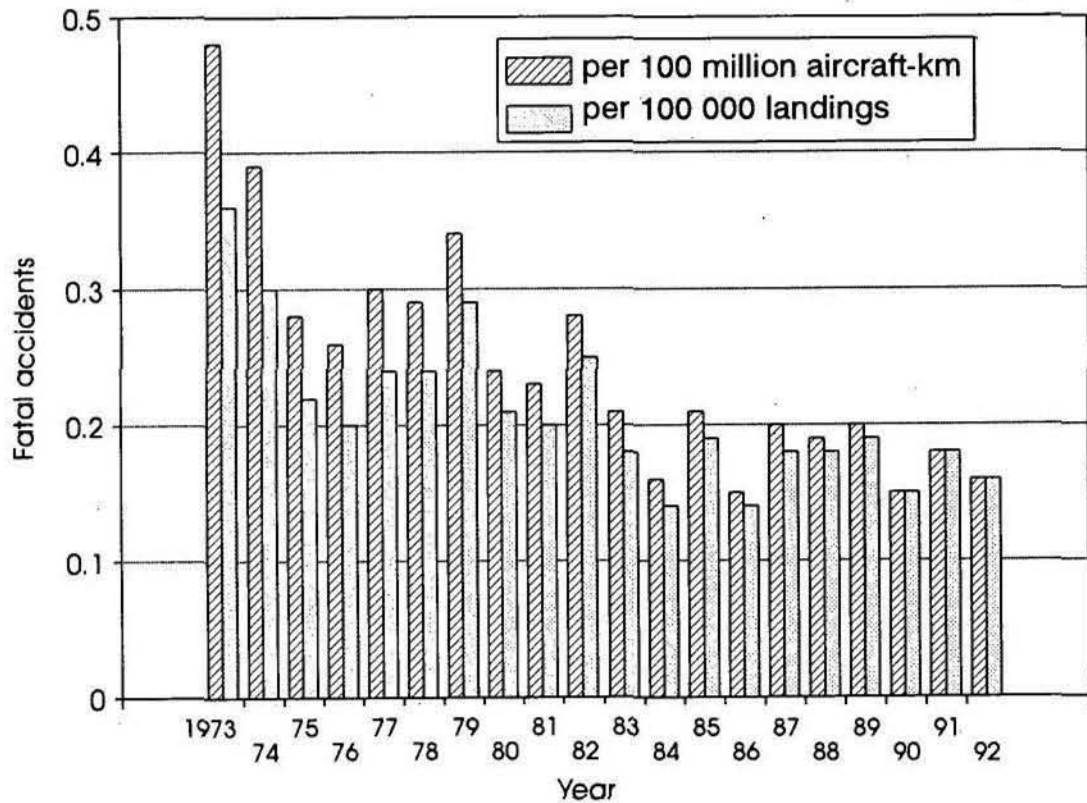
7. Safety continued to be a top priority of aviation authorities and air carriers alike in 1992. Amongst ongoing world-wide activities, ICAO convened a meeting to review the Organization's Standards and Recommended Practices in aircraft accident investigation and prevention; the meeting made 50 recommendations for safety improvements in the industry. The Organization also placed continued emphasis on a Flight Safety and Human Factors programme. Further mitigation of the hazard to aircraft posed by volcanic ash was accomplished by accelerated implementation of the international airways volcano watch.

8. The incidence of aircraft accidents involving controlled flight into terrain (CFIT) was a particular concern in 1992. An analysis of aircraft accidents covering a fourteen-year period (1978-1991) revealed that there were over 260 CFIT accidents in commercial and general aviation operations with more than 5 500 fatalities. The occurrence rate of CFIT accidents far exceeds that of other major accident categories in recent years. ICAO took steps to define the minimum requirements for Ground Proximity Warning Systems (GPWS) and requested that States take urgent steps to reduce the incidence of CFIT accidents. An industry CFIT task force



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 passengers killed per 100 million passenger-kilometres 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 million aircraft-kilometres flown on scheduled services**

was formed in consultation with ICAO 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.

## SECURITY

9. In 1992, there were nine acts of unlawful interference, significantly fewer than in 1991. While seven of the incidents were either seizures or attempted seizures, one was an act of sabotage to a ground facility and one constituted an in-flight attack utilizing a ground-to-air missile. These acts of unlawful interference resulted in the deaths of 10 persons and injuries to 123 more. Developments in acts of unlawful interference since 1973 are shown in Figures 4-4 to 4-6 and in Appendix 1, Table A1-4.

10. 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

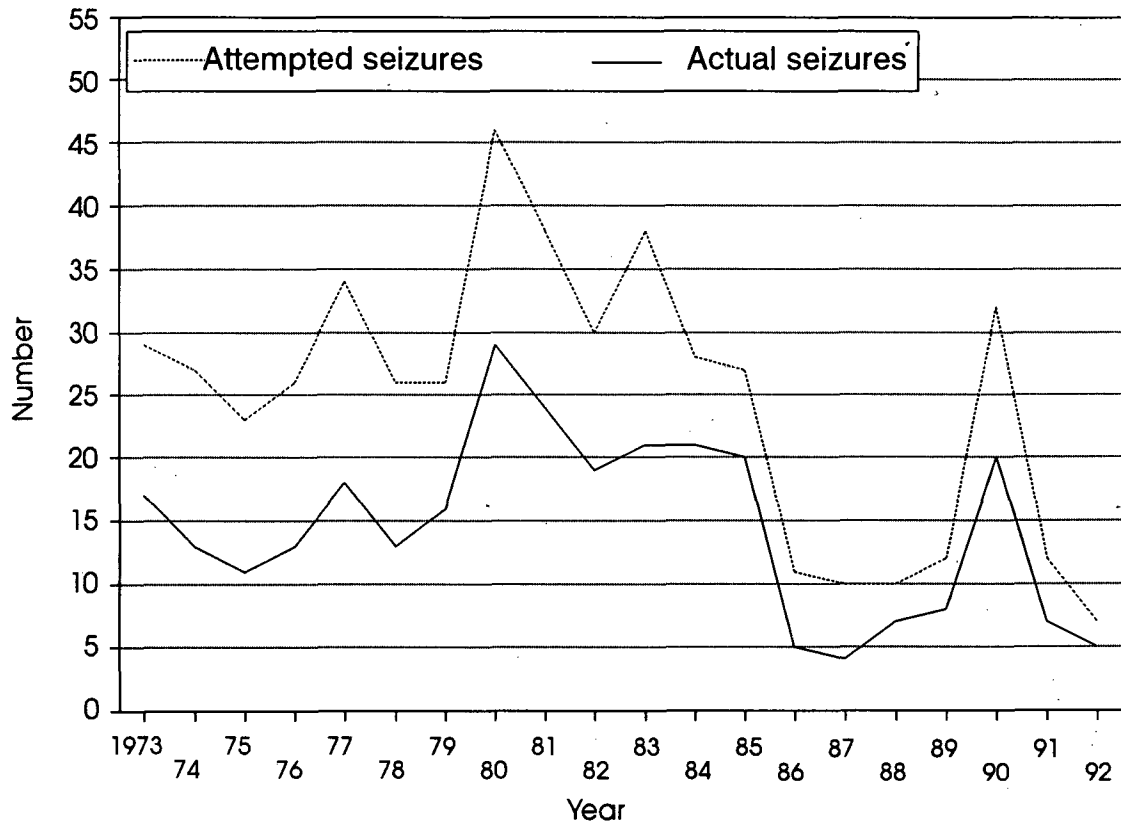


Figure 4-4. Acts of unlawful seizure

system. Since the commencement of the Mechanism activities in 1989, 98 States have requested assistance; of these, 54 received technical evaluation missions and 14 have been the subject of follow-up missions.

11. The Convention on the Marking of Plastic Explosives for the Purpose of Detection was adopted by the International Conference on Air Law on 1 March 1991. The Convention will enter into force upon ratification by 35 States, of which not less than 5 must be producer States. Thus far, the Convention has been signed by 49 States and ratified by 5 States.

## FACILITATION

12. 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. Facilitation efforts can also be focused on ensuring that air transportation is readily accessible to all members of the public.

13. In 1992 there were encouraging signs that some individual States were at long last eliminating burdensome requirements for currency declarations, installing Dual Channel (Red and Green) Clearance Systems for customs which rely on spot checks in the green channel, and/or reaching regional agreements on the acceptance of national ID cards for travel within the region. By the end of 1992 the European Community had finalized customs procedures for application on 1 January 1993, as a first step in the emergence of a "borderless Europe"; however, Community-wide changes in immigration controls had not yet been agreed.

14. In 1992 there was continued growth in the automation of cargo clearance procedures resulting in possible clearance times of as little as fifteen minutes or even less in some States. For example, several foreign carriers established electronic links with the United States Customs allowing their cargo to be cleared prior to the arrival of the aircraft. Similarly, in

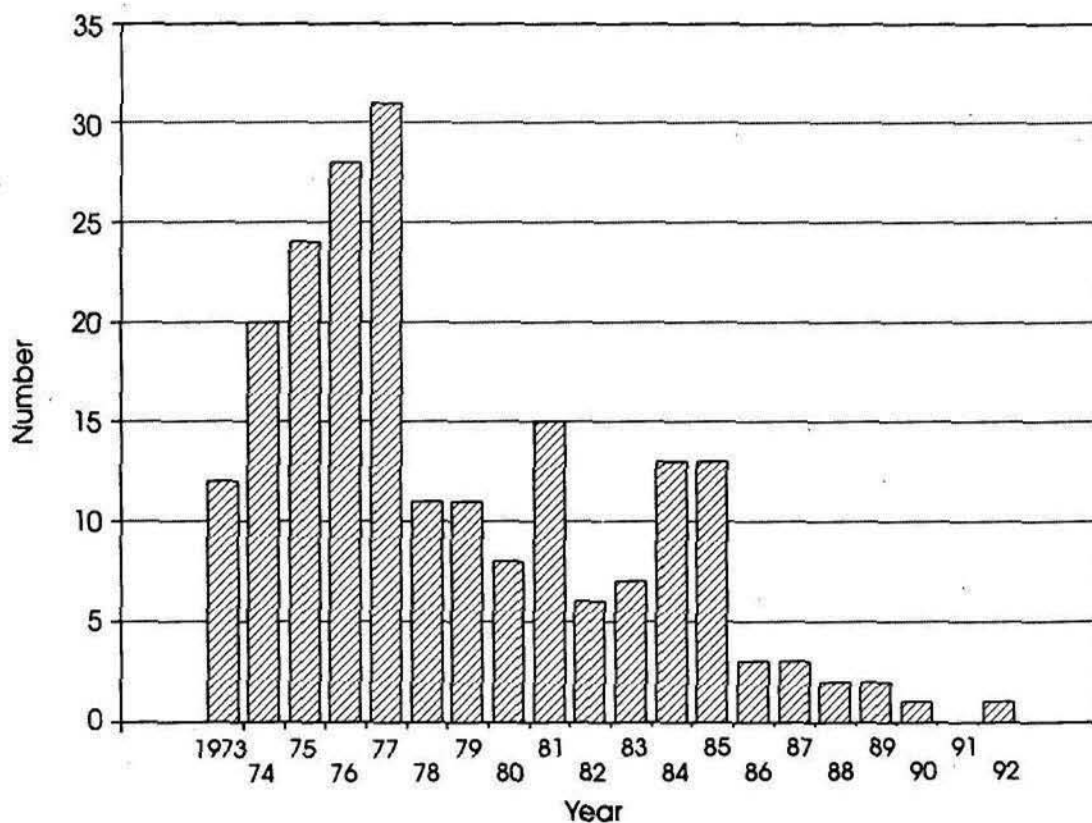


Figure 4-5. Sabotage

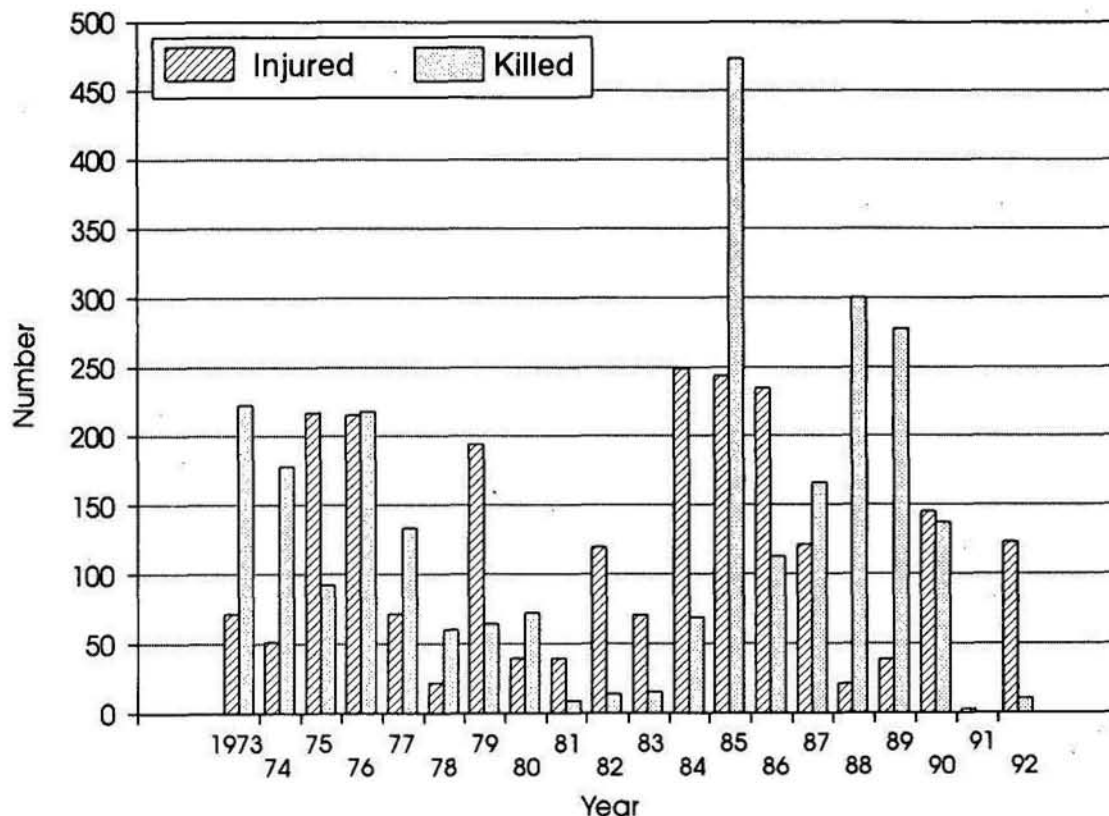


Figure 4-6. Number of persons killed or injured

Australia, New Zealand and the United States, Advance Passenger Information Systems were in operation whereby governmental authorities or airlines conveyed passengers' passport details electronically to the authorities of the country of destination prior to the arrival of the aircraft, thereby allowing expedited clearance on arrival. Although slower to start, automation in the passenger field had taken on some significance, with over twenty States issuing machine readable passports based on ICAO specifications as endorsed by the International Organization for Standardization (ISO). By the end of 1992 over sixty million of such passports were in use. The issuance of machine readable visas by several large traffic-receiving States also extended the potential facilitation benefits of machine reading to passports that are not themselves machine readable. Automation in this field also brings major security benefits for States since it becomes possible to rapidly match the identity of travellers against lists of undesirable or potentially dangerous persons and the documents themselves offer strong safeguards against alteration, forgery or counterfeiting.

15. Facilitation of travel by disabled passengers made significant progress in 1992. The period 1983-1992 had been declared the United Nations Decade of Disabled Persons in order to promote the implementation of required measures. These measures included improving access to public buildings and transportation systems and by the end of 1992 ICAO had

completed a review of the problems of elderly and disabled passengers world-wide with respect to air transportation. The first part of the review, dealing with improved access to airports, resulted in appropriate Standards and Recommended Practices incorporated into Annex 9 to the Chicago Convention. The second part, dealing with access to air services, identified certain basic principles concerning each stage of the journey of an elderly or disabled person and ICAO States were urged to follow these principles. During 1992 some individual States as well as regional bodies such as the European Civil Aviation Conference (ECAC) and the Latin American Civil Aviation Commission (LACAC) were also actively pursuing measures to facilitate the air travel of elderly and disabled passengers.

## ENVIRONMENTAL PROTECTION

16. The United Nations Conference on Environment and Development (UNCED), also known as the "Earth Summit" was held in Rio de Janeiro in June 1992, leading to an increased public and governmental awareness of the need to address environmental problems. UNCED adopted a set of basic principles ("Rio Declaration on Environment and Development") and an action plan for all major areas affecting the relationship between the environment and development ("Agenda 21"). In addition, the United Nations Framework Convention on Climate Change, which had been adopted in May, was signed by over 150 States.

17. Both the Framework Convention on Climate Change and Agenda 21 consider emissions from the transport sector to be one of the causes of atmosphere-related problems and governments have been called upon to undertake a series of activities aimed at identifying and solving these problems. In both cases, all modes of transport have been treated as a whole. Consequently, many of the activities identified are in principle applicable to air transport.

18. In 1992 ICAO's Committee on Aviation Environmental Protection (CAEP) commenced 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.

## SMOKING RESTRICTIONS

19. In response to public demand, a number of airlines world-wide in 1992 increased restrictions on smoking on board aircraft on some or all of their flights. The ICAO Assembly set in motion intensified studies of the safety aspects of banning smoking on board aircraft and the promotion of a smoke-free travel environment on all international flights. All ICAO Contracting States were in the meantime urged to take necessary measures as soon as possible to restrict smoking progressively on all international passenger flights, with the objective of implementing complete smoking bans by 1 July 1996.

PART II

WORLD OUTLOOK TO 1995

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# Chapter 5

## Global Trends and Forecasts

1. This chapter reviews developments in the world economy over the period 1981-1991 (and anticipated developments through to 1995), 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 1995.

### ECONOMIC ENVIRONMENT

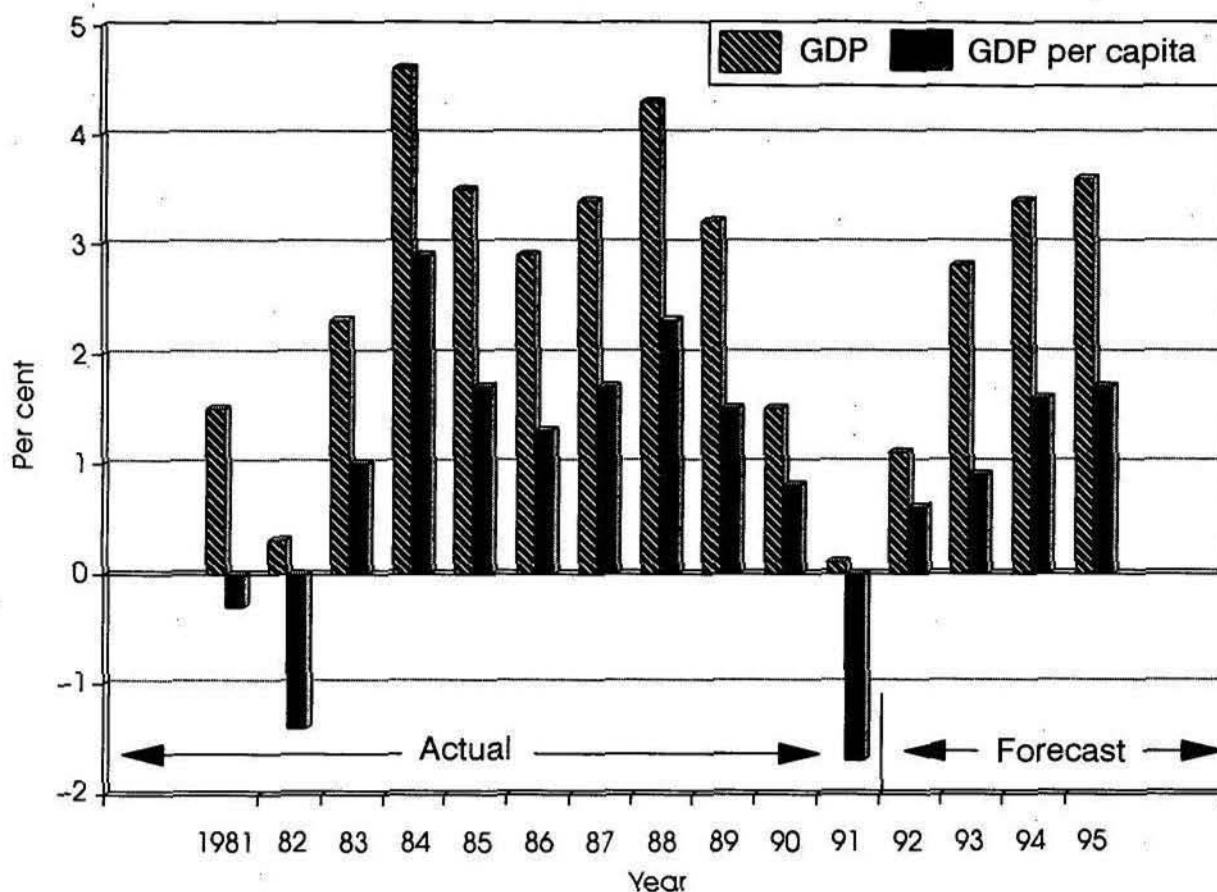
2. The demand for air passenger travel is primarily determined by income levels and demographics, and the cost of air travel. World energy demand, supply and prices are critically important both to economic progress and to the cost of travel. Hence, the airline industry is highly vulnerable to economic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

3. Between 1981 and 1991, the aggregate world economy measured in terms of Gross Domestic Product (GDP) grew at an average annual rate of 2.6 per cent in real terms. Growth rates varied across regions, from a high of 5.2 per cent for Asia/Pacific to a low of 1.2 per cent for the Latin America and Caribbean region (see Chapter 6 for details).

