PART 1: FORECASTS

FORECASTING TRAFFIC AND CAPACITY GROWTH IN EUROPE

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Forecasting is part of the marketing and corporate planning process. It helps to reduce the company's risk by objectively evaluating the demand and supply side of the air transport business.

There are a number of methodologies used to forecast the need for jet aircraft. Traditional time-series analyses assume that the key to predicting future activity of a series lies solely within its historic activity. The method of econometrics tests the relationship between data sets using statistical and economic logic.

These mathematical forecasting methods are often complemented by a judgmental approach which involves the experience of the forecaster, the opinions of the sales and marketing team, and the expectations of the airline industry. In combination, these approaches provide the capability to forecast the long-term trends or short and medium-term cycles. (Figure 1)

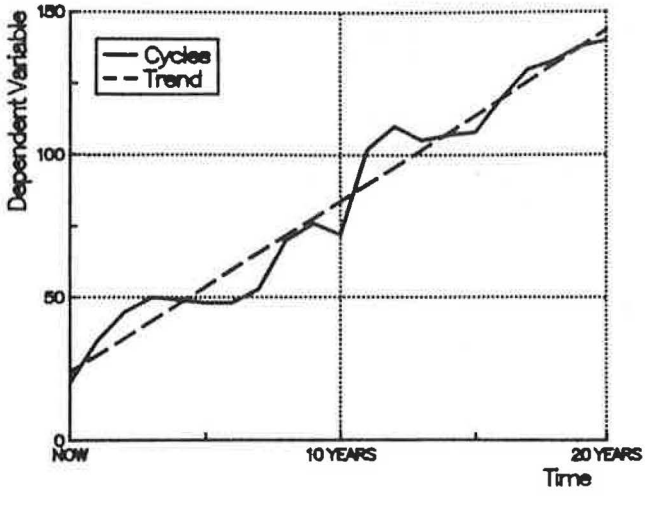

FIGURE 1 Forecast objectives.

AIRBUS INDUSTRIE FORECASTING

The Forecasting Process

To better understand past and future cycles of the industry, Airbus Industrie has developed a unique forecasting procedure that is based on the principle of system dynamics and used in conjunction with the classic long-term forecasting tools. For this purpose a series of mathematical equations has been established to represent the determinants of how much people fly, how the airlines manage their fleets to satisfy this demand, how they order new aircraft, and how their financial condition is affected by internal and external factors. The computer steps through time, simulating these decision processes, and then displays the results. When assumptions are changed, the computer simulates different decisions and results.

The following flow charts (Figures 2-5) provide a simplified overview of the model. With these diagrams, one can begin to see how internal market factors can create and prolong market cycles.

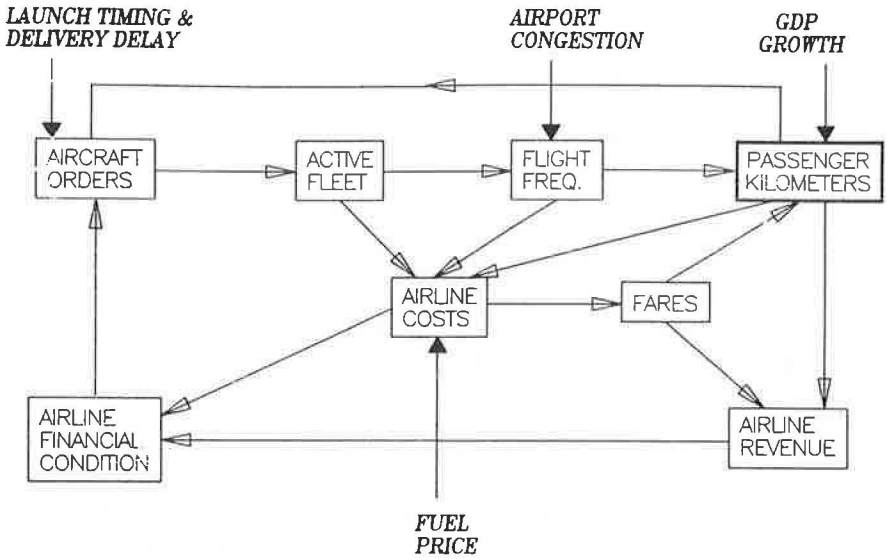

FIGURE 2 Air traffic demand forecasting.

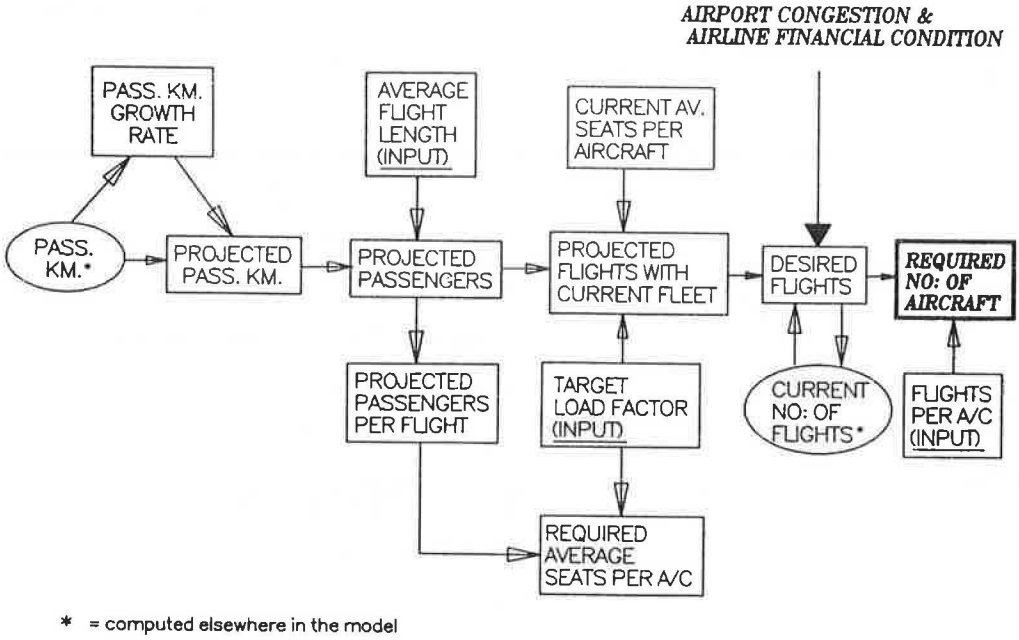

FIGURE 3 Airline planning.