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 before a slowdown in 1990 (Figure 5-1).

5. In the second half of 1990, fuel prices increased in the wake of the situation in the Gulf. However, these increases had a lesser impact on the world economy than previous ones in 1973-1974 and 1979. The price increases were relatively smaller than in the earlier cases and the capability of the economies of the industrialized countries to cope with the oil price increases was greater because of reduced energy dependency and the effects of structural reforms in the 1980s. The increases also lasted for a much shorter period, both crude oil and jet fuel prices returning to pre-crisis levels by March 1991.

6. The 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 Europe were in 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.



Source: IMF, Wharton Econometrics Services.

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

7. Despite the marked slowdown in much of the industrialized world, GDP in the developing countries averaged 3.25 per cent in 1991, about the same as 1990, while annual inflation was halved to a little over 40 per cent. In Africa, growth in real output was low because of a worsening of the terms of trade, financing constraints and the effects of civil disturbances. However, structural reform and the sustained implementation of prudent macro economic policies supported growth in the Latin American and the Asia/Pacific regions. In the latter region, strong domestic demand and rapid growth of regional trade helped to off-set a number of adverse developments including the effects of the Gulf situation and weakness of export markets in industrialized countries.

8. The industrialized countries experienced a rise in consumer price inflation rates in 1990 due mainly to the sharp increase in oil prices in the second half of the year. Globally, inflation declined from almost 5.5 per cent in 1990 to 4.5 per cent in 1991. Inflation declined further to about 3.5 per cent in 1992, as demand fell relative to productive potential in most of the major industrialized economies.

9. World population growth between 1981 and 1991 increased at an average annual rate of 1.7 per cent. Hence, growth of the world's GDP per capita between 1981 and 1991 increased at an average annual rate of 0.9 per cent, significantly lower than the growth of GDP itself, as indicated in Figure 5-1.

### ECONOMIC OUTLOOK

10. There appears to be some consensus amongst economic forecasters that global economic activity will continue to recover in 1993 after an exceptionally long slowdown. For example, 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 weakness in Europe, but a better performance in North America. However, a full recovery in the over-all global economic activity is not anticipated until factors such as lower inflation and interest rates fully work through the major economies. As a result, world real GDP is expected to increase by about 2.8 per cent in 1993 followed by 3.4 and 3.6 per cent for the years 1994 and 1995.

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

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

Region	Actual 1991	Estimated 1992	Forecast		
			1993	1994	1995
Africa	1.7	2.4	3.0	3.5	3.5
Asia/Pacific	5.1	4.8	5.0	5.8	5.8
Europe	-3.2	-4.1	1.0	1.8	2.0
Europe (excluding Eastern Europe and the Russian Federation)	0.8	1.5	2.6	3.6	3.8
Middle East	1.7	8.0	8.5	7.0	7.5
North America	-0.7	1.9	2.8	3.0	3.3
Latin America and Caribbean	2.9	2.9	3.2	3.6	4.2
World	0.1	1.1	2.8	3.4	3.6

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

### AIRLINE TRAFFIC TRENDS

12. 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 1982 and 1992. 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.
13. Global traffic data for each year of the decade 1981-1992 are given in Tables 5-2 (total traffic) and 5-3 (international traffic).
14. In broad terms, the pattern of traffic growth over the 1982-1992 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.
15. The regional distribution of scheduled passenger traffic for the years 1981 and 1991 is illustrated in Figure 5-3. The airlines of the North American and European regions dominate, contributing 73.0 per cent of the total traffic in 1981, and 71.2 per cent in 1991. Passenger traffic performed by airlines registered in the Asia/Pacific region increased from 15.8 per cent of the total world traffic in 1981 to about 19.5 per cent in 1991. Other regions contributed 11.2 per cent of the traffic in 1981 and 9.3 per cent in 1991.

### AIRLINE PRODUCTIVITY, PRICES AND FINANCIAL PERFORMANCE

16. The scheduled airline industry has a long history of improving productivity. As a result, the growth in the output of the industry (traffic volumes) 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 (tonne-kilometres performed 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 1981 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.
17. 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

**Table 5-2. World total international and domestic revenue traffic**  
(scheduled services of airlines of ICAO Contracting States, 1981-1992)

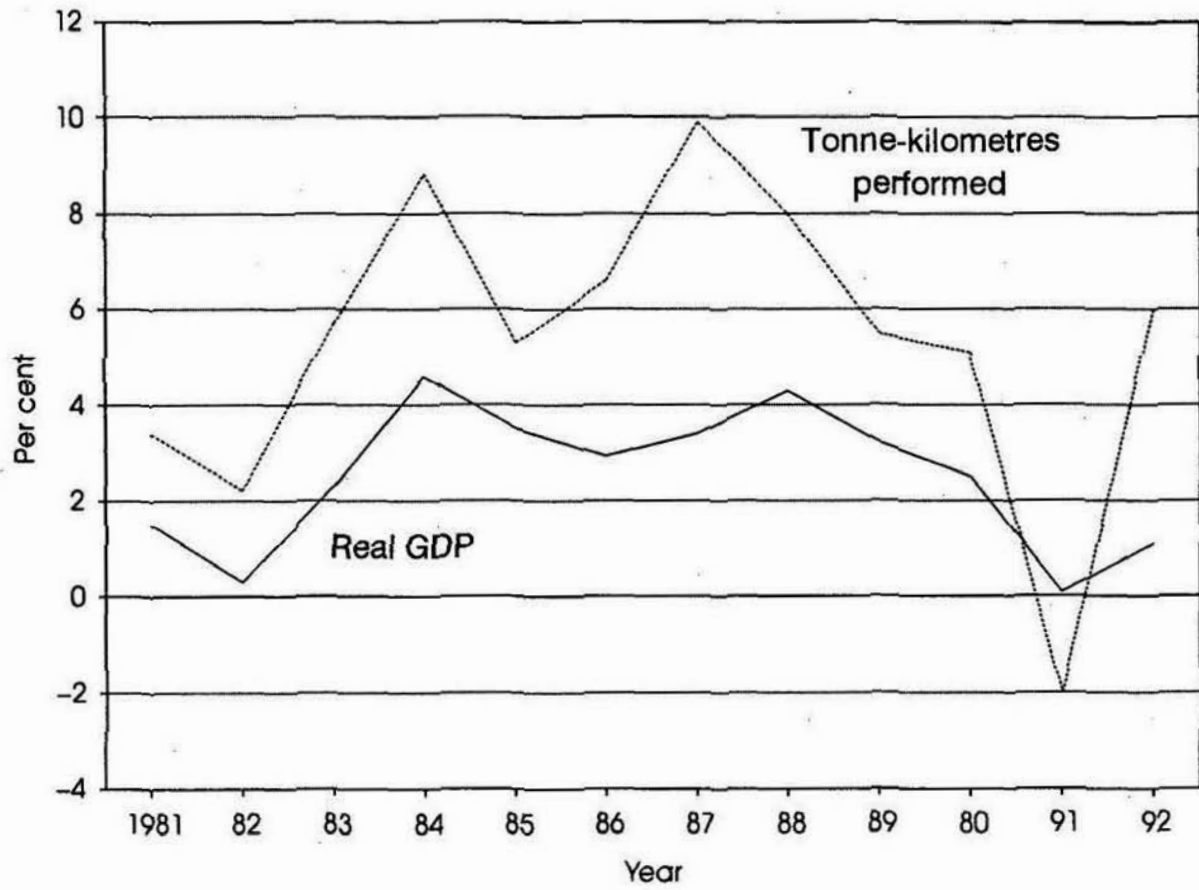
Year	Passengers carried		Passenger-km		Freight tonnes carried		Freight tonne-km performed		Mail tonne-km performed		Total tonne-km performed	
	Millions	Annual Increase (%)	Millions	Annual Increase (%)	Millions	Annual Increase (%)	Millions	Annual Increase (%)	Millions	Annual Increase (%)	Millions	Annual Increase (%)
1981	750	0.3	1 119 000	2.8	10.9	-1.8	30 880	5.1	3 800	3.3	135 490	3.4
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	8.7
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	6.9	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	223 630	5.4
1990	1 165	4.1	1 894 000	6.4	18.2	0.6	58 830	2.8	5 320	5.1	235 220	5.2
1991	1 133	-2.7	1 843 000	-2.7	17.6	-3.3	58 580	-0.4	5 090	-4.3	230 570	-2.0
1992	1 167	3.0	1 953 000	5.9	17.3	-1.7	62 050	5.9	5 180	1.8	244 020	5.8

Source: ICAO Air Transport Reporting Form A-1.

**Table 5-3. World international revenue traffic**  
(scheduled services of airlines of ICAO Contracting States, 1981-1992)

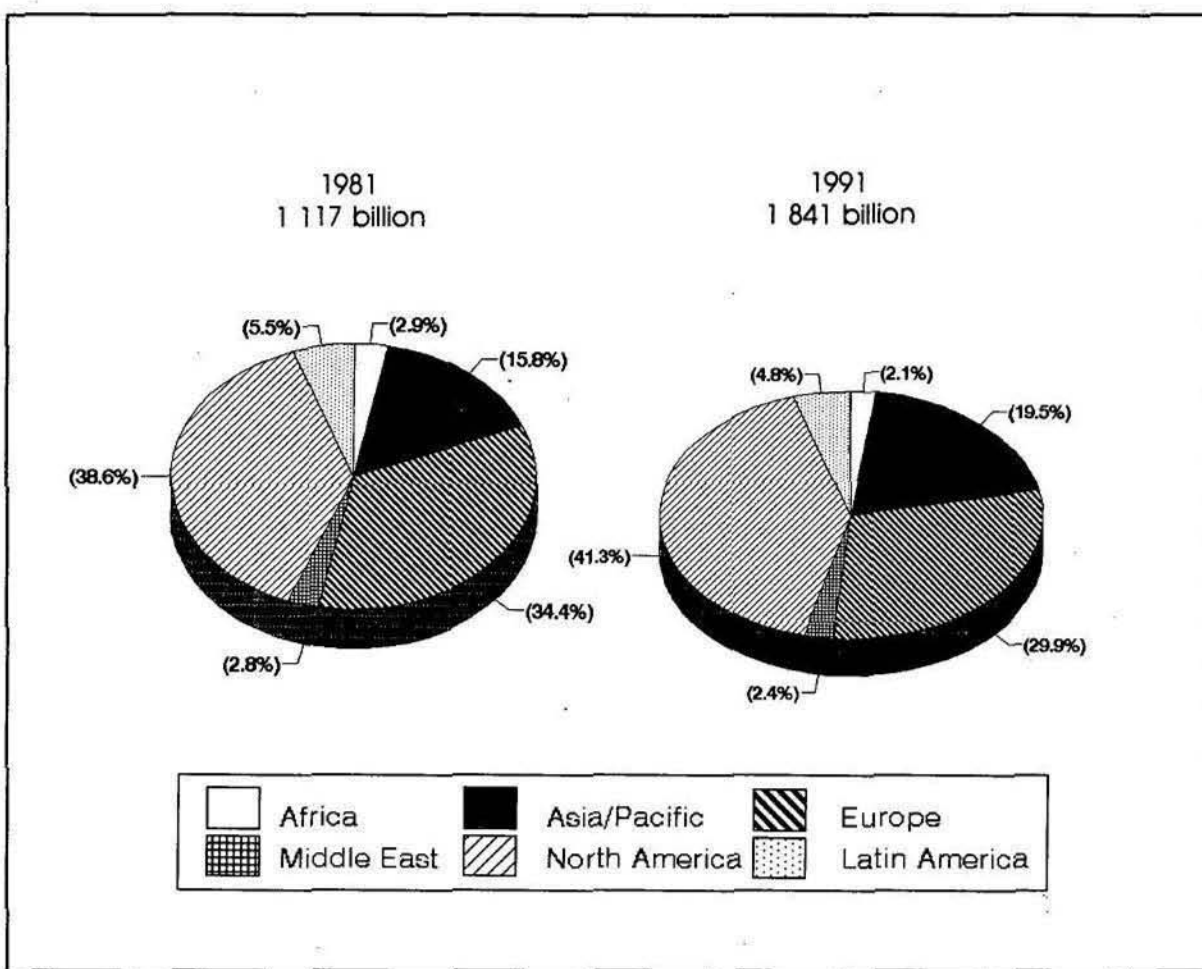
Year	Passengers carried		Passenger-km		Freight tonnes carried		Freight tonne-km performed		Mail tonne-km performed		Total tonne-km performed	
	Millions	Annual Increase (%)	Millions	Annual Increase (%)	Millions	Annual Increase (%)	Millions	Annual Increase (%)	Millions	Annual Increase (%)	Millions	Annual Increase (%)
1981	173	6.1	494 000	6.0	4.6	4.5	21 700	7.1	1 570	4.0	68 470	6.5
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	198	2.1	603 000	2.2	6.4	8.5	32 220	9.7	1 880	1.1	89 710	4.8
1987	222	12.1	688 000	14.1	7.2	12.5	36 700	13.9	1 940	3.2	101 970	13.7
1988	243	9.5	762 000	10.8	7.9	9.7	41 120	12.0	1 990	2.6	113 310	11.1
1989	262	7.8	825 000	8.3	8.6	8.9	44 960	9.3	2 080	4.5	123 220	8.7
1990	280	6.9	893 000	8.2	8.9	3.5	46 350	3.1	2 190	5.3	130 750	6.1
1991	266	-5.0	860 000	-3.7	8.5	-4.5	46 440	0.2	2 210	0.9	128 230	-1.9
1992	300	12.8	979 000	13.8	9.1	7.1	50 060	7.8	2 260	2.3	142 780	11.3

Source: ICAO Air Transport Reporting Form A-1.



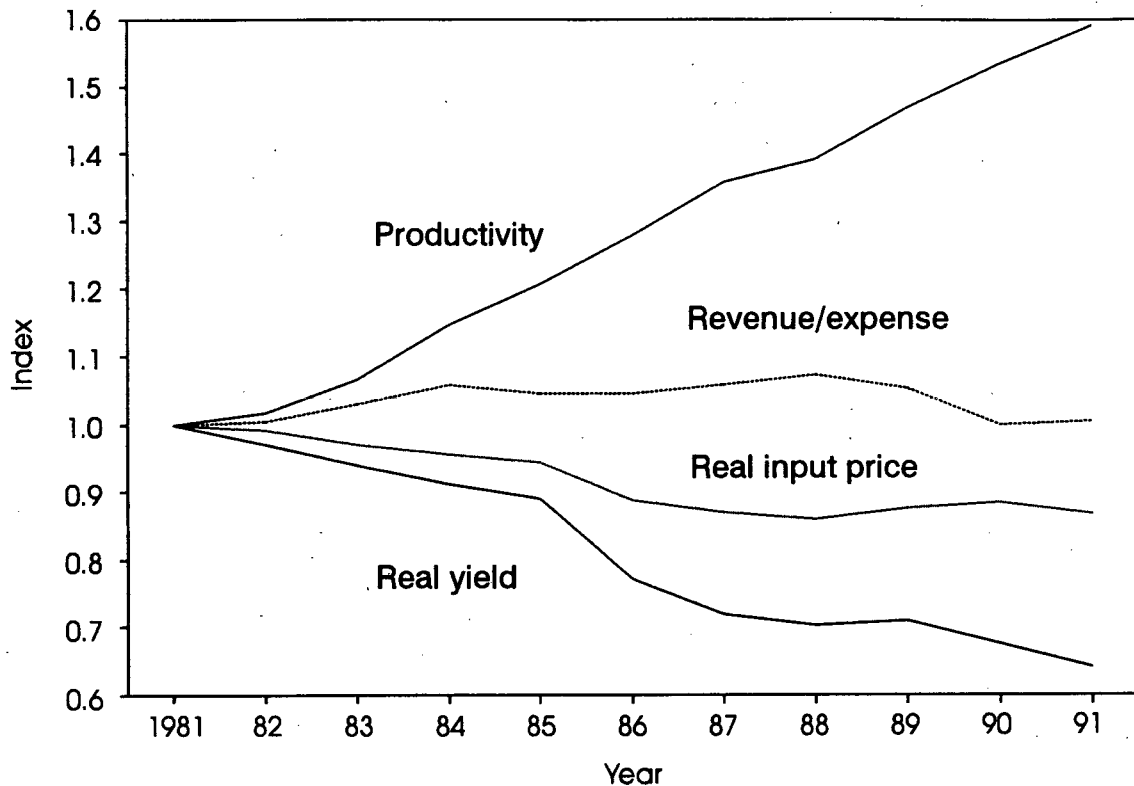
Source: IMF, ICAO Air Transport Reporting Form A-1.

Figure 5-2. World GDP and scheduled traffic growth



Source: ICAO Air Transport Reporting Form A-1.

**Figure 5-3. Regional distribution of scheduled passenger traffic — passenger-kilometres performed**



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

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

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).

18. 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



and the utilization of airline resources declined. Furthermore, 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).

19. 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 4.9 per cent to 8.8 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 5-4. Operating and net results<sup>1</sup>**  
(scheduled airlines of ICAO Contracting States)<sup>2</sup>

Year	Operating revenues U.S.\$ (millions)	Operating expenses U.S.\$ (millions)	Operating result		Net result <sup>3</sup>		Direct subsidies U.S.\$ (millions)	Income taxes U.S.\$ (millions)
			Amount U.S.\$ (millions)	Percent- age of operating revenues	Amount U.S.\$ (millions)	Percent- age of operating revenues		
1981	93 000	93 700	-700	-0.8	-1 150	-1.2	76	9
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	179 000	171 200	7 800	4.4	3 700	2.1	165	-2 870
1990	198 700	200 200	-1 500	-0.8	-4 300	-2.2	230	-300
1991	204 500	205 000	-500	-0.2	-3 500	-1.7	100	550
1992 <sup>4</sup>	212 000	213 000	-1 000	-0.5				

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.

**Table 5-5. Distribution of operating revenues and expenses in 1981 and 1991**  
(scheduled airlines of ICAO Contracting States<sup>1</sup>,  
total domestic and international services)

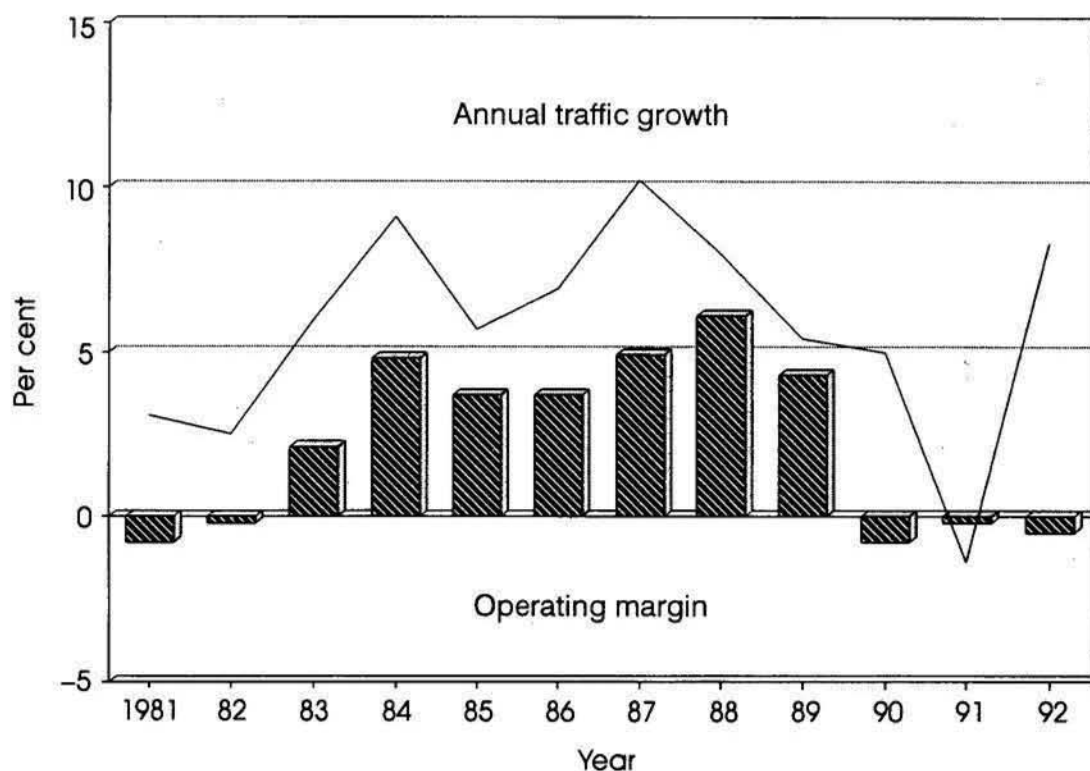
Description	Distribution by item (per cent)		Change in per cent share of item 1981 to 1991
	1981	1991	
<b>OPERATING REVENUES</b>			
Scheduled services (total)	91.2	87.2	-4.0
Passenger	79.4	76.7	-2.7
Freight	10.4	9.3	-1.1
Mail	1.5	1.1	-0.4
Non-scheduled operations	3.8	4.0	0.2
Incidental	4.9	8.8	3.9
<b>TOTAL</b>	<b>100.0</b>	<b>100.0</b>	<b>—</b>
<b>OPERATING EXPENSES</b>			
Direct aircraft			
Flight operations (total)	38.7	27.8	-10.9
Flight crew	7.1	6.9	-0.2
Fuel and oil	28.8	15.0	-13.8
Other	2.8	5.9	3.1
Maintenance and overhaul	10.2	11.5	1.3
Depreciation and amortization	6.4	7.1	0.7
Sub-total	55.3	46.4	-8.9
Indirect			
User charges and station expenses (total)	14.4	16.2	1.8
Landing and associated airport charges	3.4	3.9	0.5
En-route facility charges	1.2	1.5	0.3
Station expenses	9.8	10.8	1.0
Passenger services	8.7	10.3	1.6
Ticketing, sales, promotion	14.9	16.6	1.7
General, administrative and other	6.7	10.5	3.8
Sub-total	44.7	53.6	8.9
<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.

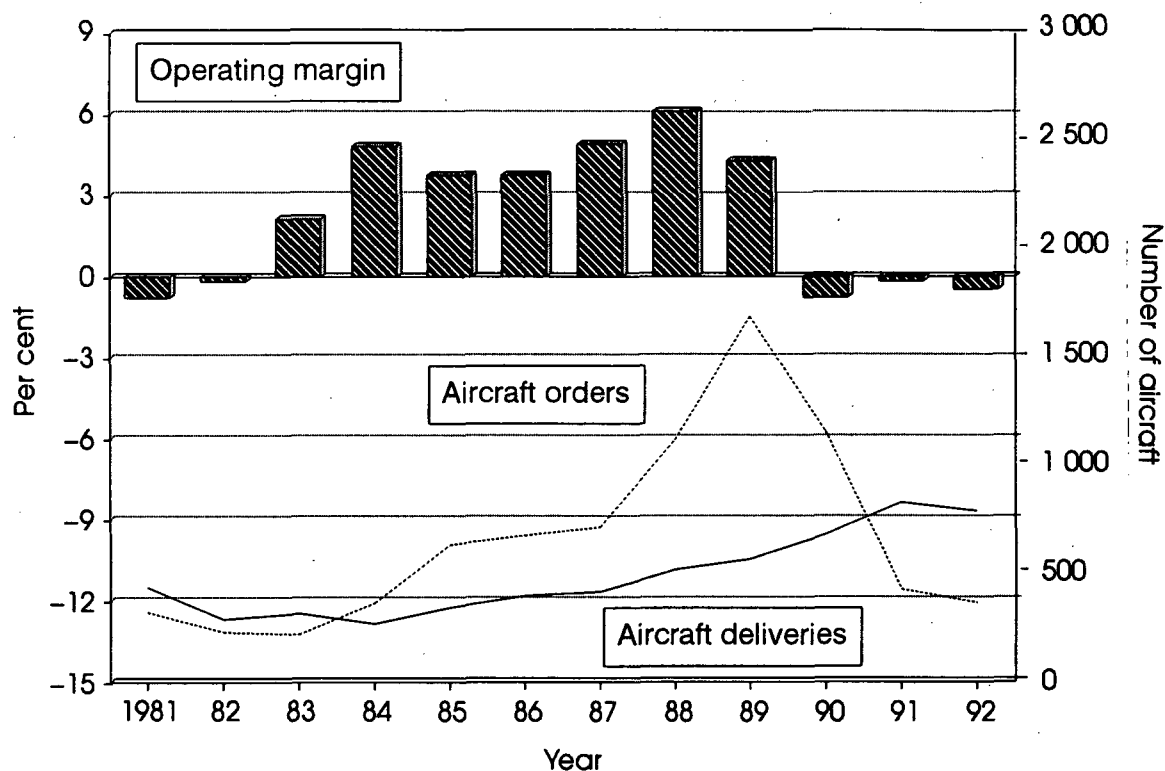
20. The variations in the annual operating result, measured as a per cent of airline revenue, are illustrated graphically for the period since 1981 in Figure 5-5, which also shows the fluctuations in traffic growth over the same period. There appears to be a positive correlation between this measure 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.

21. 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.



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 — scheduled airline industry**

22. The high rate of deliveries 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

23. 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 1993, 1994 and 1995 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.

24. 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.

25. 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.

26. 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. Changes in fuel taxes (e.g. in the United States) will push up aviation fuel prices in some markets, but the impact on yields and traffic is expected to be quite small.

27. 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, in due course, begin to rise slightly (in real terms).

28. The global and regional scheduled passenger traffic forecasts for 1993, 1994 and 1995, 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 will not be present in 1993. However, the loss of

**Table 5-6. ICAO scheduled passenger traffic forecast for 1993-1995**  
(passenger-kilometres performed)

Region of airline registration	ACTUAL			ESTIMATED		FORECAST					
	1981 (billions)	1991	Average annual growth (%)	1992 (billions)	Growth (%)	1993 (billions)	Growth (%)	1994 (billions)	Growth (%)	1995 (billions)	Growth (%)
Africa	32.5	39.1	1.9	44.0	12.5	46.6	5.9	49.5	6.2	52.7	6.5
Asia/Pacific	176.6	359.3	7.4	407.1	13.3	445.2	9.3	491.5	10.4	543.8	10.6
Europe	384.6	552.2	3.7	548.8	-0.6	564.4	2.8	589.5	4.4	617.5	4.7
Middle East	30.6	45.4	4.0	53.1	17.0	56.7	6.9	60.4	6.5	64.5	6.8
North America	431.5	759.8	5.8	808.6	6.4	857.6	6.1	914.4	6.6	978.8	7.0
Latin America/ Caribbean	61.1	87.5	3.7	90.7	3.6	96.0	5.9	102.8	7.1	110.9	7.9
World	1 116.9	1 843.3	5.1	1 952.3	5.9	2 066.5	5.9	2 208.1	6.9	2 368.2	7.3

this stimulus will be more or less offset by improved economic growth, and global passenger traffic should therefore grow by nearly 6 per cent, about the same rate as in 1992. Further improvements to economic growth in 1994 and 1995 are expected to raise traffic growth in these years to 6.9 and 7.3 per cent respectively, in continuing reflection of the pent-up demand after the decline in traffic in 1991. 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.

29. Traffic growth in 1992 varied greatly across geographic regions because of the impact of specific local or regional factors. For example, Middle East traffic had been particularly affected by the Gulf war in 1991 and the return to normal conditions in 1992 produced a very high annual growth in that year. On the other hand, European traffic remained weak in 1992 because of continuing economic adjustments and uncertainties, particularly in the Russian Federation.

30. Over the forecast period, the differences in traffic growth will be generally less than in 1992. European growth, however, will remain lower than for other regions. Asia/Pacific traffic growth will be above average, reflecting an anticipated healthy economic performance in this region. Further details of the trends and forecasts on a region-by-region basis may be found in Chapter 6.

### AIRLINE FINANCIAL FORECAST

31. 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).

32. 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 per cent in 1993, 10 per cent in 1994 and 11 per cent in 1995.

33. 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 5 per cent in 1993, 7 per cent in 1994 and 8 per cent in 1995. These compare with average rates of 7.8 per cent per annum over the past three years, and 9 per cent per annum over the preceding seven years.

34. 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 -0.5 per cent in 1992 to 3 per cent in 1993, 6 per cent in 1994 and 8 per cent in 1995.

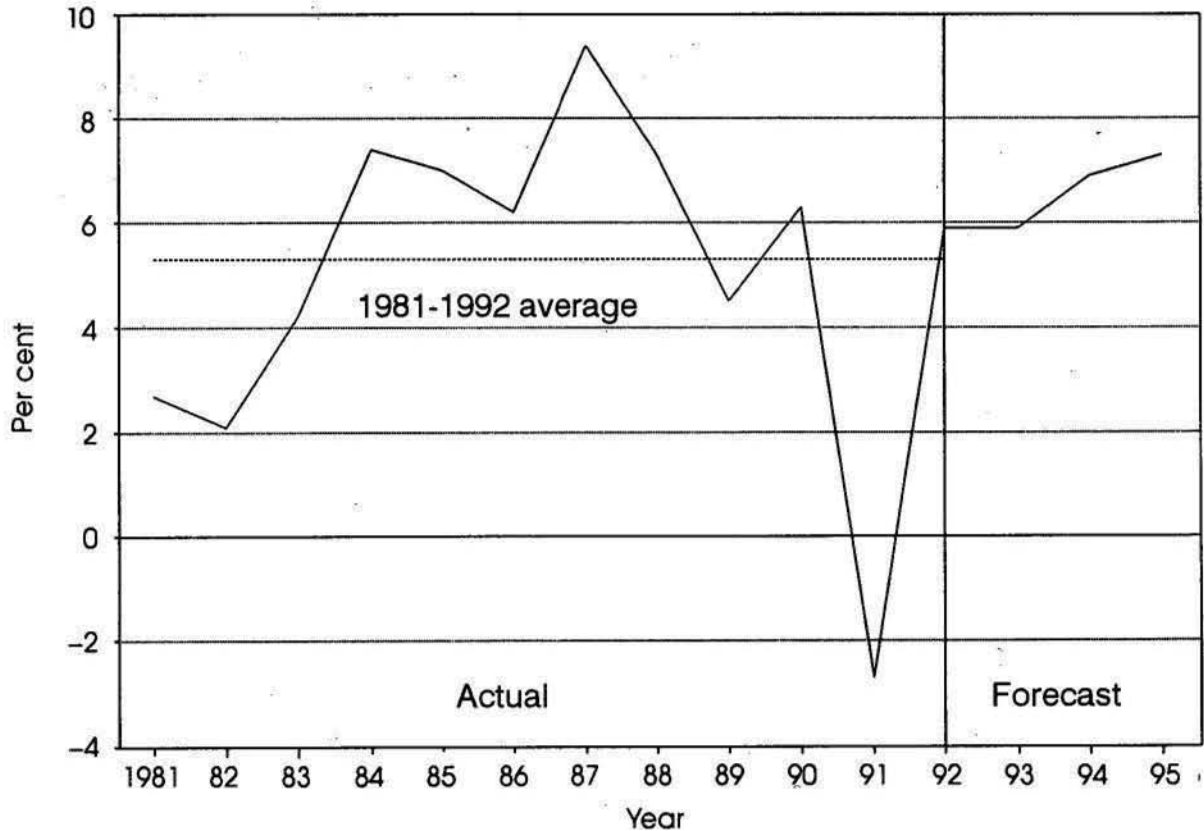


Figure 5-7. World scheduled passenger traffic growth — passenger-kilometres performed

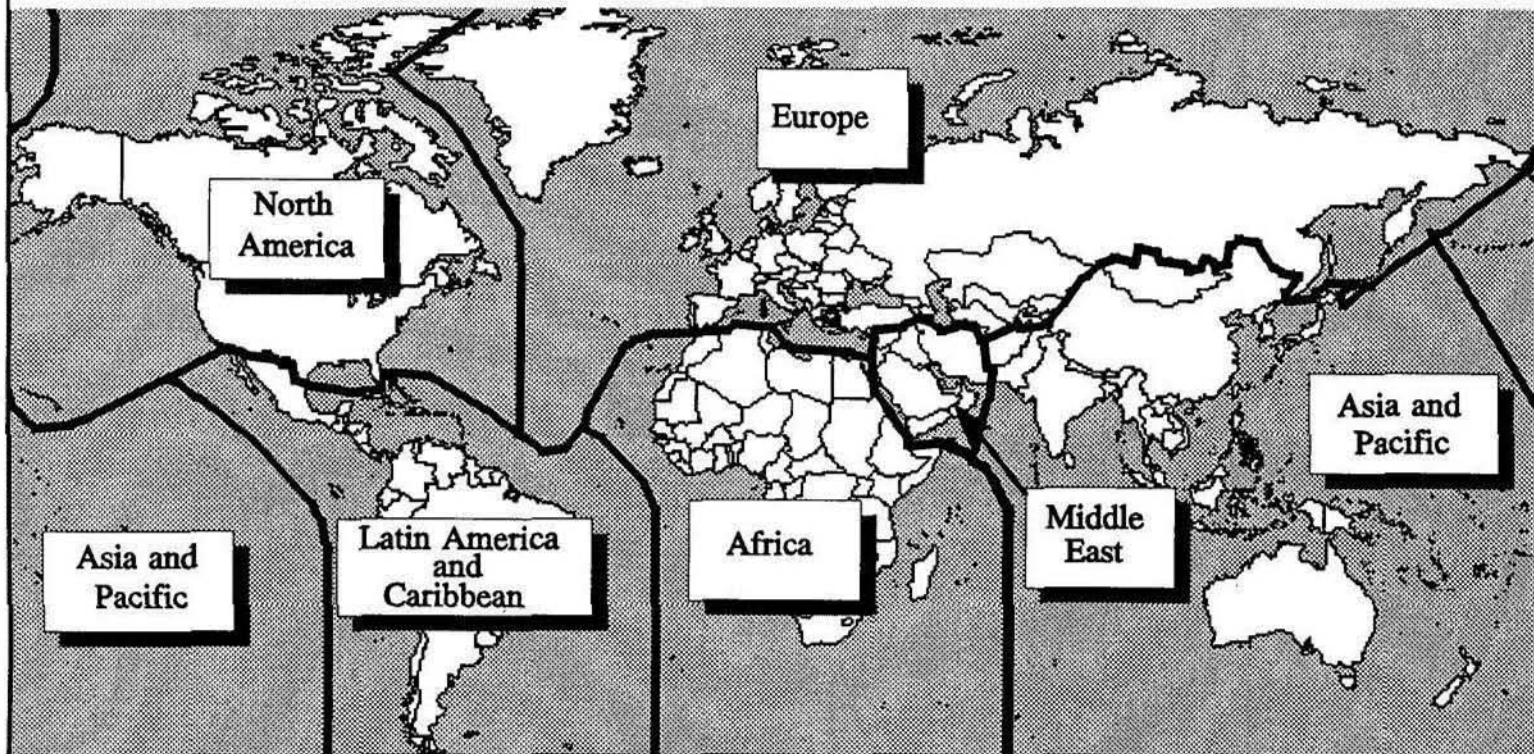
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PART III

REGIONAL PERSPECTIVES, 1992 TO 1995

## 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 1992, the economic environment over the period 1981-1991 and anticipated through to 1995, and airline finances and passenger traffic trends over the 1981-1991 period; and presents scheduled passenger traffic forecasts for the airlines of each region through to 1995. 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 1992*

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

	INTERNATIONAL			TOTAL		
	1992	Increase over 1991 (%)	Share of world traffic (%)	1992	Increase over 1991 (%)	Share of world traffic (%)
Passengers carried (thousands)	13 500	16.9	4.5	25 200	4.7	2.2
Passenger-kilometres performed (millions)	36 570	16.9	3.7	44 000	12.1	2.3
Freight and mail tonne-kms performed (millions)	1 170	9.9	2.2	1 250	8.4	1.9

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

2. During 1992, civil aviation in some African States suffered from reduced financial support from governments and other sources as resources were diverted to other problems, notably those caused by drought in the sub-Saharan region and by political unrest. Also in 1992 the World Bank and the IMF continued to put pressure on African governments to improve their levels of economic performance and in particular to reduce the dependency of major economic sectors, including air transport, on government handouts.

3. In view of the inability or unwillingness of governments to subsidize future operations, a growing number of African airlines sought help from aviation consultancy companies based abroad to try to improve their commercial practices and to improve economic efficiency through the rationalization of staff and other cost-cutting measures with a view *inter alia* to partial privatization. A number of feasibility studies were also initiated aimed at establishing autonomous civil aviation authorities. However, the privatization and self-financing movement was hampered by a shortage of viable local private investors and lack of interest by foreign investors.

4. In 1992 Mali became the eleventh African State to participate in the treaty governing the multinational airline Air Afrique. Through a new Annex to the treaty, Air Afrique saw its designated area widened, which had repercussions on the bilateral arrangements between treaty- and non-treaty States. A Multinational Air Services Agreements Negotiating Committee (Comité multinational de négociation d'accords aériens) was created in relation to arrangements with non-treaty States.

5. Within the framework of the Economic Community of Central African States, a greater degree of co-operation was achieved in 1992 between the national carriers of Cameroon and Gabon.

6. The lifting of sanctions against South Africa and the deregulation of that country's international civil aviation policy led to an increasing number of African scheduled air carriers operating to and from South Africa. As a result of the new United Kingdom/South Africa air services agreement, which allows for the multiple designation of carriers and double disapproval of tariffs, cheaper air fares were introduced for journeys between London and some Southern African cities transiting through Johannesburg than those for travel between these cities and London on direct flights.

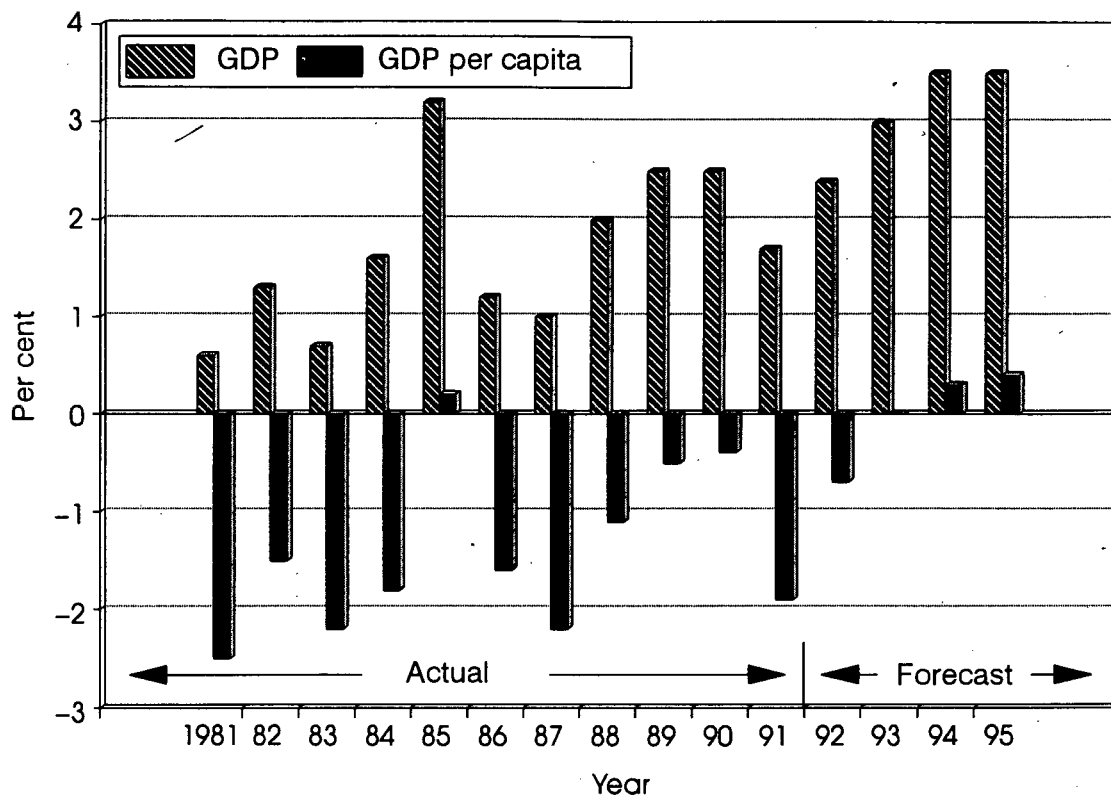
7. In an effort to withstand competition in an increasingly deregulated air transport industry, the member States of the Southern African Development Community (SADC) considered the establishment of a new SADC regional air transport regime which would *inter alia* be responsible for standardization of air transport regulation in the sub-region.

8. The African Joint Air Services (AJAS), an airline co-operative project pursued by Uganda, United Republic of Tanzania and Zambia, suffered a set-back when Zambia withdrew due to financial constraints. Future progress might depend on the project's ability to attract some other State or States from among members of the Preferential Trade Area for Eastern and Southern African States (PTA).

### ***Economic Environment***

9. Over the 1981-1991 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.

10. 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



Source: IMF, Wharton Econometrics Services.