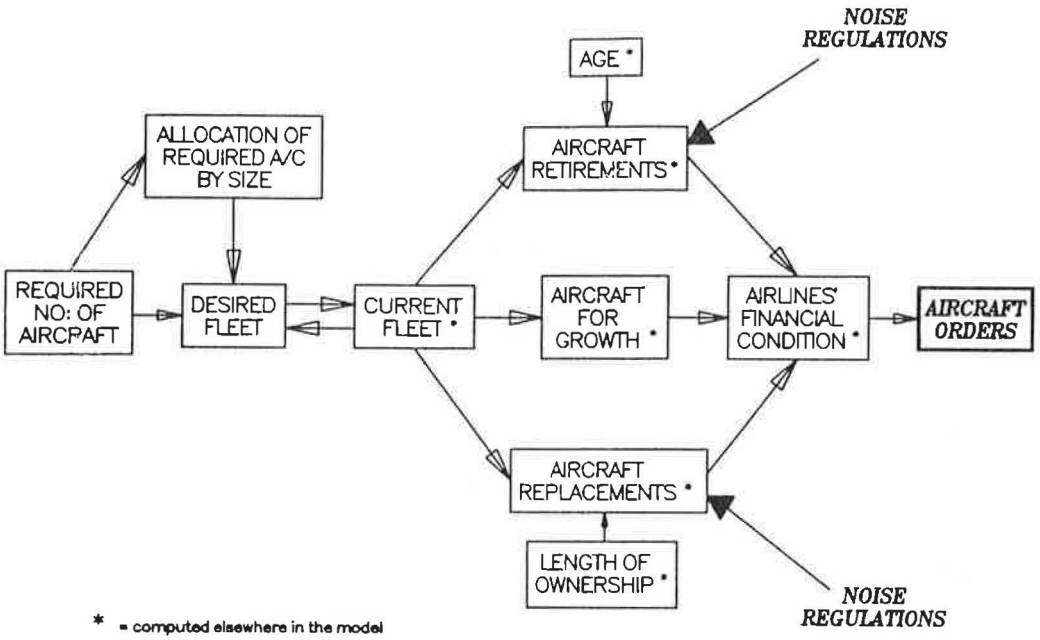

FIGURE 4 Orders for new aircraft.

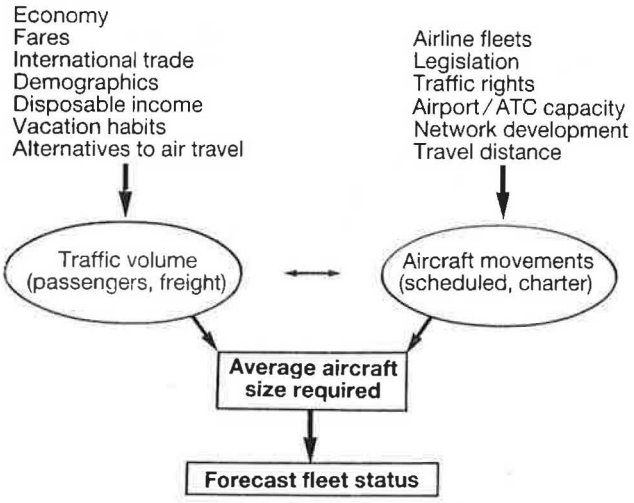

FIGURE 5 Forecast parameters.

The market itself is internally cyclical, but external factors trigger and intensify the severity of these cycles. For instance:

- GDP growth affects demand.
- Airport and air traffic control congestion limit flight frequency and affect aircraft size.
- Fuel price changes affect airline costs.
- The price of new aircraft affects airline costs.
- Launch timing affects aircraft orders.
- Lengthy delays in aircraft delivery stimulate additional orders.

Forecast Parameters

The future demand for new aircraft will remain closely related to the state of the economy. Therefore, as shown in Figure 6, any forecast demand for air travel is predicated on a number of global economic and industry assumptions:

- Economic growth - real increase in GDP on the order of 2.9 percent annually, following a cyclical pattern;
- Fares - a continuing trend of real fare decreases, sustained by liberalization, increased competition, and cost-cutting measures within the airline industry;
- International Trade - influencing primarily long-haul passenger and cargo markets and the creation of direct flights;
- Demographics - European population generally increasing by almost 8 percent over the next 10 years, with people of all age groups gaining air travel experience and increasing their willingness to continue flying;
- Disposable Income - after having satisfied their needs for basic consumer products, a preference turning more and more to leisure activities, many of which include air travel;
- Vacation Habits - people making more shorter excursions in addition to the annual holidays, with 80 percent of the air travellers by the turn of the century making their journeys for reasons not entirely related to business; and

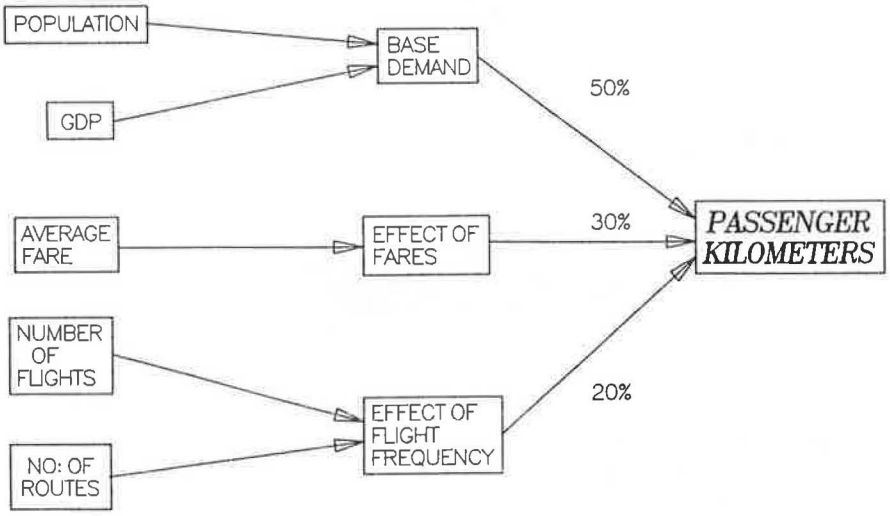

FIGURE 6 Elasticity of demand.