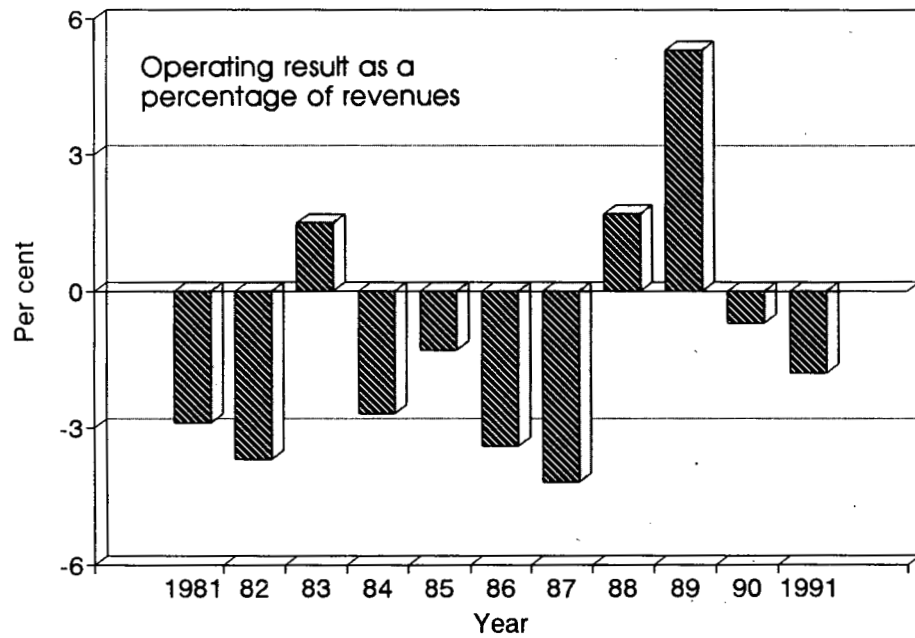
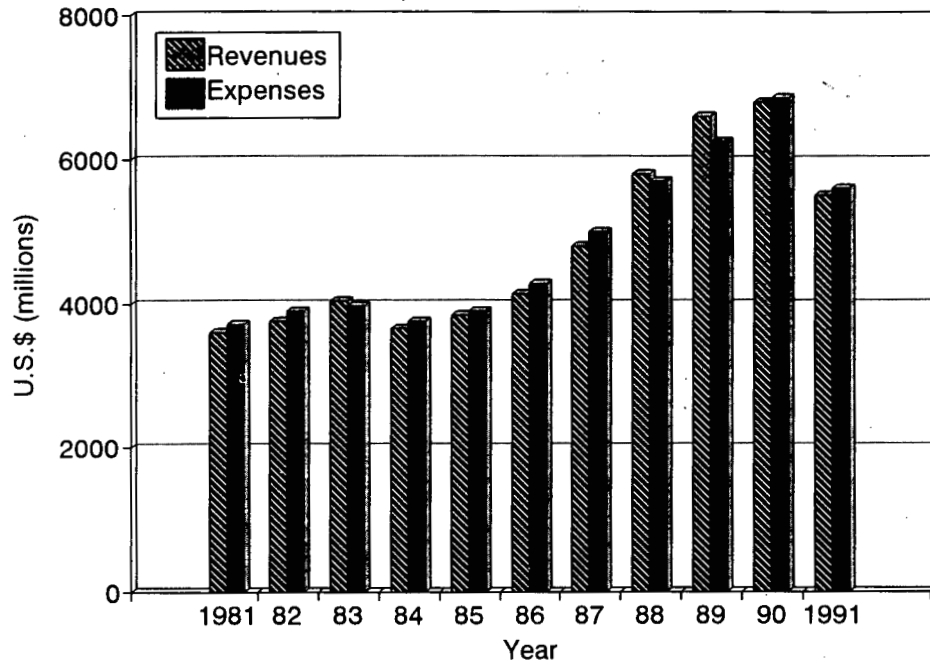
**Figure 6-1. Annual change in real GDP and GDP per capita  
— Africa**

the region has faced increasing difficulties in foreign debt servicing. Severe drought and political unrest have also constrained economic activity.

11. For 1992, the real growth of GDP is estimated to be around 2.4 per cent. In 1993, 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 3.0, 3.5 and 3.5 per cent for the years 1993, 1994 and 1995 respectively.

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

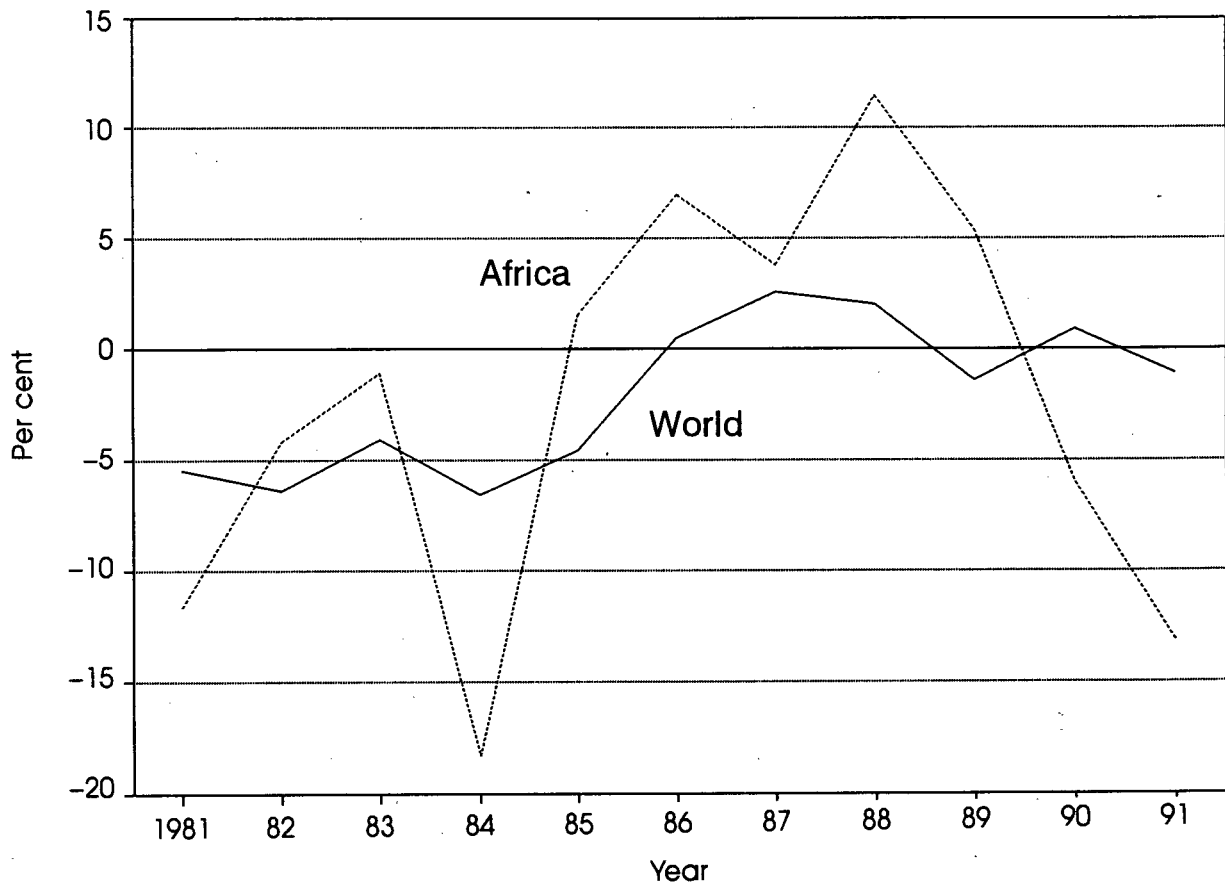
12. Over the 1981-1991 period, operating revenues (in United States dollars) of the scheduled airlines of the African region increased at an average annual rate of 4.3 per cent (compared with the world annual average of 8.2 per cent). Operating expenses for the same period increased by 4.2 per cent per annum. Positive operating results were achieved in 1983, 1988 and 1989, as illustrated in Figure 6-2.



Source: ICAO Air Transport Reporting Form EF-1.

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

13. For the 1981-1991 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 1.8 per cent in real terms (compared with a 1.9 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.



Note.— 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**

### Airline Passenger Traffic Trends and Forecast

14. Over the 1981-1991 period, scheduled passenger traffic (passenger-kilometres performed) of airlines of the African region increased at an average annual rate of 1.9 per cent (compared with the world annual average of 5.1 per cent). Strong positive growth in traffic was recorded in 1992, following a severe decline in 1991. The year-to-year traffic growth comparison between world and African airlines is shown in Figure 6-4.

15. 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 5.9, 6.2 and 6.5 per cent for the years 1993, 1994 and 1995 respectively, compared with world airline growth of 5.9, 6.9 and 7.3 per cent. The expectations for relatively buoyant growth for African airlines are based primarily on an improved economic outlook.

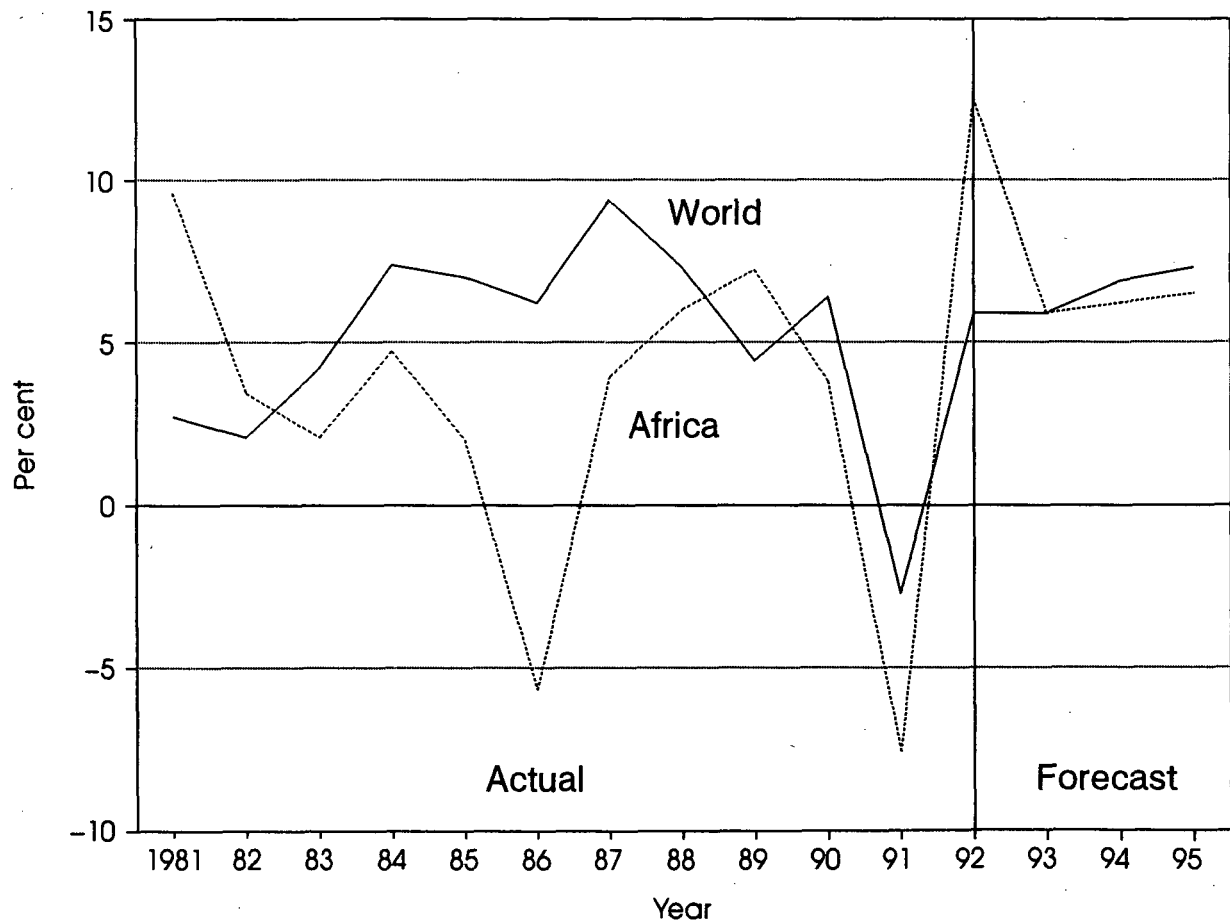


Figure 6-4. Scheduled passenger traffic growth (PKPs) — Africa and World



## ASIA/PACIFIC

*The Region in 1992***Table 6-2. Scheduled traffic — airlines of Asia/Pacific**

	INTERNATIONAL			TOTAL		
	1992	Increase over 1991 (%)	Share of world traffic (%)	1992	Increase over 1991 (%)	Share of world traffic (%)
Passengers carried (thousands)	67 600	14.0	22.5	239 100	11.1	20.5
Passenger-kilometres performed (millions)	272 200	14.8	27.8	406 700	13.2	20.8
Freight and mail tonne-kms performed (millions)	17 310	6.8	33.1	19 180	6.2	29.5

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

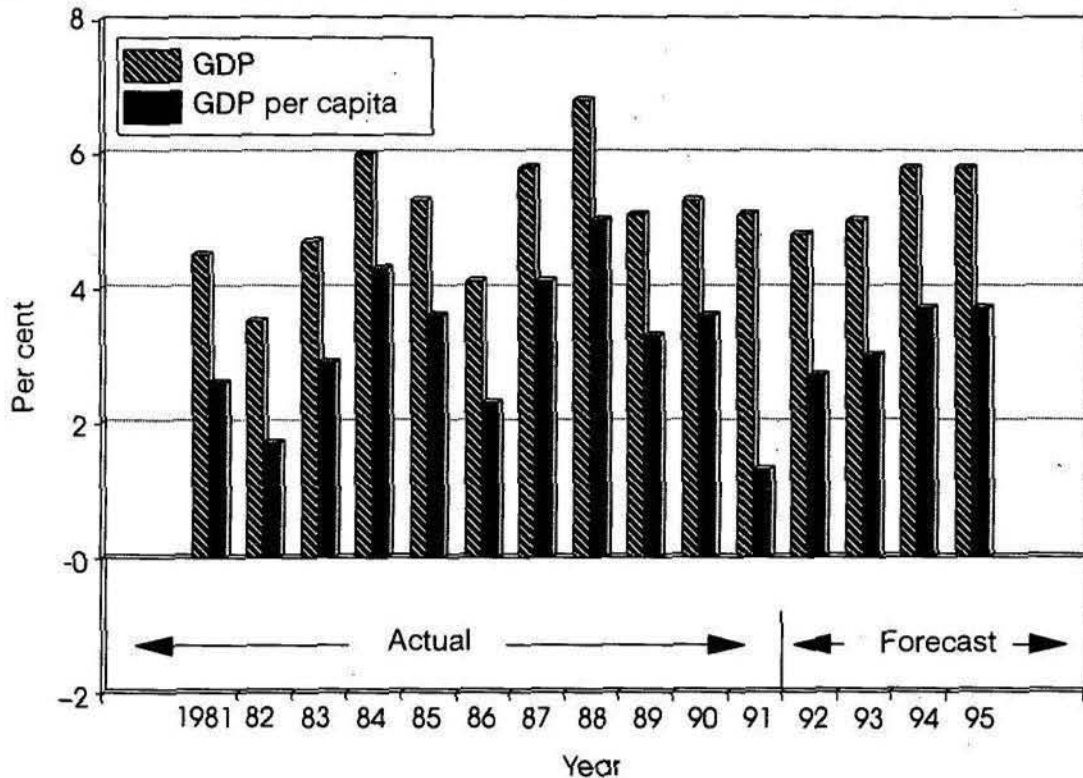
16. During 1992, some States in the Asia/Pacific region continued with their policy of liberalizing air transport service in and between countries in that region. A major event was the decision by Australia and New Zealand to establish a single market for air transport services. Other countries allowed their domestic carriers to enter international markets, including Sempati Air of Indonesia and Pelangi Air of Malaysia. Maldives and Sri Lanka adopted an "open skies" policy for air services between their territories.

17. As already indicated in Chapter 2, during 1992 changes to the ownership of air carriers was an important feature in this region, with the partial or full privatization of a number of government owned carriers.

18. Co-operative activities amongst the airlines continued and expanded during 1992 as, for example, through the opening of several new joint air services. Faced with a severe shortage of cockpit crews, Japan Airlines entered into an agreement with Qantas (Australia) for the latter to operate JAL's services between Japan and Australia/New Zealand. Because of financial and operational difficulties, Kiribati entered into an agreement with Air Nauru for the latter to operate international services on behalf of Air Tungaru.

**Economic Environment**

19. Over the 1981-1991 period, the aggregate Asia/Pacific economy (GDP) grew at an average annual rate of 5.2 per cent in real terms, and GDP per capita increased at 3.2 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.



Source: IMF, Wharton Econometrics Services.

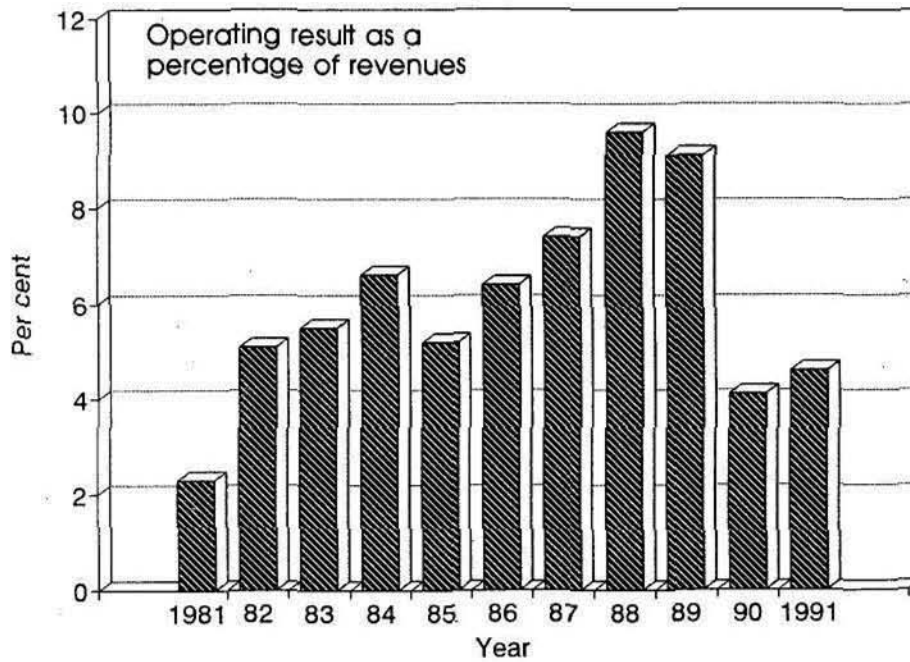
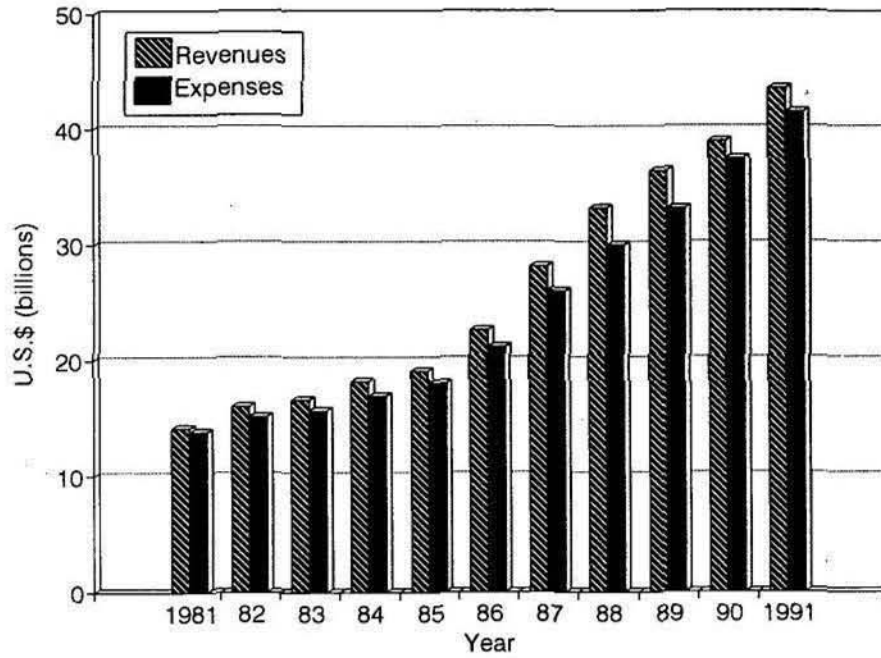
Figure 6-5. Annual change in real GDP and GDP per capita — Asia/Pacific

20. Economic growth in the region slowed in 1991 and 1992, primarily because of a substantial slowdown in the Japanese economy. Japanese growth is expected to remain relatively low in 1993 with recovery in 1994. The Australian economy is also slowly emerging from recession. A number of other countries, particularly in East and South East Asia, are growing rapidly and have a favourable outlook in the medium-term.

21. For the region as a whole, economic growth in 1992 is estimated to be about 4.8 per cent. Real growth in GDP is expected to be 5.0 per cent in 1993 and 5.8 per cent in each of 1994 and 1995.

### **Airline Financial Trends**

22. Over the 1981-1991 period, operating revenues (in United States dollars) of the scheduled airlines of the Asia/Pacific region increased at an average annual rate of 11.9 per cent (compared with the world annual average growth rate of 8.2 per cent). Operating expenses for the same period increased by 11.6 per cent per annum. Positive operating results were achieved throughout the period 1981 to 1991, as illustrated in Figure 6-6.