· Alternatives to Air Travel - new means of telecommunication replacing a part of intracorporate travel, and on short-haul distances high-speed trains complementing air transport in a few selected markets allowing airports to allocate slots for more medium and long-haul air services.

The forecast traffic volume may then be transported by a few big aircraft or many small size aircraft. The truth most likely will be somewhere in between, and the resulting fleet mix will depend on the frequency that a given route can sustain. The growth in aircraft movements is influenced by several factors:

· Existing airline fleets will have to be operated irrespectively of whether the combination currently in service is or is not ideal.
· Increased competition resulting from liberalization will support higher frequency levels, with curfews having a depressing effect on aircraft utilization.
· In a regulated environment, pool agreements on traffic rights will enable airlines to fix a market split based on given frequency or capacity offerings. This is not the case in a deregulated market.
· Increasing airport and ATC congestion will put a physical limit on the expansion of aircraft movement growth. (This point will be dealt with more in detail later on.)
· Network structure, such as hub-and-spoke or direct flights, will affect utilization, frequency, and aircraft size.
· The longer the flight distance, the lower the demand for frequency and vice versa.

It should be kept in mind, however, that traffic and frequency growth influence each other. For instance, offering more non-stop flights or opening up new routes will make air travel more attractive. On the contrary, the airlines' inability to increase their departures out of certain airports, coupled with growing delay problems, may have a negative impact on traffic growth potential. Similarly, legislation in the form of air traffic liberalization can result in lower fare levels which, in turn, will stimulate demand.

FACTORS AFFECTING AVIATION FORECASTS FOR EUROPE

European Liberalization

Forecasting for European liberalization also includes assumptions concerning utilization and financial changes within the airlines (Figures 7 and 8). Leading up to 1992 it has been assumed that competition will stimulate the number of flights per aircraft. This has two effects. First, an increase in flight frequency causes an increase in operating costs due to decline in load factors, which in turn reduces operating margins. However, increasing flight frequency also stimulates demand (passenger-km) growth. In order to have fare competition, it has been assumed that the airlines will cut their operating costs.

Lower fares cause a decrease in operating margin but also cause demand to increase. An alternative scenario has also been analyzed in which potential cost and fare reductions could be offset by increasing charges.

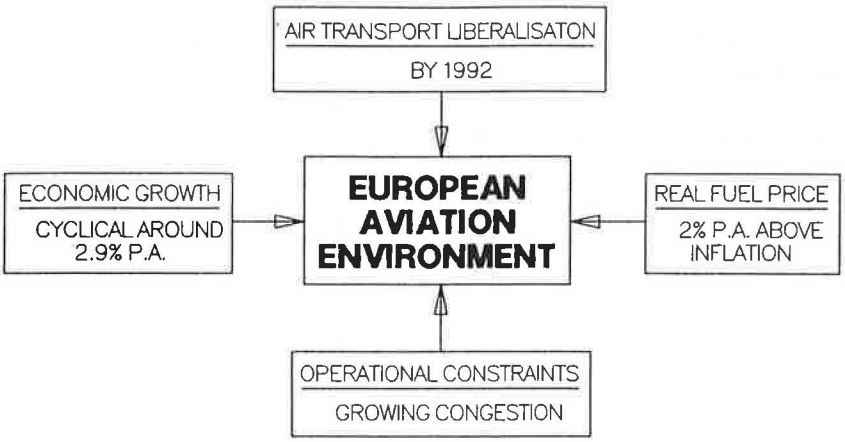

FIGURE 7 European aviation environment.

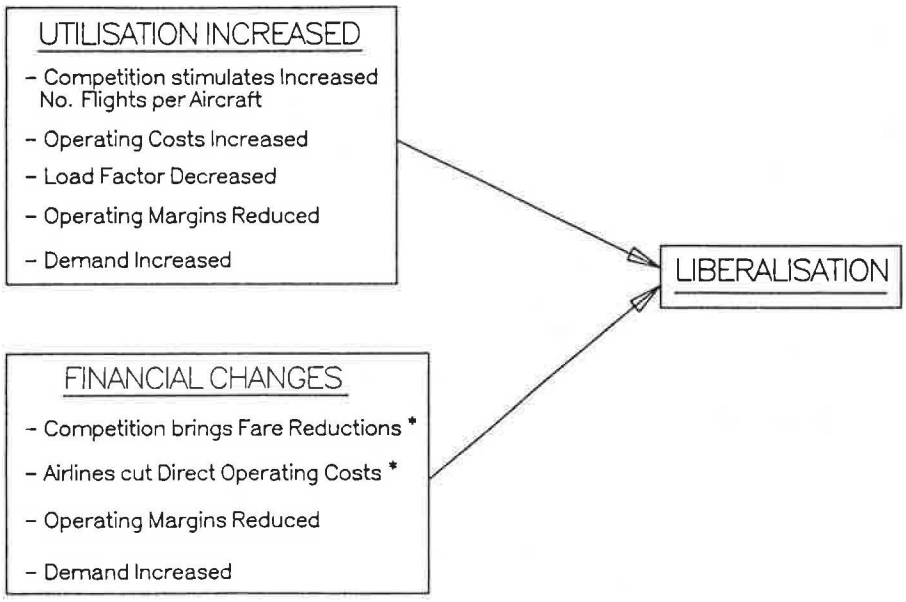

FIGURE 8 European liberalization.

Operating Constraints

The crucial point in all traffic and capacity forecasts is to find the most likely split between the number of flights (frequency) and the corresponding seat capacity.

Under today's conditions more flights mean more aircraft in service; this automatically leads to more airport and airspace congestion. On the other hand, marginal increases in frequency mean bigger capacity aircraft with corresponding needs for investment in enlarged landside and passenger handling facilities.

Airbus Industrie is the only manufacturer that has studied the influence of airport and airspace congestion in recent years; and this has been taken into account, not only for the aircraft capacity forecast displayed in Figure 9 but also in the decision to build the latest additions to the Airbus product range -- the A330 and A340.