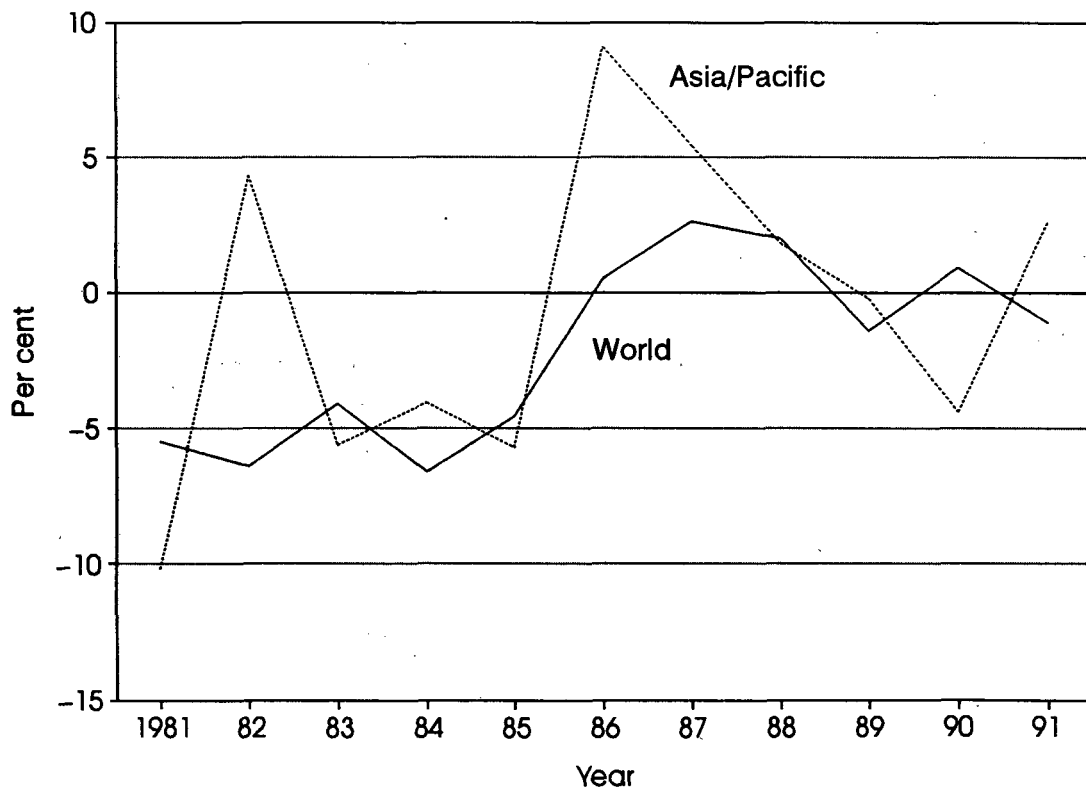
Source: ICAO Air Transport Reporting Form EF-1.

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

23. For the 1981-1991 period, average scheduled passenger yields for airlines of the region, measured in terms of U.S. cents per passenger-kilometre performed (PKP), grew at an average annual rate of 0.2 per cent in real terms (compared with a 1.9 per cent per annum decline for the world). 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***

24. Over the 1981-1991 period, scheduled passenger traffic (passenger-kilometres performed) of airlines of the Asia/Pacific region increased at an average annual rate of 7.4 per cent (compared with the world annual average of 5.1 per cent). Strong positive growth in traffic was recorded in 1992 (13.3 per cent), following a weak performance over the 1989-1991 period. The year-to-year traffic growth comparison between world and Asia/Pacific airlines is shown in Figure 6-8.



Note.— 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**

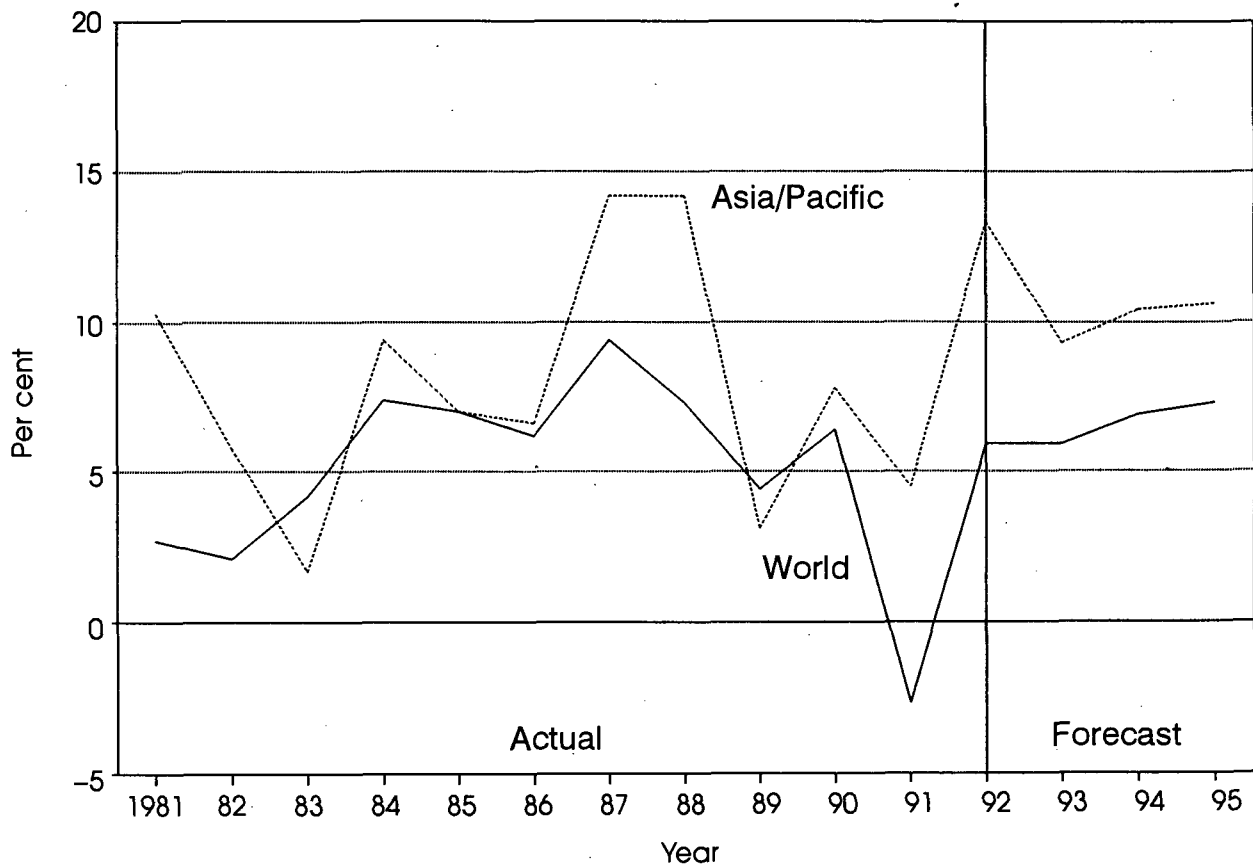


Figure 6-8. Scheduled passenger traffic growth (PKPs) —  
Asia/Pacific and World

25. 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 9.3, 10.4 and 10.6 per cent for the years 1993, 1994 and 1995 respectively, compared with world airline growth of 5.9, 6.9 and 7.3 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 1992***Table 6-3. Scheduled traffic — airlines of Europe**

	INTERNATIONAL			TOTAL		
	1992	Increase over 1991 (%)	Share of world traffic (%)	1992	Increase over 1991 (%)	Share of world traffic (%)
Passengers carried (thousands)	128 640	14.5	42.8	327 040	-2.3	28.0
Passenger-kilometres performed (millions)	331 110	13.6	33.8	551 730	0.0	28.3
Freight and mail tonne-kms performed (millions)	18 770	5.6	35.9	20 890	1.1	31.1

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

26. In December 1991 the 12 States Members of the European Community (EC) signed the Treaty of Maastricht which had as one of its aims the integration of the currencies of the member States into a single currency. During previous years the relative value of the various European currencies had been kept fairly stable relative to each other through the European exchange-rate mechanism (ERM). However, in 1992 pressure began to build against some of the weaker currencies in the ERM or those linked to the European Currency Unit (ECU) causing some of them to devalue and for the U.K. Pound and the Italian Lira also to leave the ERM.

27. In 1992, air travellers within the EC saw their duty-free privileges extended till mid-1999. The withdrawal of this facility to air travellers for journeys within the EC would have a significant impact on the revenues airports collect, directly or indirectly, for such sales and other alternative means of replacing this source of revenues would have to be found, including the possibility of raising airport user charges.

28. Also in 1992, the EC under pressure from the local airlines issued a Directive stating that the Value Added Tax (VAT) which was to be collected on all air fares sold for intra-EC travel was to be zero-rated.

29. As indicated in Chapter 2, during 1992 privatization and merger of airlines were also major features for this region. A number of co-operative agreements were also signed between European airlines as well as between European airlines and airlines outside the region.

30. As regards the capacity of the European air traffic system, a number of key decisions were taken by the Ministers of Transport of the European Civil Aviation Conference (ECAC) at their meeting in London on 17 March 1992. In particular, the Ministers agreed to:

- a) extend the En-Route Strategy, which they launched in 1990 to harmonize and integrate the operations of Western European air traffic control systems, to the new ECAC member States in Central and Eastern Europe, and reaffirmed their commitment to it. The Permanent Commission of Eurocontrol also decided to extend the Central Flow Management Unit Project, launched by ECAC Ministers in 1988, to the same States;
- b) launch a new Airports Strategy to further this effort by expanding the current programme of research and demonstrations to cover new procedures and equipment required for air traffic management in and around airports; and
- c) request EUROCONTROL, in co-operation with ICAO, ECAC member States, the EC Commission and European industry, to extend its work on a future European Air Traffic Management System to meet the needs of all ECAC States in the 21st century.

### ***Economic Environment***

31. Over the 1981-1991 period, the aggregate European economy (GDP) grew at an average annual rate of 1.4 per cent in real terms, and GDP per capita increased at 0.6 per cent. The year-to-year changes in the region's GDP and GDP per capita are illustrated in Figure 6-9.

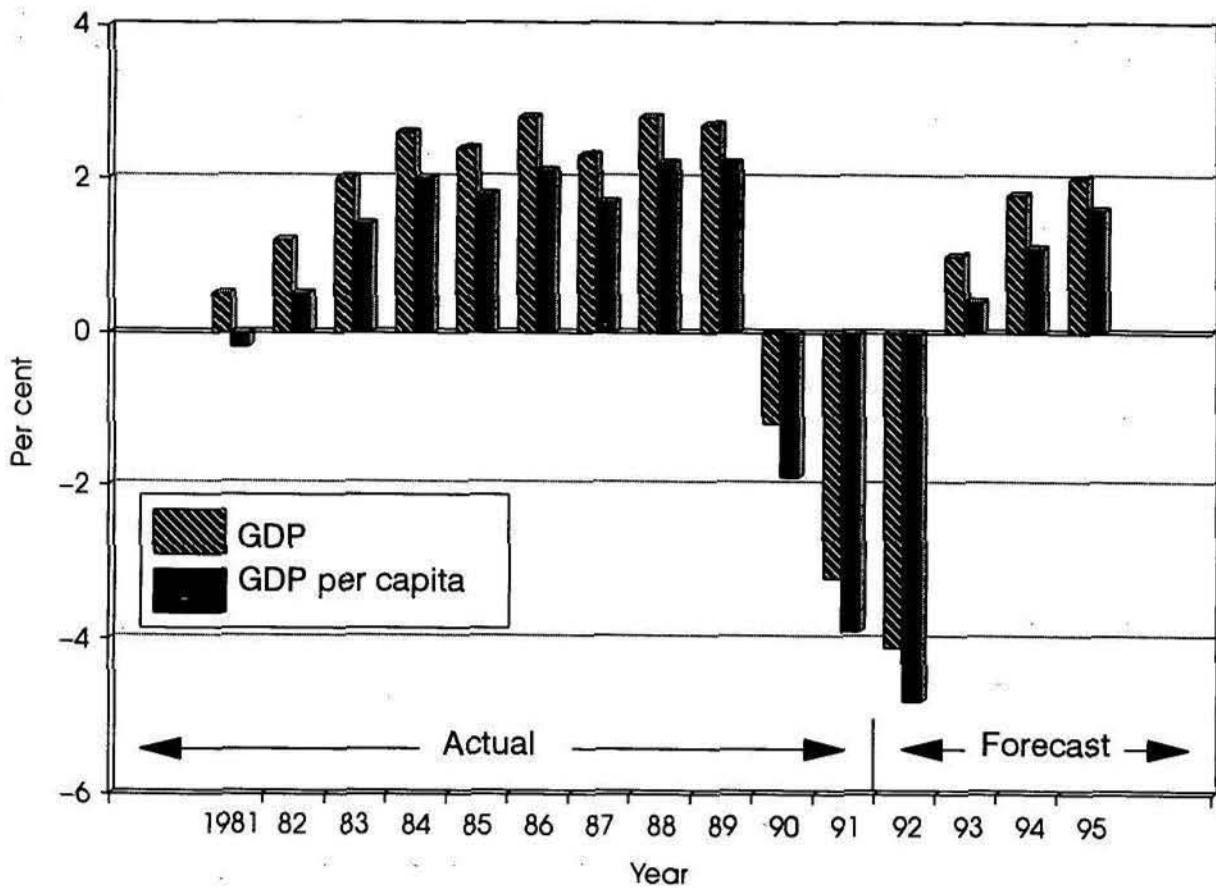
32. The declines in real GDP for the whole of Europe in 1990, 1991 and 1992 result from large reductions in output in Eastern Europe and the Commonwealth of Independent States, which are immersed in the difficult transition from planned economies to market economies. The strains in Europe have been compounded by recession in some Western European countries, particularly in 1992 when German growth slowed quite sharply.

33. A slow recovery is expected to commence in 1993 and continue through 1994 and 1995, and GDP growth for the whole of Europe is expected to be 1.0 per cent, 1.8 per cent and 2.0 per cent for these years respectively. Because of the structural changes occurring in this region, there is an unusually large element of uncertainty associated with the medium-term economic outlook.

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

34. Over the 1981-1991 period, operating revenues (in United States dollars) of the scheduled airlines of the European region increased at an average annual rate of 9.2 per cent (compared with the world annual average of 8.2 per cent). Operating expenses for the same period increased by 9.0 per cent per annum. Positive operating results were achieved in the years 1982 to 1989 inclusive. A negative result occurred in 1990, followed by a very small positive result in 1991 (Figure 6-10).

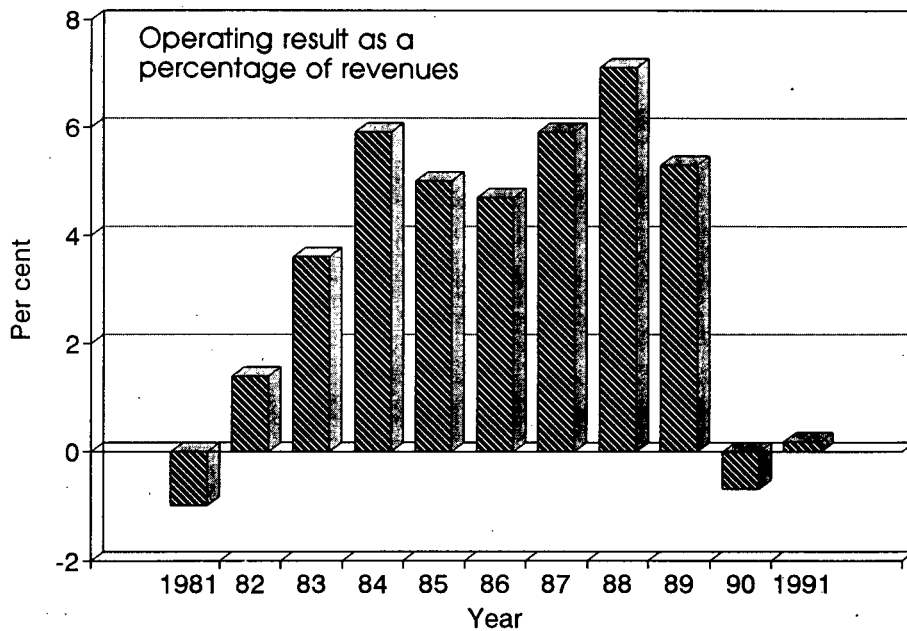
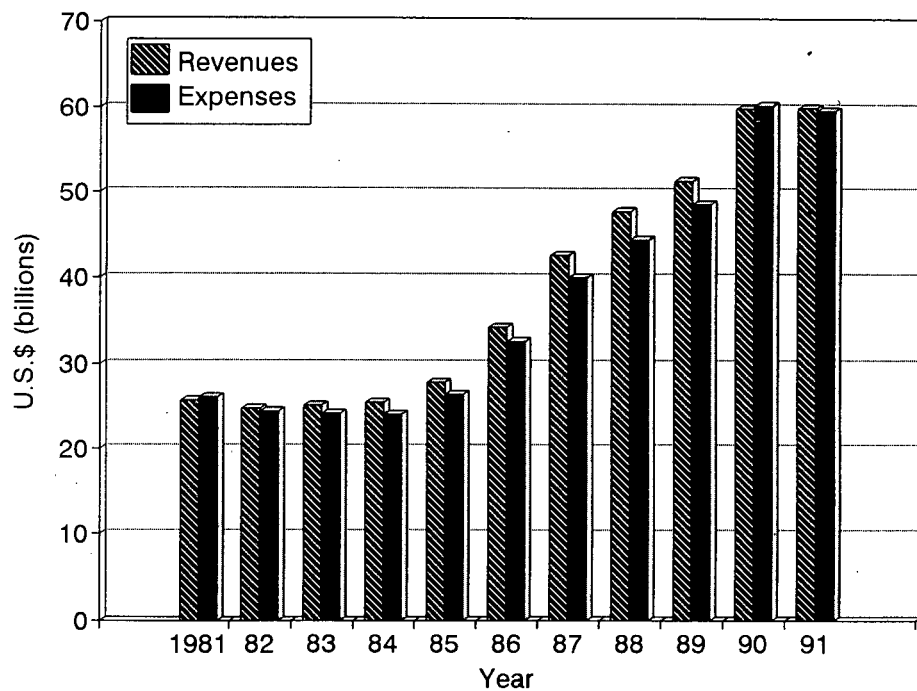
35. For the 1981-1991 period, average scheduled passenger yields for airlines of the region, measured in terms of cents per passenger-kilometre performed (PKP), grew at an average annual rate of 0.1 per cent in real terms (compared with a 1.9 per cent decline for the world). The year-to-year comparisons of the changes in the real passenger yield of European and world airlines are shown in Figure 6-11. The average yields achieved by European airlines were significantly higher than those of world airlines as a whole during the entire period. 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.



Source: IMF, Wharton Econometrics Services.

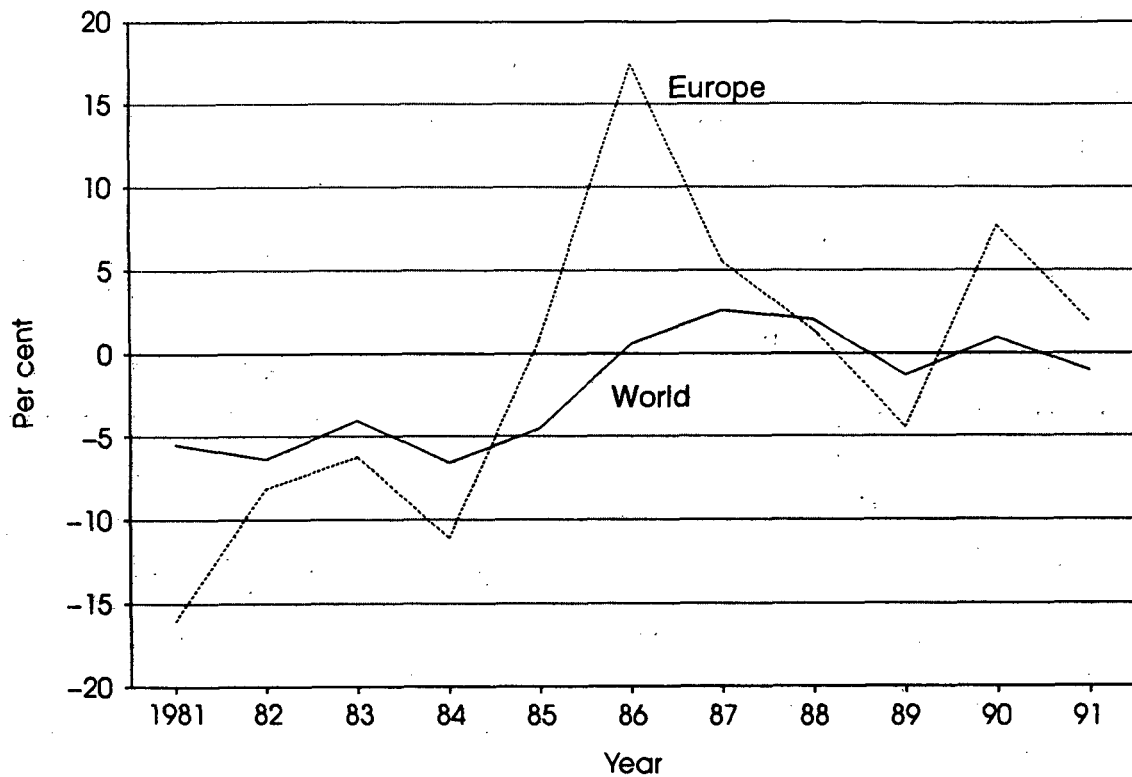
Figure 6-9. Annual change in real GDP and GDP per capita — Europe





Source: ICAO Air Transport Reporting Form EF-1.

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



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

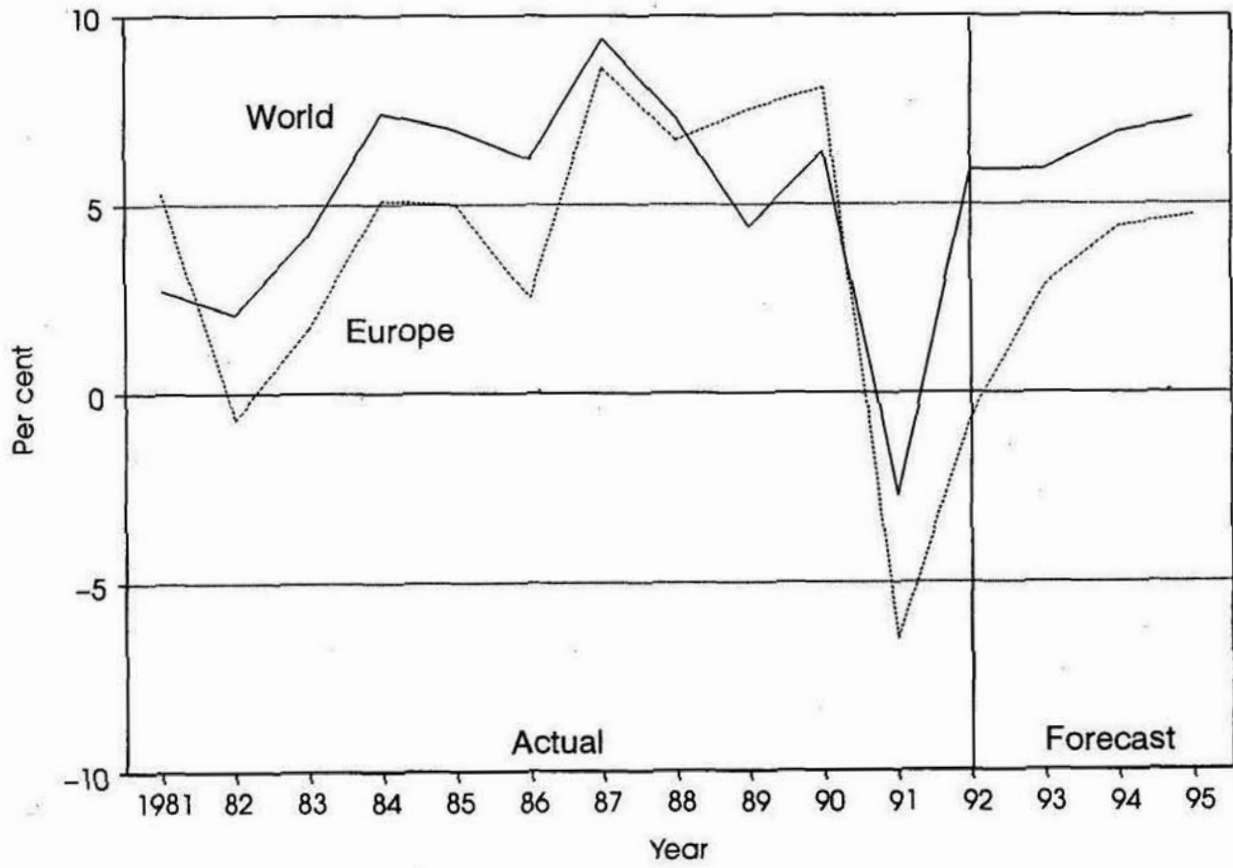
Source: ICAO Air Transport Reporting Forms A-1 and EF-1.

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

### Airline Passenger Traffic Trends and Forecast

36. Over the 1981-1991 period, scheduled passenger traffic (passenger-kilometres performed) of the airlines of the European region increased at an average annual rate of 3.7 per cent (compared with the world annual average of 5.1 per cent). After a very difficult year in 1991, traffic declined a little further in 1992. A large fall in the traffic of the Commonwealth of Independent States was not fully offset by significant growth in the traffic of the airlines of Western Europe. The year-to-year traffic growth comparison between world and European airlines is shown in Figure 6-12.

37. As shown in Table 5-6 of Chapter 5 and illustrated in Figure 6-12, scheduled passenger traffic of the airlines of the European region is expected to recover slowly over the forecast period with growth rates of 2.8 per cent, 4.4 per cent and 4.7 per cent for the years 1993, 1994 and 1995 respectively (compared with world airline growth of 5.9, 6.7 and 7.3 per cent).



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

## MIDDLE EAST

*The Region in 1992*

Table 6-4. Scheduled traffic — airlines of the Middle East

	INTERNATIONAL			TOTAL		
	1992	Increase over 1991 (%)	Share of world traffic (%)	1992	Increase over 1991 (%)	Share of world traffic (%)
Passengers carried (thousands)	15 800	20.8	5.3	27 400	9.3	2.3
Passenger-kilometres performed (millions)	44 830	21.5	4.6	53 050	17.0	2.7
Freight and mail tonne-kms performed (millions)	2 650	18.4	5.1	2 710	17.7	4.0

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

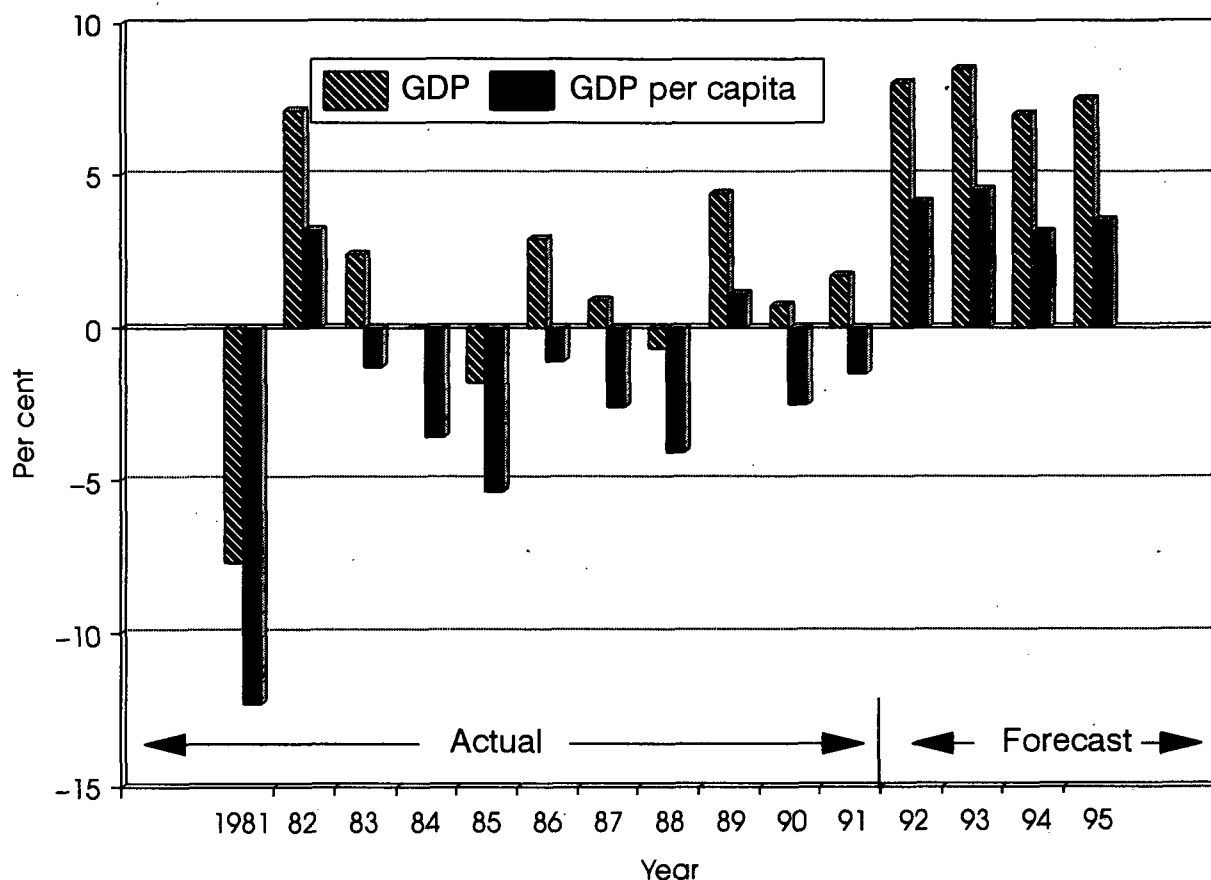
38. During 1992 the Middle East achieved the highest economic growth of all regions, in part due to the normalization of oil production and exports from Kuwait and continued strong economic growth in the Islamic Republic of Iran. Economic growth in the region was the major factor behind an increase in air traffic in this region to levels well above those attained during the pre-Gulf war period.

39. However, some of the effects of the Gulf war continued to affect air transport in the region. For example, airlines in the region continued to have to pay higher insurance and security costs, and flight operations costs remained high due to the need to follow circuitous air routes because of an air exclusion zone over Iraq and because airway Romeo 219 remained closed. Also, some of the infrastructure destroyed during the war had not yet been replaced.

40. In 1992 a significant number of new bilateral air transport agreements were signed by States in this region. The creation of several new States from former Soviet republics is likely to create new opportunities to expand air services and to promote further negotiations.

***Economic Environment***

41. Over the 1981-1991 period, the aggregate Middle East economy (GDP) grew at an average annual rate of 1.7 per cent in real terms, although GDP per capita fell at 1.8 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.



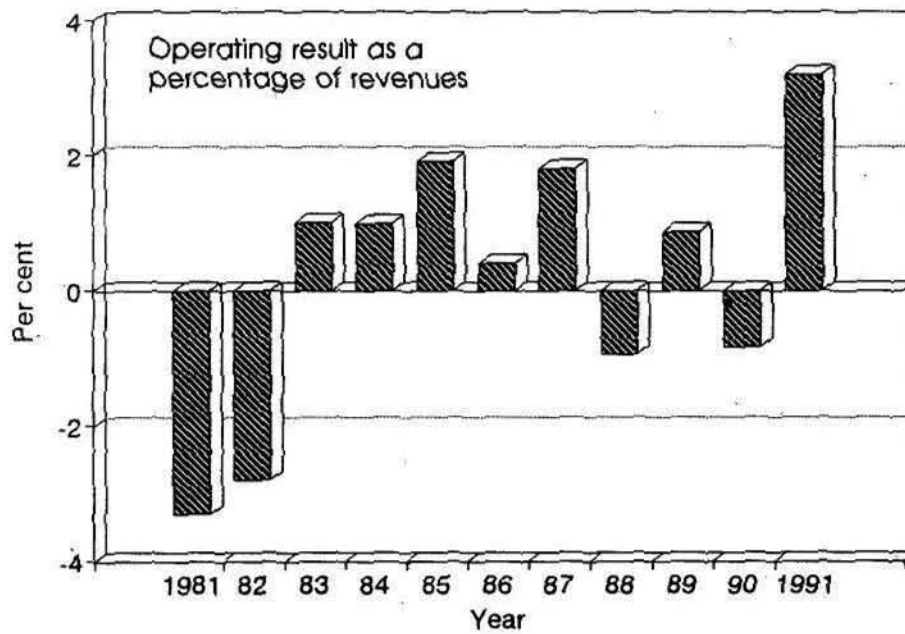
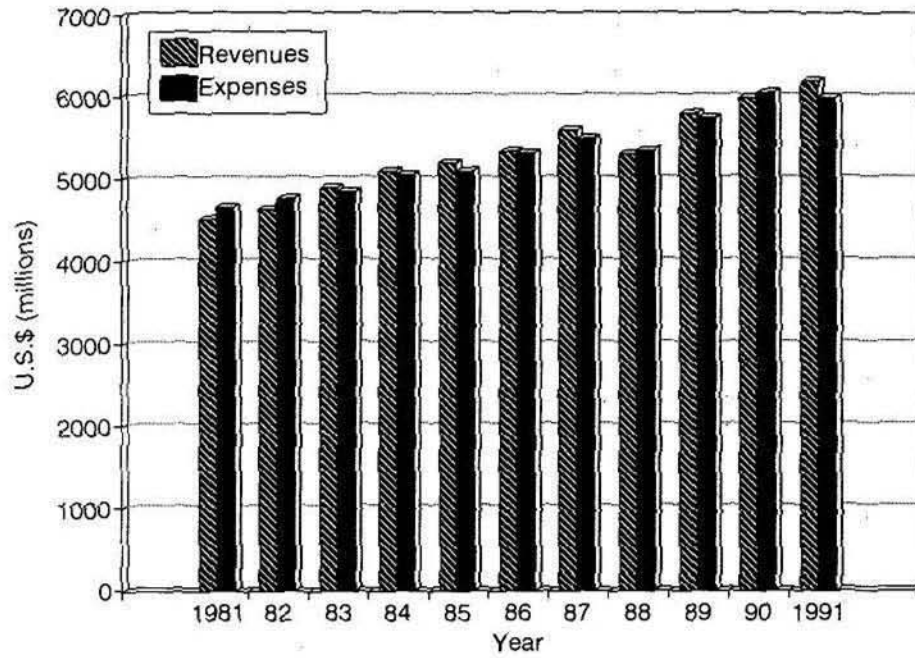
Source: IMF, Wharton Econometrics Services.

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

42. With a return to political and economic stability in the region, GDP growth recovered quite strongly in 1992 (around 8 per cent growth) and relatively buoyant conditions are expected over the medium term. GDP growth rates of 8.5 per cent, 7.0 per cent and 7.5 per cent are forecast for 1993, 1994 and 1995 respectively.

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

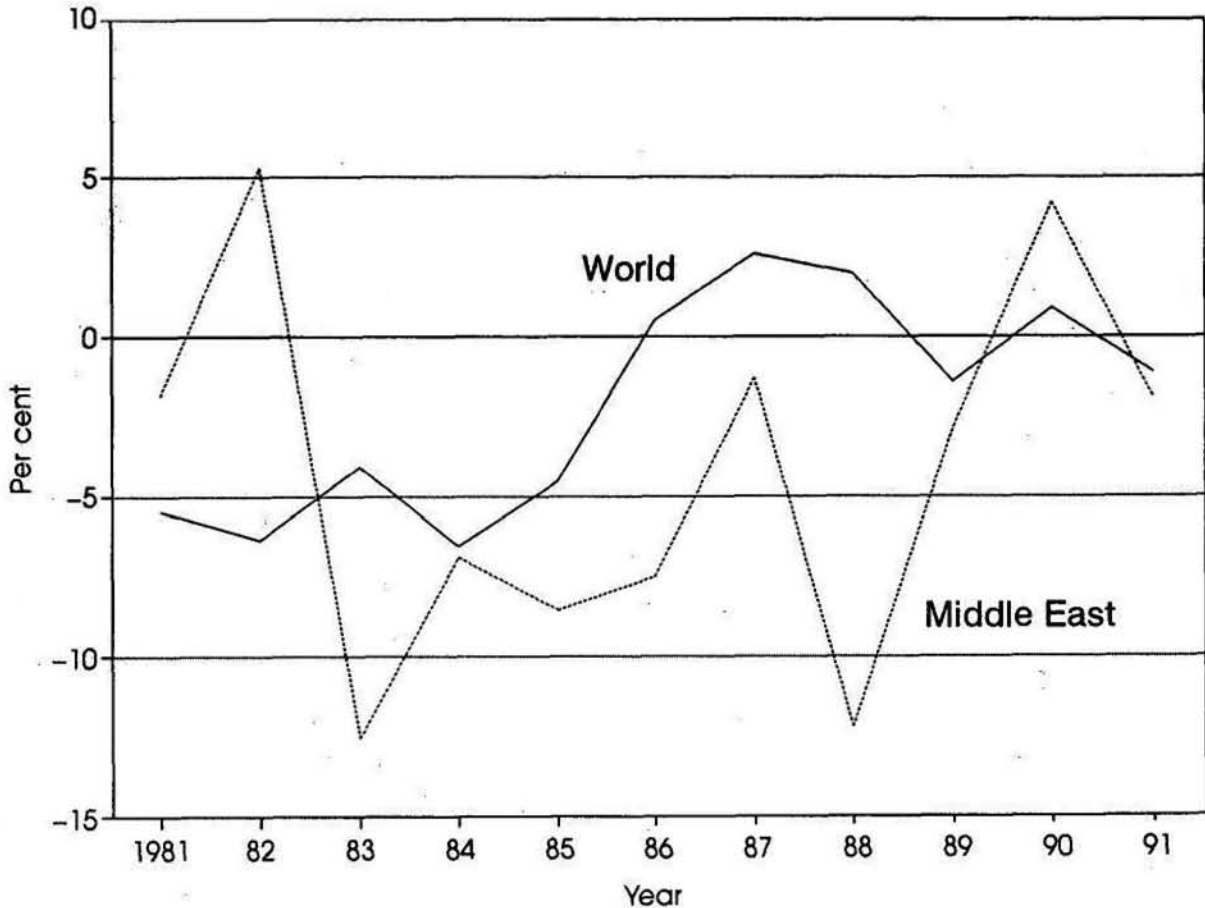
43. Over the 1981-1991 period, operating revenues (in United States dollars) of the scheduled airlines of the Middle East region increased at an average annual rate of 3.2 per cent (compared with the world annual average of 8.2 per cent). Operating expenses for the same period increased by 2.6 per cent per annum. As shown in Figure 6-14, the region experienced a mixture of positive and negative operating results over the period, with 1991 the most successful year financially.



Source: ICAO Air Transport Reporting Form EF-1.

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

14. For the 1981-1991 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 3.3 per cent in real terms (compared with a 1.9 per cent decline for the world). The year-to-year comparisons of the changes in real passenger yield of Middle East and world airlines are illustrated in Figure 6-15.



Note.— 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

45. Over the 1981-1991 period, scheduled passenger traffic (passenger-kilometres performed) of the airlines of the Middle East region increased at an average annual rate of 4.0 per cent (compared with the world annual average of 5.1 per cent). After declines in 1990 and 1991 associated with the Gulf war, traffic recovered strongly in 1992, growing at 17 per cent. The year-to-year traffic growth comparison between world and Middle East airlines is shown in Figure 6-16.

46. 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 6.9, 6.5 and 6.8 per cent for the years 1993, 1994 and 1995 respectively, compared with world airline growth of 5.9, 6.9 and 7.3 per cent. These regional growth rates are higher than those achieved during most of the 1980s and reflect an improved economic performance.

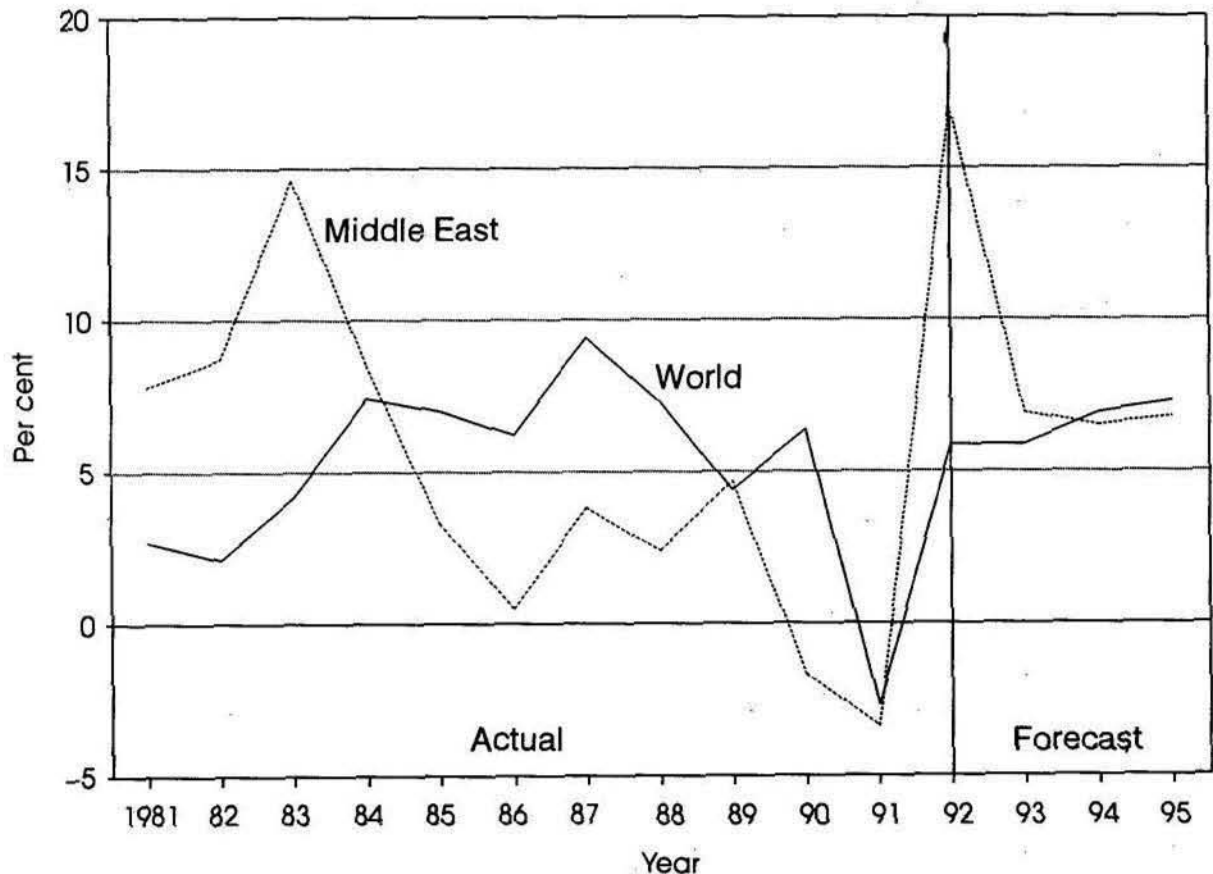


Figure 6-16. Scheduled passenger traffic growth (PKPs) — Middle East and World



## NORTH AMERICA

*The Region in 1992*

Table 6-5. Scheduled traffic — airlines of North America

	INTERNATIONAL			TOTAL		
	1992	Increase over 1991 (%)	Share of world traffic (%)	1992	Increase over 1991 (%)	Share of world traffic (%)
Passengers carried (thousands)	55 100	7.6	18.4	483 360	3.1	41.4
Passenger-kilometres performed (millions)	238 790	12.7	24.4	806 390	6.1	41.3
Freight and mail tonne-kms performed (millions)	9 860	8.9	18.8	19 970	7.5	29.7

Source: ICAO Air Transport Form A-1.