Airport Capacity Use

Airports are only part of the total air transport system which, by itself, is of no use if it does not respond to the needs of the demand side, i.e. to provide fast, safe, and on-time transportation to the passengers and cargo shippers. It has become evident that many airports have reached the limits of their capacity to handle more aircraft movements, along with the fact that the construction of new airports or the extension of existing ones is often a task impossible to accomplish over the short to medium term.

Airport capacity is a scarce resource; its best economic use can be measured by the number of passengers handled with existing facilities, e.g. passenger throughput per hour or day.

A comparison of five movement-limited airports in

Europe reveals that, although traffic rose on average by around 60 percent in the course of the last 10 years, there was a noticeable trend toward more passengers per aircraft movement at Paris Orly and the London airports. (Figure 10) Only a relatively small increase in the number of passengers per flight has been recorded in Frankfurt. Almost the entire growth in traffic volume in Munich has been absorbed by an increase in aircraft movements, thus adding considerably to congestion and delay problems.

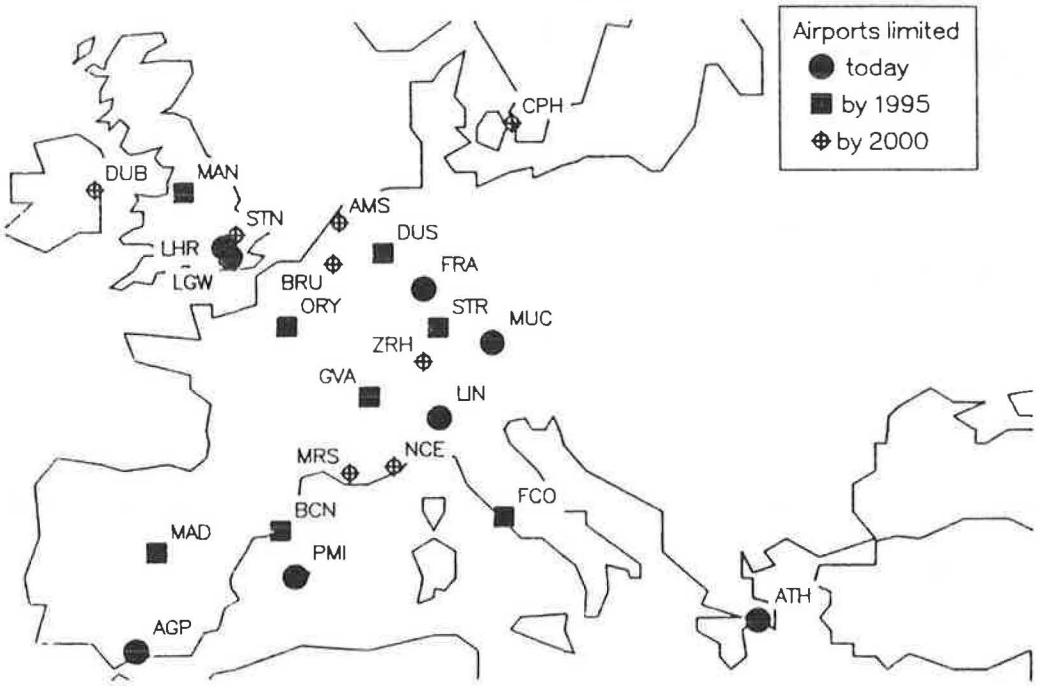

FIGURE 9 Capacity-limited European airports, 1990-2000.

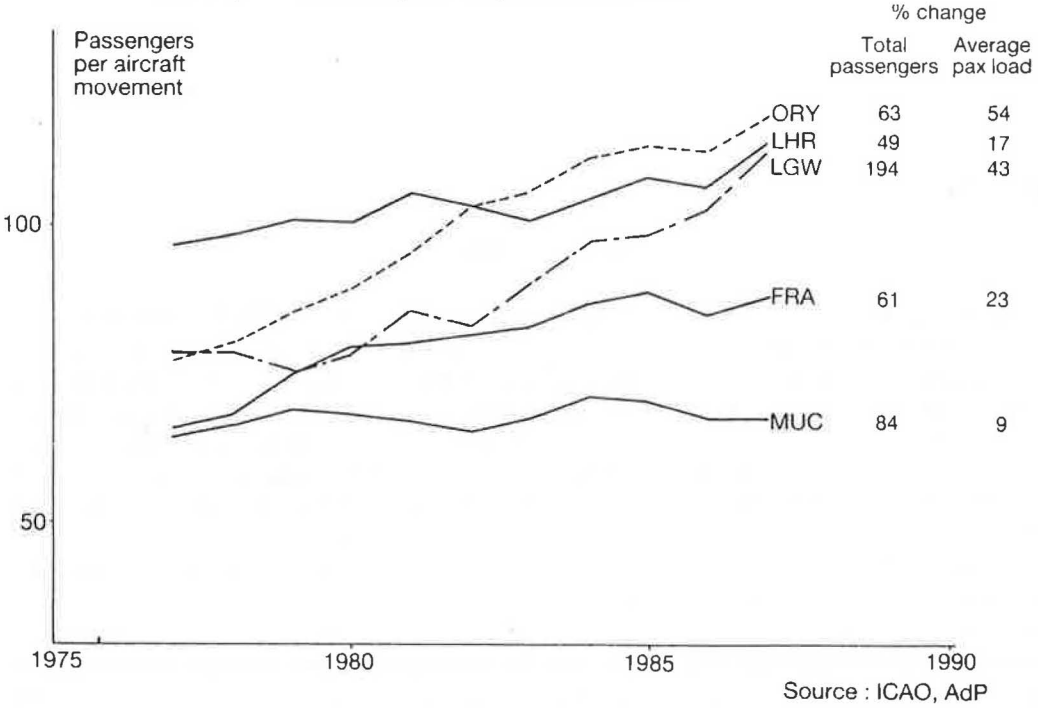

FIGURE 10 Throughput at Selected European Airports, 1977-1987.

Airport Capacity: Terms and Definitions

A variety of terms and definitions is used today to determine the capacity of a given airport, depending on methodology and specific purpose. (See Figure 11.) The absence of agreed standard measures makes it impossible to define existing and future limits of system capacity.