47. Canada, Mexico and the United States negotiated a North American Free Trade Agreement with intended implementation on 1 January 1994 which, while not including air transport services, does include certain aircraft repair and maintenance services and specialty air services (commercial non-transport operations such as crop dusting and aerial surveys) on a 6-year phase-in basis.

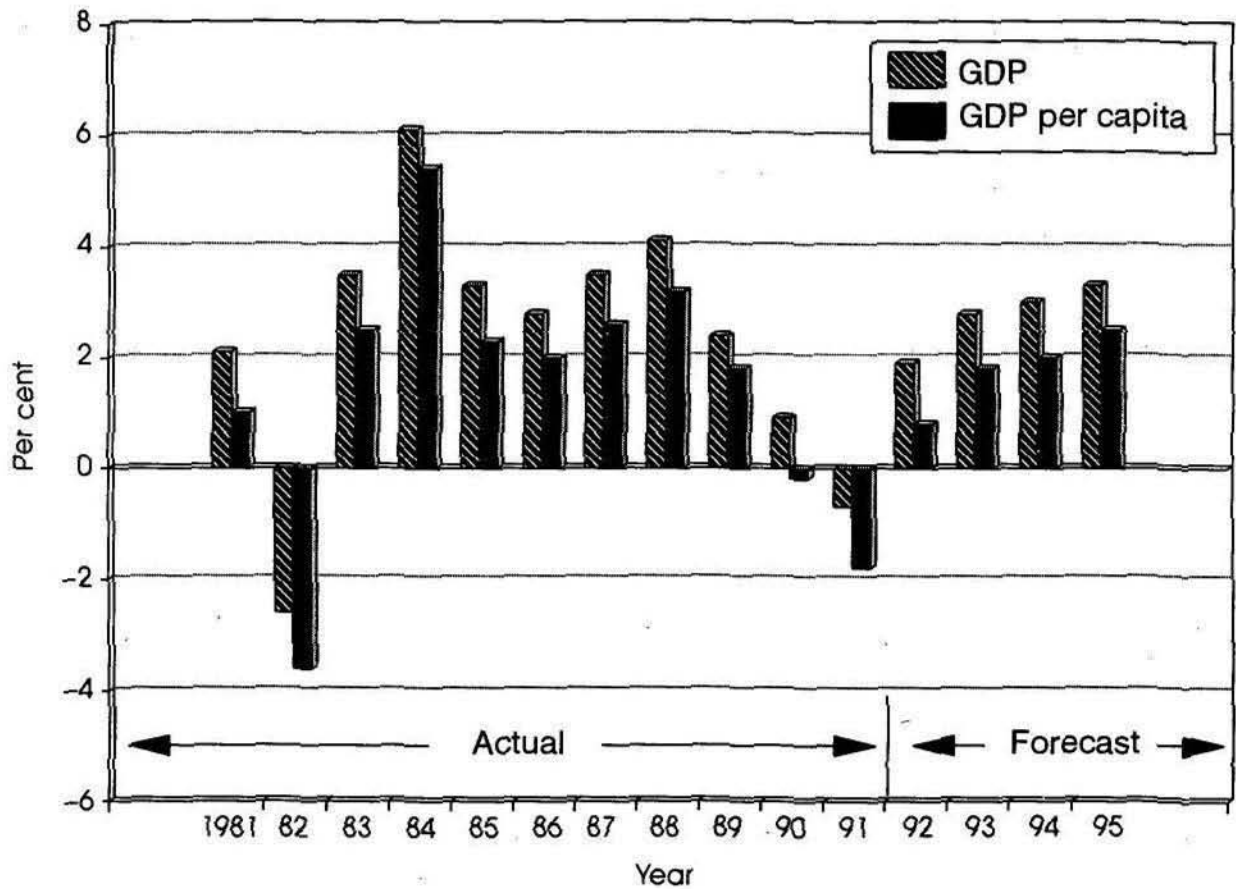
48. Canada and the United States continued strong but as yet unsuccessful efforts to update their transborder air services arrangements which have not seen any major changes agreed since 1974. Nevertheless, although new routes were not agreed, the transfer of several existing routes to different U.S. carriers resulted in numerous city-pair markets receiving new direct services or better connecting services. Also, in a spirit of comity and reciprocity, both governments continued to approve many new local and regional scheduled services to be flown with aircraft of 60 or fewer seats when the applications failed to meet the criteria for automatic licensing agreed in 1984 (e.g. regarding distance, populations, etc.). Since 1984, this liberal approach has produced a more than fiftyfold increase in transborder small aircraft scheduled service seats, which were offered about equally by commuter air carriers of the two countries.

49. Both major Canadian airlines, Air Canada and Canadian Airlines International, became involved in cross-border equity purchase arrangements, Air Canada buying into the much larger Continental Airlines and Canadian Airlines International seeking a significant equity infusion from the AMR Corporation, the parent of American Airlines, on the basis of a contract for computer reservation systems and other services.

### Economic Environment

50. Over the 1981-1991 period, the aggregate North American economy (GDP) grew at an average annual rate of 2.3 per cent in real terms, and GDP per capita increased at 1.4 per cent per annum. The year-to-year changes in the region's GDP and GDP per capita are illustrated in Figure 6-17.

51. The recovery from recession in the United States economy began in 1992 and is expected to develop throughout the time horizon of this study. The Canadian economy is also recovering. North American GDP is expected to grow at 2.8 per cent, 3.0 per cent and 3.3 per cent in 1993, 1994 and 1995 respectively.



Source: IMF, Wharton Econometrics Services.

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

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

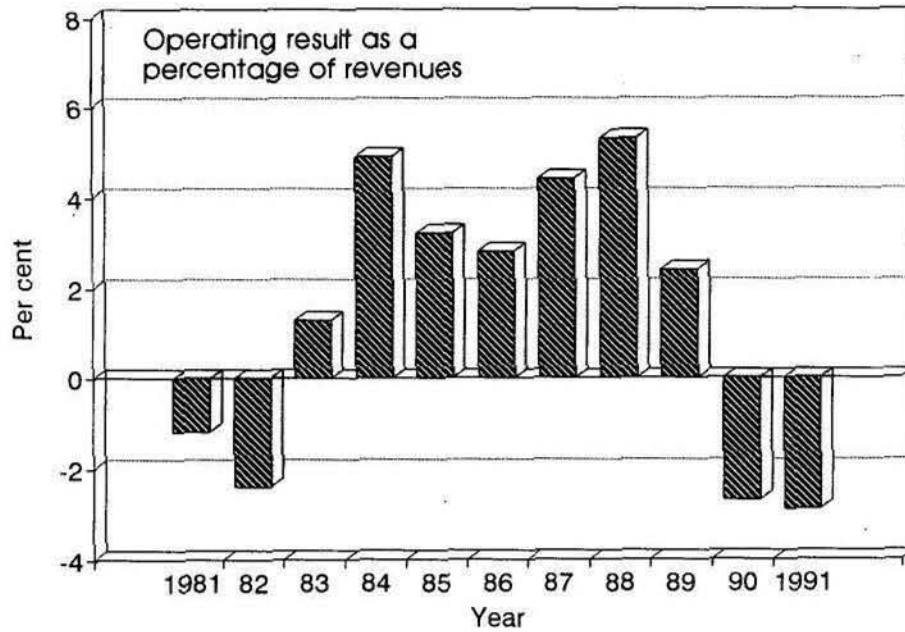
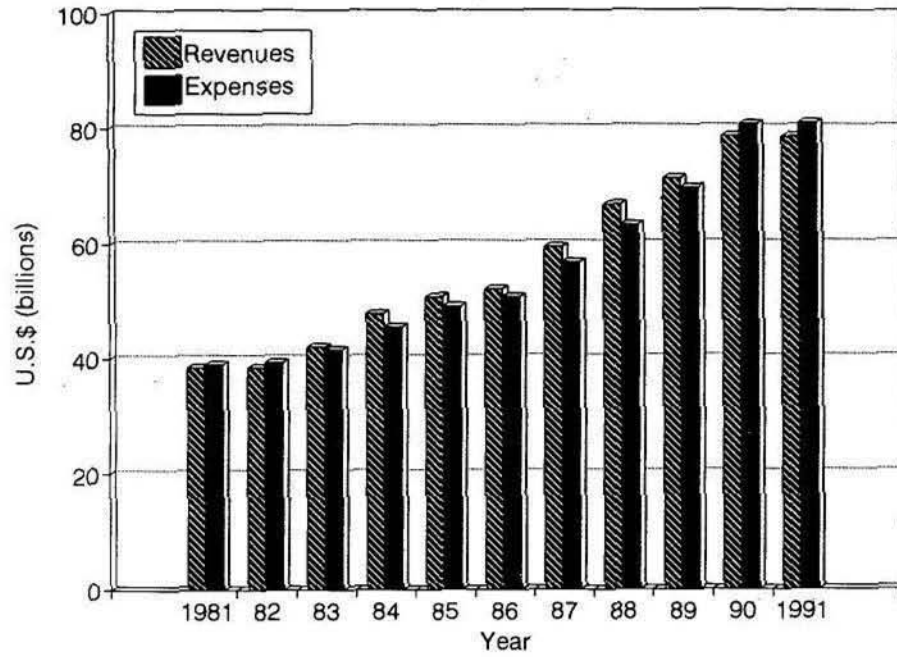
52. Over the 1981-1991 period, operating revenues (in United States dollars) of the scheduled airlines of the North American region increased at an average annual rate of 7.4 per cent (compared with the world annual average of 8.2 per cent). Operating expenses for the same period increased by 7.5 per cent per annum. The string of operating surpluses in the 1983 to 1989 period gave way to serious deficits in 1990, 1991 and 1992. Positive operating results were achieved in the years 1983 through 1989, with significant losses in both 1990 and 1991, as illustrated in Figure 6-18.

53. For the 1981-1991 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 3.3 per cent in real terms (compared with a 1.9 per cent decline for the world). 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.

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

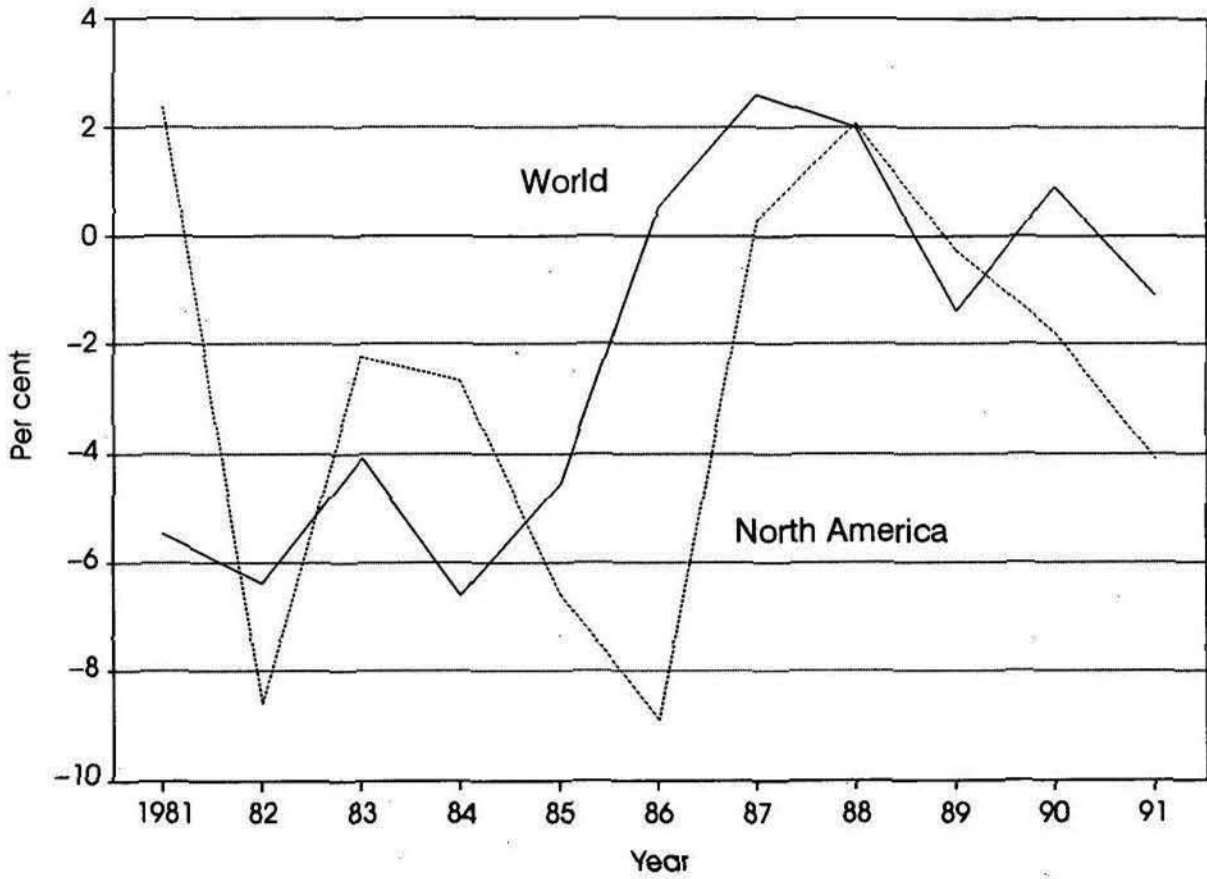
54. Over the 1981-1991 period, scheduled passenger traffic (passenger-kilometres performed) of the airlines of the North American region increased at an average annual rate of 5.8 per cent (compared with the world average of 5.1 per cent). After the decline in traffic in 1991, significant growth was 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. The year-to-year traffic growth comparison between world and North American airlines is shown in Figure 6-20.

55. 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 6.1, 6.6 and 7.0 per cent for the years 1993, 1994 and 1995 respectively, which is quite similar to the expected growth pattern for the world as a whole (5.9, 6.9 and 7.3 per cent).



Source: ICAO Air Transport Reporting Form EF-1.

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



Note.— 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**

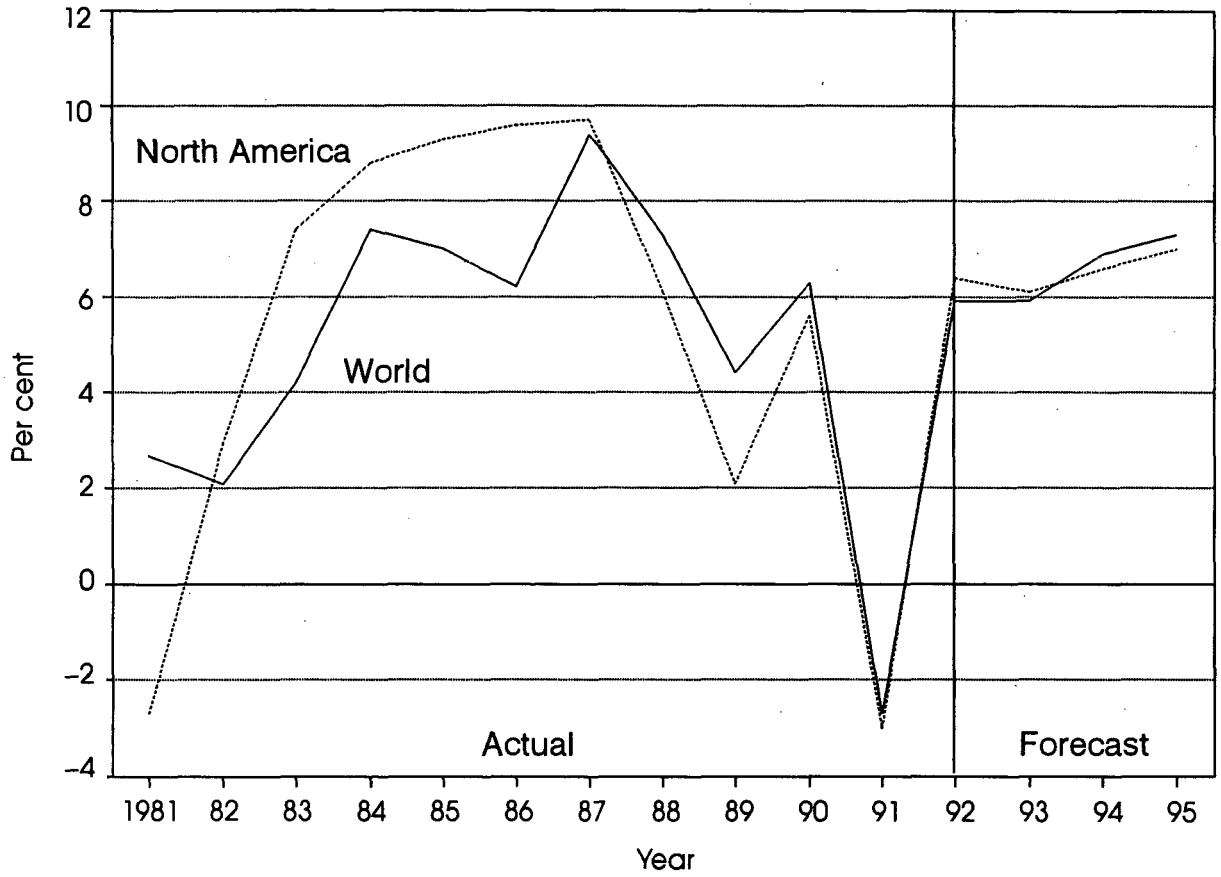


Figure 6-20. Scheduled passenger traffic growth (PKPs) — North America and World

## LATIN AMERICA AND THE CARIBBEAN

*The Region in 1992*

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

	INTERNATIONAL			TOTAL		
	1992	Increase over 1991 (%)	Share of world traffic (%)	1992	Increase over 1991 (%)	Share of world traffic (%)
Passengers carried (thousands)	19 600	6.9	6.5	65 000	-0.7	5.6
Passenger-kilometres performed (millions)	55 940	8.1	5.7	90 680	3.5	4.6
Freight and mail tonne-kms performed (millions)	2 560	11.8	4.9	3 230	10.5	4.8

Source: ICAO Air Transport Form A-1.

56. The common trends in 1992 in the region were towards a more stable political situation, an open commercial attitude oriented towards exports, a serious approach to fiscal policy and a decrease in the level of government participation in economic activities through the privatization of public enterprises. Not least among these was the trend toward the privatization and globalization of air transport in the region through the sale of government-owned air carriers to private and overseas interests (see Chapter 2).

57. Another significant development in 1992 was the continued integration of the various economic blocks in the region. The North American Free Trade Agreement reached between Canada, Mexico and the United States, as well as the adoption of liberal clauses in new air transport agreements between the United States and States in Central America and the Caribbean, led the States in Central America to increase their efforts to revive the Central American Common Market. This in turn brought about changes in protectionist practices in relation to the granting of air transport rights and the ownership of national airlines.

58. To face the growing competition and capacity triggered by United States carriers operating within Central America, airlines from this sub-region promoted the adoption of a common air transport policy which would protect them against extra-regional competitors and allow Central American States to negotiate new air transport agreements as a block.

59. In South America, the States constituting the Andean Pact (Bolivia, Colombia, Ecuador, Peru and Venezuela), which in 1991 had adopted an open skies policy between and within their territories, reached an agreement in 1992 on the multiple designation of air carriers for intra-regional air transport services. However, the only expansion so far has been on air services between Colombia and Venezuela.

60. The countries belonging to the Mercosur (Argentina, Brazil, Paraguay, and Uruguay) also now have as an aim the unification of their air services into a single market. A step in this direction has been the agreement reached among seven carriers belonging to member States to sell international air fares to passengers not residents in the Mercosur area at discounts of 40 to 45 per cent of the normal published fares.

61. Following a review of air transport policy at the beginning of 1992, Brazil adopted a neo-conservative approach to international air transport, linked to the promotion of users rights and protection of the environment. Chile, which had adopted the most liberal policy in air transport in this region, revised its policy towards one of reciprocal rights and equality of conditions among carriers.

### ***Economic Environment***

62. Over the 1981-1991 period, the aggregate Latin America/Caribbean economy (GDP) grew at an average annual rate of 1.2 per cent in real terms, although GDP per capita fell at 0.9 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.

63. Economic stabilization, trade liberalization, and fiscal and structural reforms in the region have brought about a dramatic reduction in inflation and improved economic growth in 1991 and 1992. Further progress is anticipated over the medium term, and GDP is forecast to grow at 3.2 per cent, 3.6 per cent and 4.2 per cent in 1993, 1994 and 1995 respectively.

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

64. Over the 1981-1991 period, operating revenues (in United States dollars) of the scheduled airlines of the Latin America/Caribbean region increased at an average annual rate of 3.5 per cent (compared with the world annual average of 8.2 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.