· Capacity service rate	· Practical capacity
· Processing rate	· Runway system capacity
· Movement rate	· Declared capacity
· Max. throughput rate	· Sustained capacity
· Service rate	· Peak capacity
· Acceptance rate	· Maximum capacity
· Demand rate	· Ultimate capacity
· Runway capacity	· Saturation capacity

(All terms in movements per hour) Source: Swissair

FIGURE 11 Examples of Airport Capacity Measures Commonly Used

Airport Congestion in Europe

In Europe 24 airports risk becoming frequency-limited by the turn of the century. These airports today handle 55 percent of all commercial air transport movements in Europe. Their self-declared present maximum runway capacity is on the order of 4.6 million movements per year. In 1988 these airports handled almost 4 million movements. This leaves only marginal opportunities for future growth in flight frequency. Assuming a 20-percent capacity improvement by early in the next century, achieved by a better organization of resources, frequency could increase 1.9 percent annually.

Passenger-Kilometer Growth Rate

Charter passenger-kilometers (pkm) represent approximately 25-28 percent of scheduled pkm. Charter pkm growth is higher than scheduled growth, but it is more sensitive and reacts quicker to economic downturns.

Air traffic liberalization in Europe, along with growing congestion problems will result in a "most likely" traffic expansion in the order of 4.9 percent per year. If these conditions did not exist and air traffic in Europe could develop as in the past, annual pkm growth would be 4.8 percent in the "business-as-usual" case.

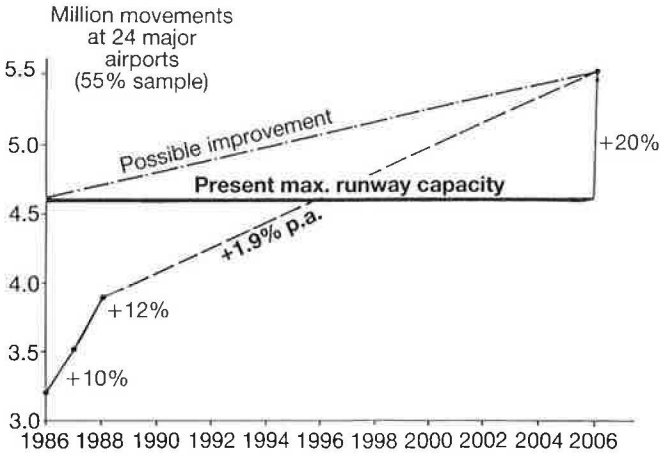

FIGURE 12 Airport congestion in Europe.

Air Travel Maturity

Air travel has not yet reached a point of saturation, even within those countries that enjoy a high level of economic development. (Figure 17) Rising national wealth stimulates demand for air travel -- a trend which is supported by factors outside pure economic relationships. For instance, the absence of public surface transport alternatives plus deregulation resulted in every US citizen statistically making more than one trip per year. If, on the other hand, the Japanese population changes its spending, the future traffic growth potential to and from this country would be tremendous.

Air traffic liberalization means increased competition between the airlines, with fare reductions and a higher level of flight frequency attracting the travelling public. These were the underlying assumptions for the "most likely" case shown above.

There exists, however, the possibility that from 1992 onwards intra-European air travel may be defined as domestic travel. Air travel may then become subject to a value added tax with ticket prices going up correspondingly. In addition, airports will see revenues from tax-free sales decreasing sharply. Authorities may then look for other sources of revenue (e.g. increased handling fees) which will undoubtedly be passed on to the passenger in the form of higher ticket prices. Monopolistic pricing of prime slots at hub or congested airports is also likely to push landing fees up.

It is therefore possible that potential cost and fare reductions may be compensated for by increases in taxes and fees. The effect of this has been analyzed in a third scenario, the "no fare reduction" case shown in Figures 18 and 19.

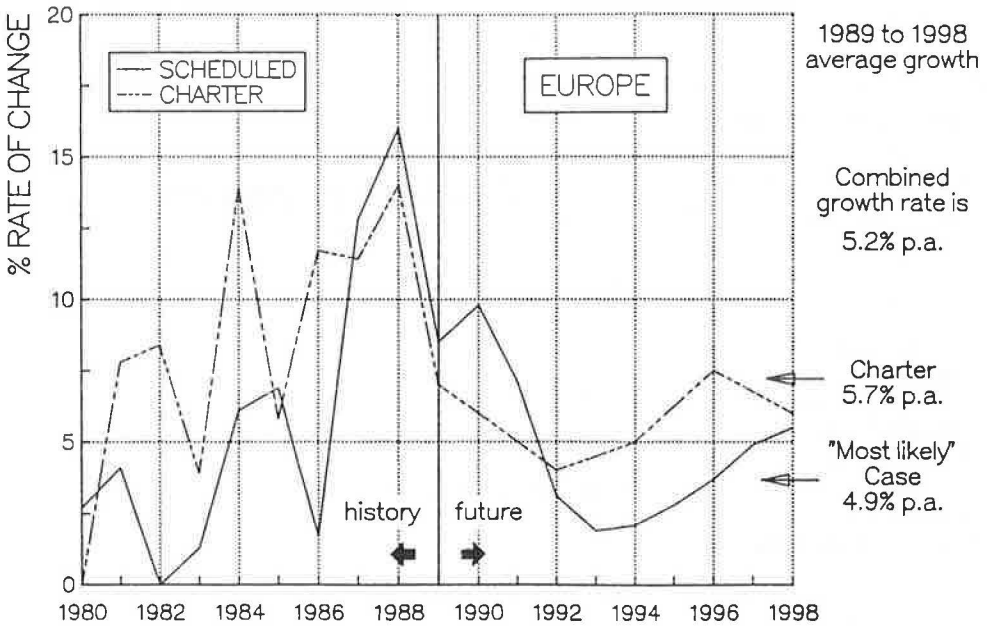

FIGURE 13 Growth rate of annual passenger kilometers (most likely case).

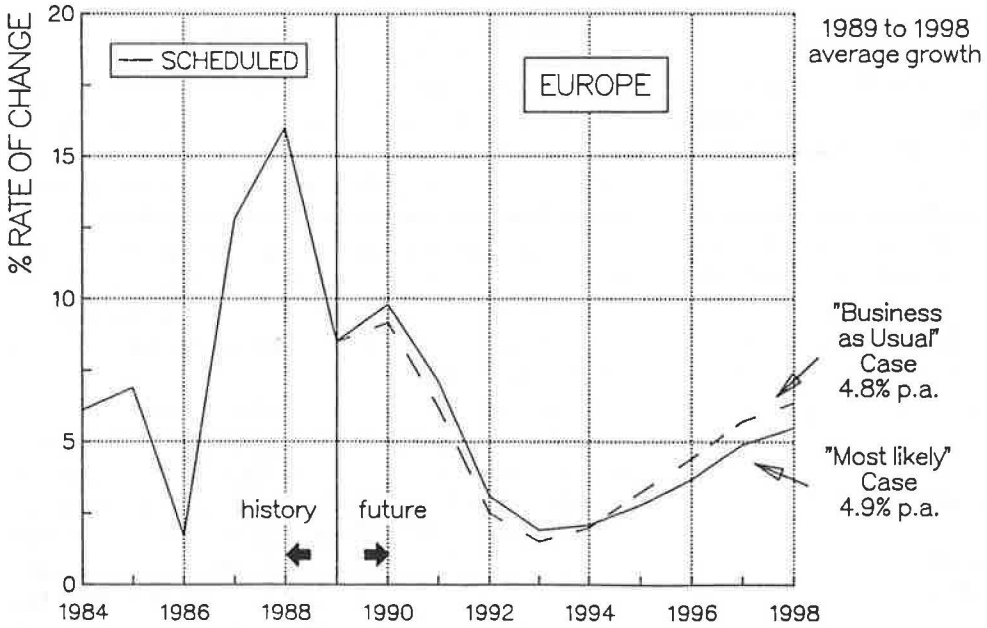

FIGURE 14 Growth rate of annual passenger kilometers (business as usual case).

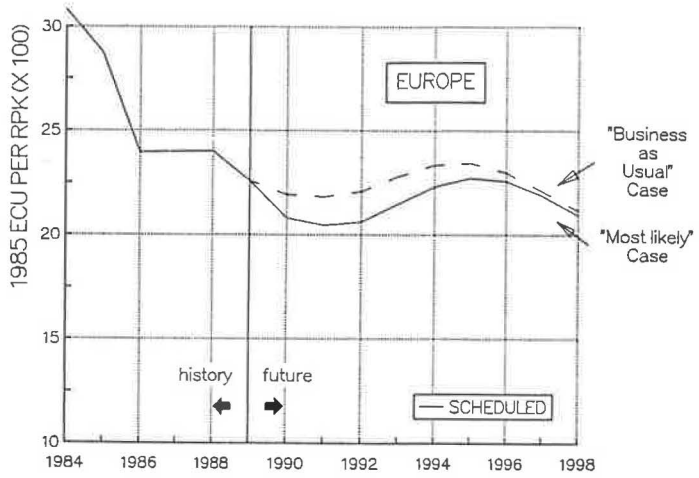

FIGURE 15 Real air fares in Europe (domestic plus intra-European).

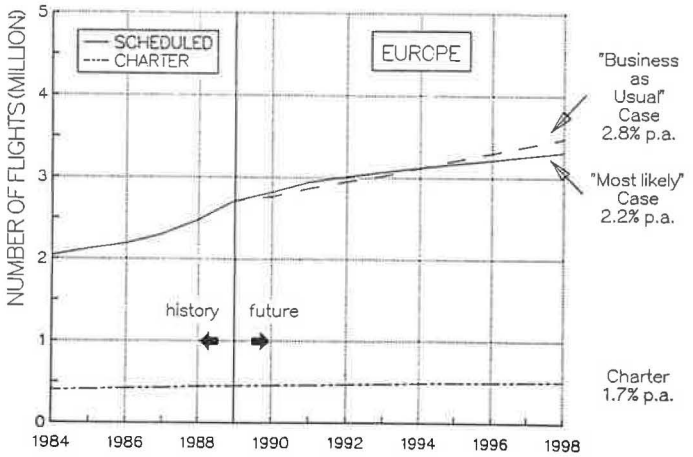

FIGURE 16 Annual flights (domestic plus intra-European), 1984-1998.

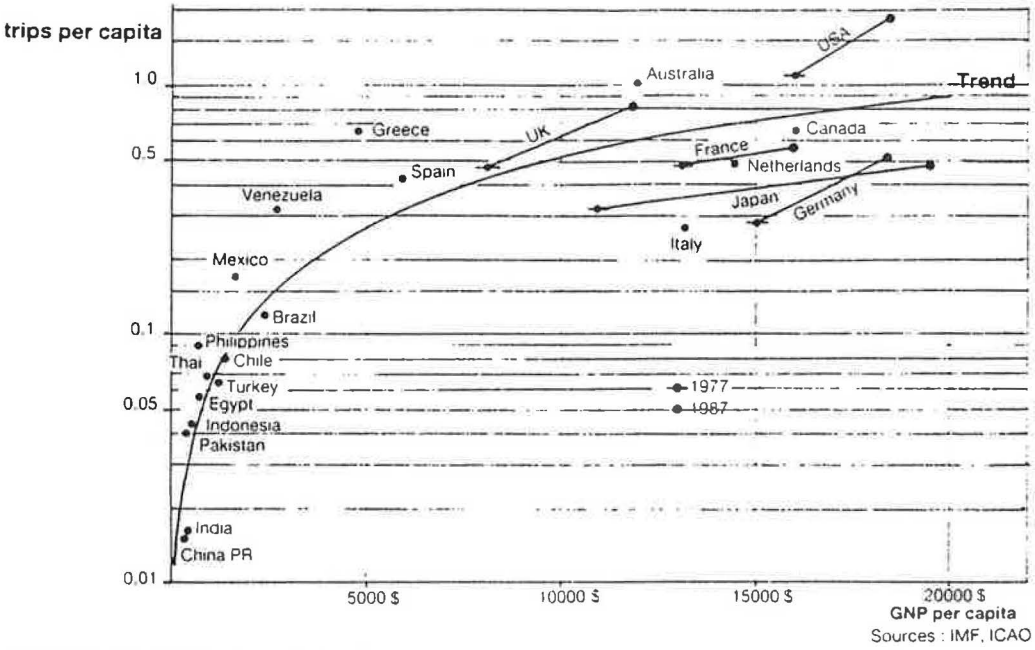

FIGURE 17 Maturity of air travel market, selected countries.