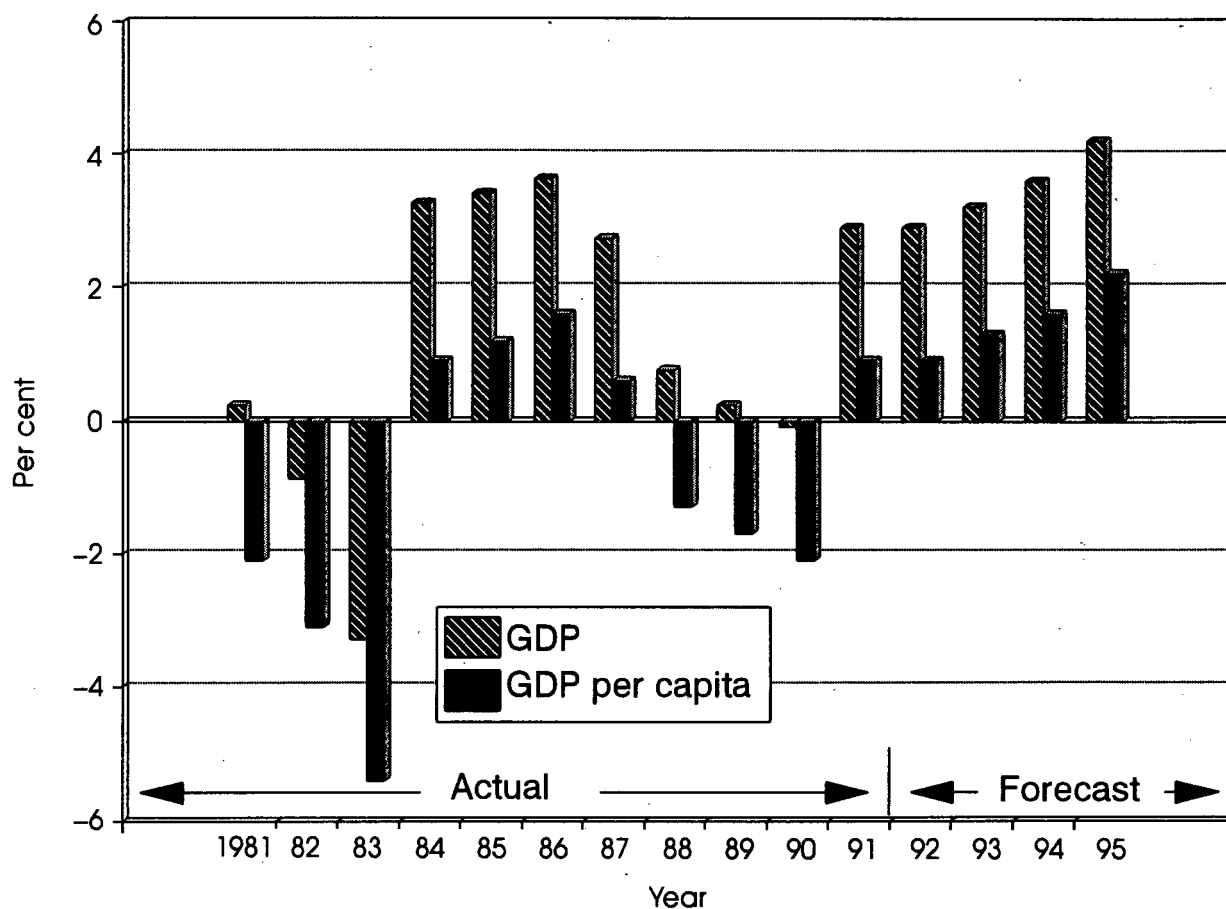
65. For the 1981-1991 period, average scheduled passenger yields for airlines of the region, measured in terms of cents per passenger-kilometre performed (PKP), declined at an average annual rate of 3.9 per cent in real terms (compared with a 1.9 per cent decline for the world). The year-to-year comparisons of the changes in real passenger yield of Latin America/Caribbean and world airlines are illustrated in Figure 6-23.



### Airline Passenger Traffic Trends and Forecast

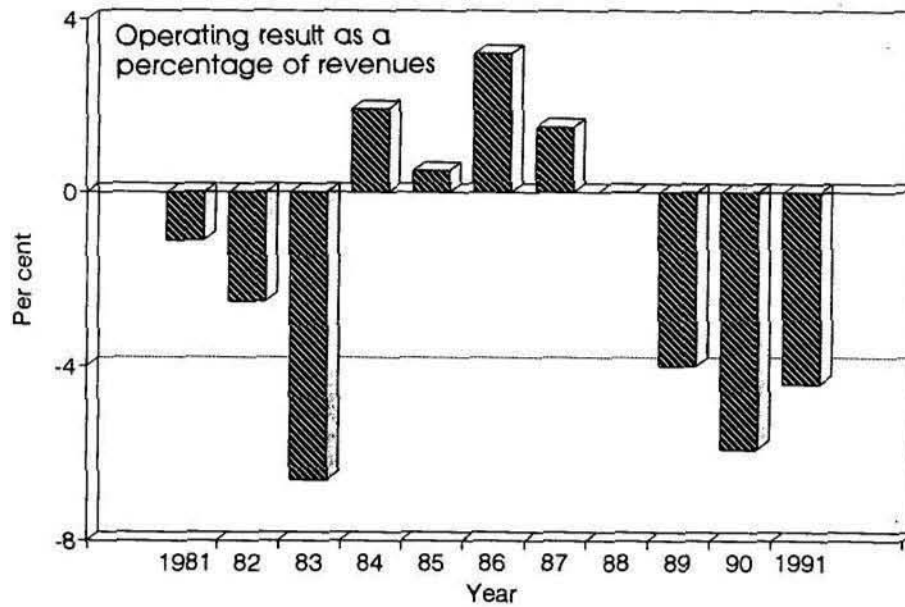
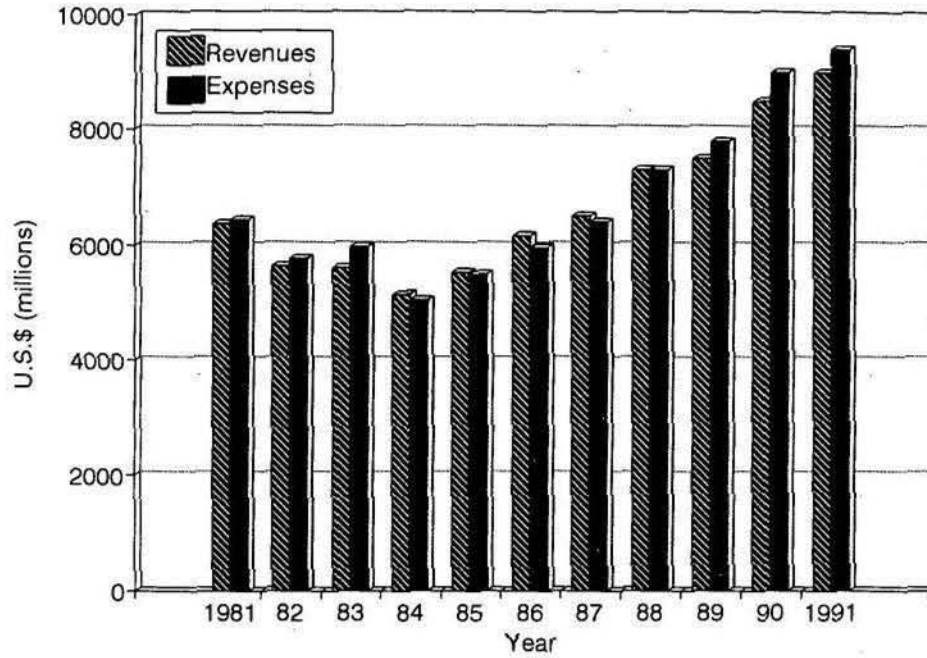
66. Over the 1981-1991 period, scheduled passenger traffic (passenger-kilometres performed) of airlines of the Latin America/Caribbean region increased at an average annual rate of 3.7 per cent (compared with the world annual average of 5.1 per cent). After two years of slow growth, demand began to recover in 1992, with a growth of 3.6 per cent. The year-to-year traffic growth comparison between world and Latin America/Caribbean airlines is shown in Figure 6-24.

67. 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 5.9 per cent, 7.1 per cent and 7.9 per cent in 1993, 1994 and 1995 respectively, which is quite similar to the expected growth pattern for the world as a whole (5.9, 6.9 and 7.3 per cent).



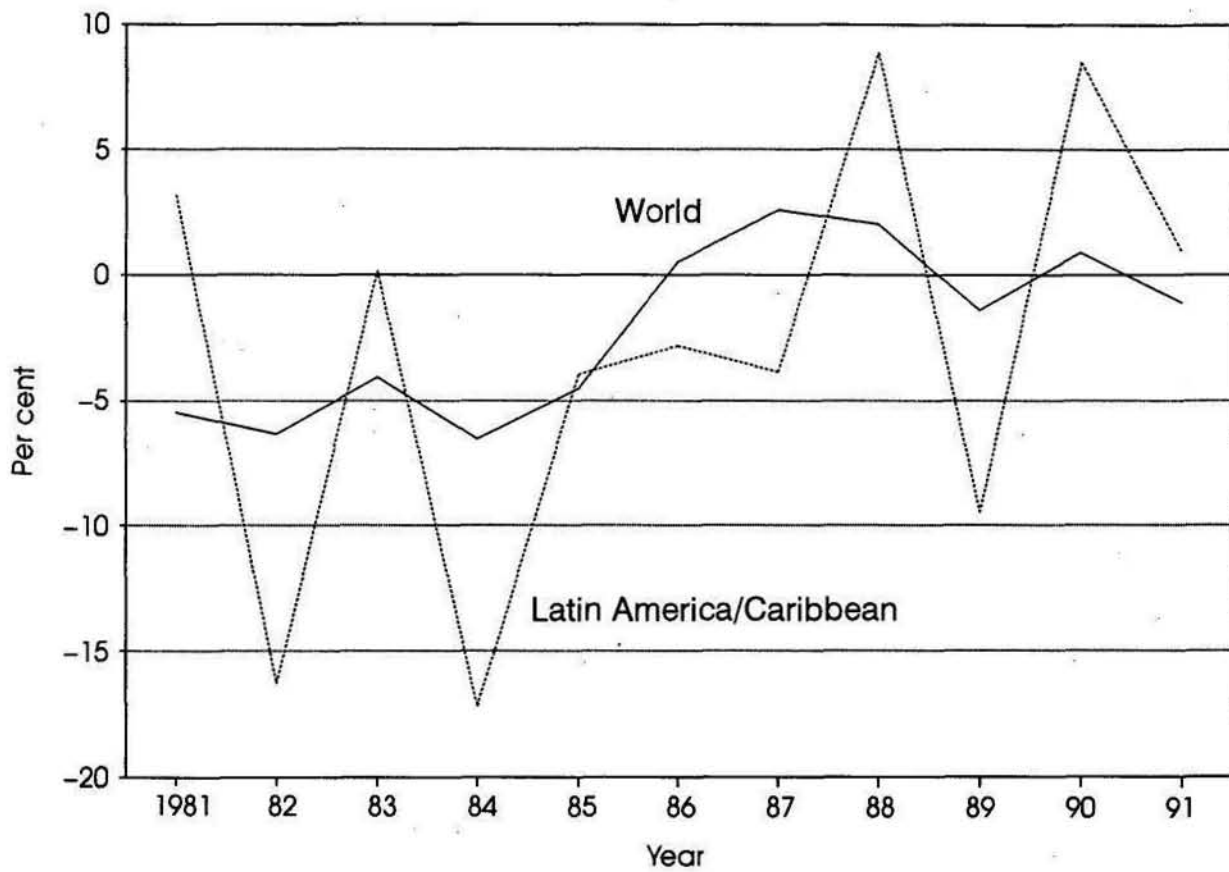
Source: IMF, Wharton Econometrics Services.

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



Source: ICAO Air Transport Reporting Form EF-1.

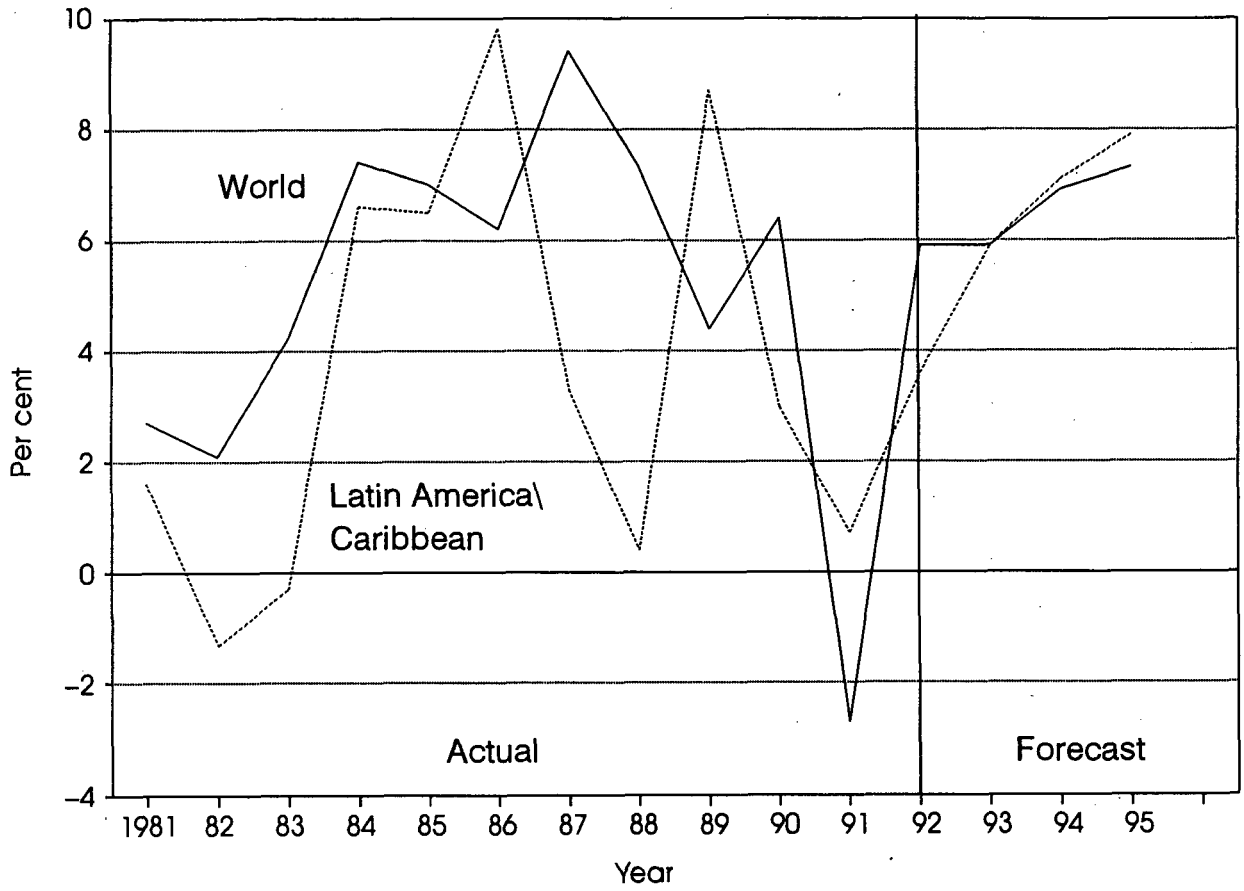
**Figure 6-22. Scheduled airline operating revenues and expenses — Latin America/Caribbean**



Note.— 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**



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

## APPENDICES

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# Appendix 1

## Statistical Tables

Table A1-1. Regional distribution of scheduled traffic — 1992

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*)	—	—	327 040	551 730	71	19 820	71 290	113 720	63
Percentage of world traffic			28.0	28.3		31.9	29.2	27.1	
Europe (not including CIS)	3 190	3 538	230 800	371 720	66	17 810	52 930	85 150	62
Percentage of world traffic			19.8	19.0		28.7	21.7	20.3	
Africa	425	469	25 200	44 000	59	1 200	5 200	10 290	51
Percentage of world traffic			2.2	2.3		1.9	2.1	2.5	
Middle East	369	290	27 400	53 050	66	2 650	7 570	13 040	58
Percentage of world traffic			2.3	2.7		4.3	3.1	3.1	
Asia and Pacific	2 561	2 425	239 100	406 700	69	18 430	55 280	87 600	63
Percentage of world traffic			20.5	20.8		29.7	22.7	20.9	
North America	7 688	6 808	483 360	806 390	64	16 870	93 140	171 810	54
Percentage of world traffic			41.4	41.3		27.2	38.2	41.0	
Latin America and Caribbean	1 074	1 339	65 000	90 680	57	3 080	11 540	22 590	51
Percentage of world traffic			5.6	4.6		5.0	4.7	5.4	
Total (including CIS)	—	—	1 167 100	1 952 550	66	62 050	244 020	419 050	58
<b>International services of airlines of ICAO Contracting States</b>									
Europe (including CIS)	2 672	1 886	128 640	331 110	66	17 940	49 420	78 970	63
Percentage of world traffic	39.4	52.4	42.8	33.8		35.8	34.6	33.2	
Europe (not including CIS)	2 512	1 826	123 700	315 500	66	17 400	47 460	74 990	63
Percentage of world traffic	37.0	50.7	41.2	32.2		34.8	33.2	31.5	
Africa	318	216	13 500	36 570	58	1 130	4 460	8 890	50
Percentage of world traffic	4.7	6.0	4.5	3.7		2.3	3.1	3.7	
Middle East	293	154	15 800	44 830	66	2 590	6 760	11 440	59
Percentage of world traffic	4.3	4.3	5.3	4.6		5.2	4.7	4.8	
Asia and Pacific	1 435	465	67 600	272 200	68	16 780	42 680	66 800	64
Percentage of world traffic	21.1	12.9	22.5	27.8		33.5	29.9	28.1	
North America	1 543	522	55 100	238 790	67	9 120	31 530	56 750	56
Percentage of world traffic	22.7	14.5	18.4	24.4		18.2	22.1	23.9	
Latin America and Caribbean	528	358	19 600	55 940	59	2 500	7 930	14 890	53
Percentage of world traffic	7.8	9.9	6.5	5.7		5.0	5.6	6.3	
Total (including CIS)	6 789	3 601	300 240	979 440	66	50 060	142 780	237 740	60

\* 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 1992**  
(commercial operators of ICAO Contracting States)

Type of aircraft	Before 1992	Delivered during 1992	Total as of 31/12/92	Ordered during 1992	Remaining to be delivered as of 31/12/92
<b>TURBO-JETS</b>					
Airbus Industrie A-300	362	22	384	18	89
Airbus Industrie A-310	199	24	223	11	38
Airbus Industrie A-320	251	111	362	—	294
Airbus Industrie A-321	—	—	—	13	153
Airbus Industrie A-330	—	—	—	1	144
Airbus Industrie A-340	—	—	—	—	110
Boeing 737	2 168	218	2 386	114	656
Boeing 747	874	61	935	28	239
Boeing 757	411	99	510	38	297
Boeing 767	405	63	468	21	151
Boeing 777	—	—	—	42	118
British Aerospace — 146	185	13	198	21	37
Canadair Regional Jet	—	3	3	—	33
Fokker 100	113	46	159	19	96
McDonnell-Douglas MD-80/90	963	84	1 047	35	186
McDonnell-Douglas MD-11	34	42	76	1	97
Total of aircraft in production	5 965	786	6 751	362	2 738
Total of aircraft not in production	5 965	—	5 963	—	—
Total turbo-jets	11 928	786	12 714	362	2 738
<b>TURBOPROPS</b>					
Aerospatiale/Aeritalia ATR-42/72	264	51	315	20	101
British Aerospace ATP	41	9	50	6	5
British Aerospace Jet Stream 41	—	—	—	—	25
CASA/Nurtanio CN-235	14	—	14	—	6
DeHavilland Canada DHC-8	283	42	325	21	57
Dornier DO-328	—	—	—	—	45
Embraer EMB-120 Brasilia	242	21	263	3	40
Fokker 50	122	28	150	27	32
SAAB SF-340	274	50	324	31	73
SAAB 2000	—	—	—	—	46
Total of aircraft in production	1 240	201	1 441	108	430
Total of aircraft not in production	2 546	—	2 546	—	—
Total turboprops	3 786	201	3 987	108	430

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 1991.



**Table A1-3. Aircraft accidents involving passenger fatalities on scheduled air services, 1973-1992**

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>								
1973	36	862	0.17	0.27	0.48	0.77	0.28	0.36
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	0.16
<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

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	
		Total attempted seizures	Actual seizures			Injured	Killed
1973	41	29	17	12	—	71	222
1974	47	27	13	20	—	51	178
1975	47	23	11	24	—	217	92
1976	54	26	13	28	—	217	218
1977	65	34	18	31	—	215	133
1978	37	26	13	11	—	71	59
1979	37	26	16	11	—	22	64
1980	54	46	29	8	—	194	72
1981	53	38	24	15	—	39	8
1982	36	30	19	6	—	39	14
1983	45	38	21	7	—	119	15
1984	41	28	21	13	—	70	68
1985	40	27	20	13	—	249	473
1986	14	11	5	3	—	243	112
1987	13	10	4	3	—	235	166
1988	12	10	7	2	—	121	300
1989	14	12	8	2	—	38	278
1990	36	32	20	1	3	145	137
1991	15	12	7	0	3	2	0
1992	9	7	5	1	1	123	10

\* 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 1993, 1994 and 1995 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 30 years were used in the subsequent econometric (least squares regression) analysis, with the following results at the global level.

$$\ln PKP = 1.60 + 2.08 \ln GDP - 0.66 \ln PYIELD$$

(24.7)                      (6.3)

$$R^2 = 0.999$$
$$S.E. = .026$$

R = coefficient of correlation

S.E. = standard error of the estimate

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

— END —

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