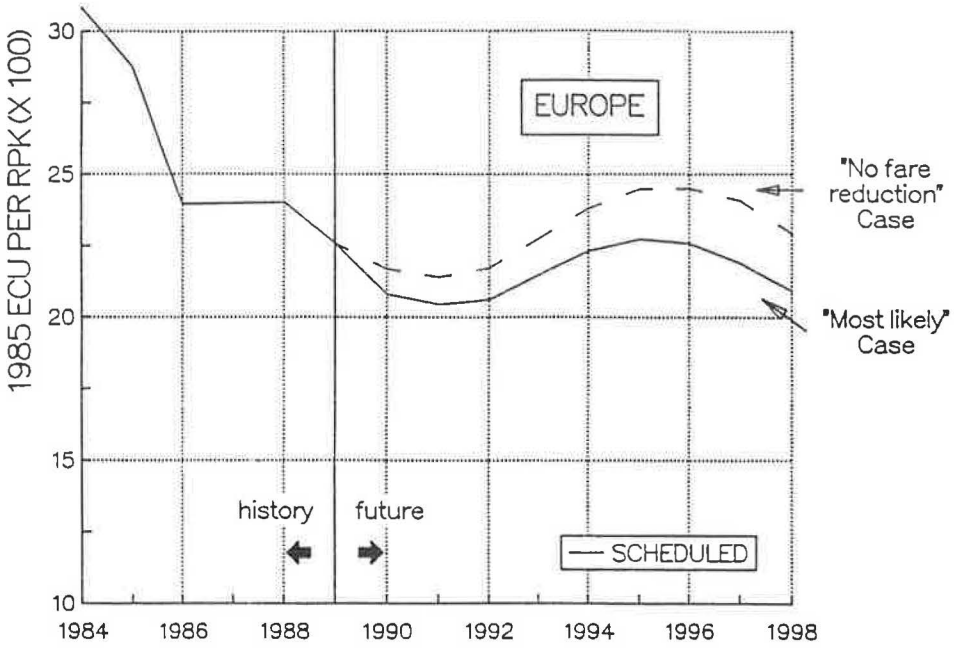

FIGURE 18 Real air fares in Europe (domestic plus intra-European) under the no-fare-reduction scenario.

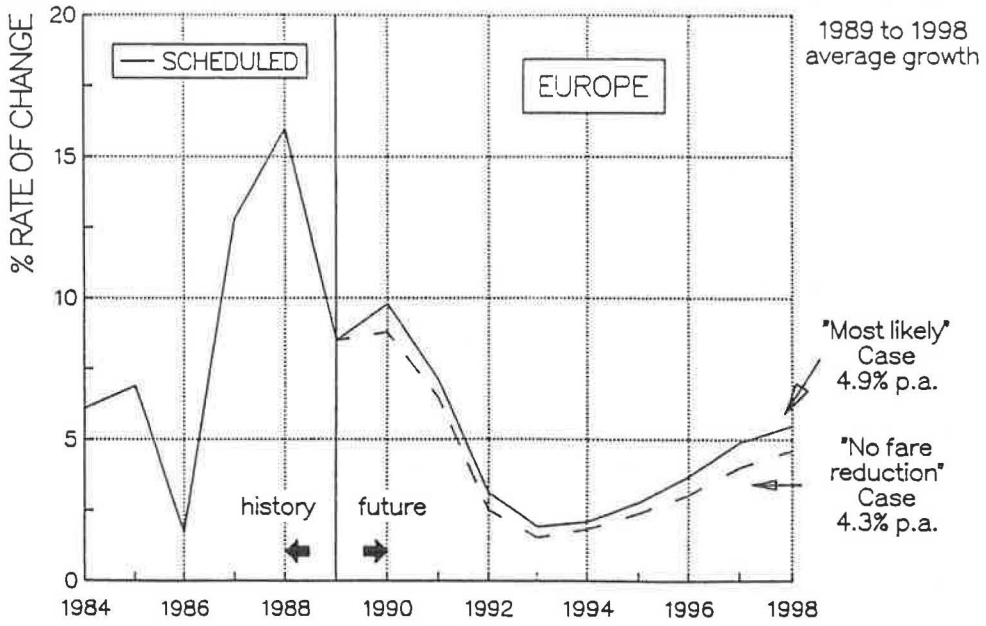

FIGURE 19 Growth rate of annual passenger kilometers (no fare reduction case).

Compared to the "most likely" case, which forecasts 4.9 percent traffic growth per year, the traffic expansion expected in the "no fare reduction" case is on the order of 4.3 percent annually.

Despite these growth-constraining factors, airlines still have considerable opportunity to economize, especially in the area of indirect operating cost. Therefore the "no fare reduction" case represents a hypothetical scenario.

SOLUTIONS TO CONGESTION PROBLEMS

Airport Solutions

· separation between jets and turboprop aircraft in the approach areas with dedicated runways for each
· transfer of general aviation and commuters to secondary airfields,

· frequency restrictions on charter flights,
· priority for bigger capacity aircraft in slot allocation,
· market-oriented pricing policies such as maximum passenger throughput per slot or a revised system of navigation charges, and
· relaxed curfews for "silent" aircraft.

Surface Transport Alternatives

Air traffic is part of the basic economic infrastructure, providing transport over medium and long-haul routes which cannot be provided by traditional surface modes.

Re-emerging rail technology and improved train services are not necessarily competitive to air traffic, but in many cases should be considered as a complement to it. High-speed rail service could enable airlines to reduce jet operations on some loss-generating, short-haul routes, thereby permitting an airport to handle more medium and long-haul flights. (Figure 20)

The growing number of airports linked to intercity train services is an indication of the trend to combine operational and economical advantages of rail and air services into an integrated transport system to maximize the macroeconomic benefits.

Improved Aircraft Technology

Aircraft manufacturers could help relieve congestion problems by the following improvements in aircraft characteristics:

· product lines offering choice of sizes and ranges,
· good airfield and climb performance,
· off-optimum cruise capability,
· incorporation of latest navigation and communications equipment,
· ease of ground handling for fast turnarounds, and
· environmental acceptability

Air Transport Development, 1989-2008

Figures 21 and 22 summarize the Airbus Industrie forecasts for Europe over the coming 20-year period. Two scenarios are presented: Scenario 1 -Potential Growth, and Scenario 2 - Constrained Growth.

Figure 21 describes the basic conditions and assumptions for each scenario and indicates the outcomes in terms of growth in traffic (pkm) and service frequency. Figure 22 shows the effects on aircraft fleet size and characteristics.

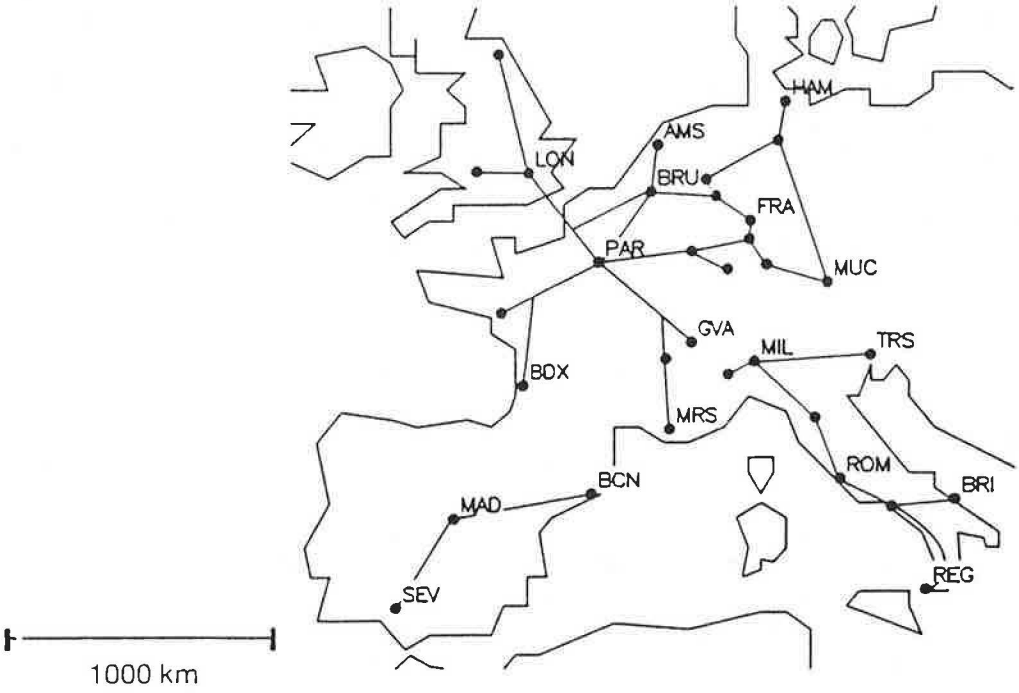

FIGURE 20 European high-speed rail network (existing and by 2000).

Scenario 1: Potential Growth	Scenario 2: Constrained Growth
Liberalization effects	No real fare reductions
· Fare reductions in real terms · Route and frequency expansion	· Increase in cost and fees (e.g. VAT, airport charges,...) · Monopolistic pricing
Functioning infrastructure	Constrained frequency development
· Airport capacity · Air traffic control capacity	· Congested infrastructure · Reduced attractiveness
Pkm growth 4.9% p.a. Frequency growth 2.8% p.a.	**Pkm growth 3.8-4.0% p.a.** Frequency growth 1.9-2.2% p.a.

FIGURE 21 European air transport development, 1989-2008.

	Potential Growth	Constrained Growth
Pkm growth	4.9%p.a.	4.0%p.a.
Seat growth	4.4%p.a.	3.5%p.a.
Frequency growth	2.8%p.a.	2.0%p.a.
Fleet size 1989	**1800**	**1800**
Total deliveries/ retirements by a/c size category	+2700/-1350	+2350/1500
≥130 seats	+ 350/-640	+ 250/700
131-170 seat	+ 700/-300	+ 600/38
171-230 seats	+ 500/- 80	+ 400/-100
231-340 seats	+ 900/-200	+ 850/-200
≤341 seats	+ 250/-130	+ 250/-120
Fleet size 2008	**3150**	**2650**
Avg.seat cap. 1989	164	164
Avg.seat cap. 2008	220	230

FIGURE 22 European jet fleet, 1989-2008.

FORECASTS OF TRANSPACIFIC AVIATION ACTIVITY, 1989-2020

Gene S. Mercer, Federal Aviation Administration

There are challenging times ahead for the aviation community--particularly with respect to transpacific travel which has been growing at double digit rates during recent years. This paper presents forecasts of transpacific aviation activity through the year 2020 and discusses the factors which will be driving demand for aviation services, the evolving structure of the aviation industry, and FAA's assumptions concerning fleets, schedules, and fares.

FORECAST BACKGROUND

Forecasting air traffic to the year 2020--three decades into the future--is even more hazardous than a forecast of the present traffic would have been had it been made in 1960, just prior to the dramatic changes brought on by the advent of jet air travel followed by the U.S. deregulation experience. With an accelerating rate of change in technology, social values, and economic development, no one can predict with confidence 30 years into the future. Still, it is necessary to have some sense of future air travel demand in order to plan an air traffic system to serve the needs of future generations. With some trepidation, therefore, my presentation today will be a general picture of how future air travel across the pacific might develop. The underlying economic and social reasons--economic growth, shifting demographic patterns, changing life-styles, and increasing reliance on air as the predominant mode of travel--will continue to stimulate air traffic demand well into the next century. This is especially true for the Pacific Rim. It is imperative, therefore, that the aviation community review the current status of transpacific travel and the future impact of traffic growth due to the movement toward worldwide deregulation and the growing interdependence of world economies.

Deregulation in the United States

Following deregulation in the United States in 1978, there was a boom in U.S. domestic airline passenger traffic--from 250 million enplanements in 1978 to 442 million in 1988. Many factors contributed to this unprecedented growth including lower fares, a wider variety of routes and types of service, and special incentives offered by airlines. The U.S. deregulation experience has become a model for the rest of the world and, as we witness the gradual spread of airline deregulation throughout a large part of the free world,