

Worldwide Aviation Outlook

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This paper presents forecasts of scheduled passenger and freight traffic for the period 1982-1992. The approach and basic assumptions are described and forecast results are presented for six major regions of the world. The overall average growth rate for scheduled passenger kilometers over the ten year period is forecast at 7.0% per annum and the rate for scheduled freight tonne kilometers is forecast at 7.5% per annum. The paper also discusses the dependence of traffic developments on changes in the competitive and regulatory environment and, finally, presents some statistical evidence and the importance of airline profitability for future traffic growth.

Nomenclature

ASK	= available seat kilometers
RPK	= revenue passenger kilometers
RTK	= revenue tonne kilometers
Passenger yield	= revenue earned per RPK
Freight yield	= revenue earned per freight RTK

Introduction

LONG term traffic forecasting at ICAO is mainly done in two contexts (Fig 1):

1) Every year the staff does a general study of the air transport situation in one of the major regions of the world including a ten year forecast of the traffic by the airlines of that region. The most recent study covered the Latin America/Caribbean region and the one prior to that covered the Middle East.

2) Every three years we undertake a global review of the development of air transport, analyzing developments over the past ten years and looking ten years ahead. One of these reviews was completed in 1983 (Ref 1) and is the main basis for this paper.

Our approach to long term traffic forecasting is conventional: for both regional and global forecasts we apply econometric models for scheduled passenger and freight traffic. These models may vary from case to case but because each forecast covers a large number of countries with differing circumstances they must be very simple and their results must be reviewed and adjusted in the light of observed trends and our knowledge of the operating environment in the countries concerned.

When doing a forecast we also cast an eye on related forecasts prepared by others. For example when doing a forecast for a region we take into account available forecasts by airlines and airports in that region. This is because we recognize that the actual traffic developments tomorrow will be influenced by today's planning by the industry directly involved.

Finally, we pay much attention to the consistency of our regional and global forecasts. For example when doing one of our global forecasts we carefully examine the regional subtotals of the projected worldwide traffic to satisfy our

selves that these regional shares are mutually consistent and make sense in relation to our earlier regional forecasts.

ICAO Forecasts of Scheduled Traffic

For our current world forecasts of scheduled passenger and freight traffic the econometric models each include two independent variables. On the passenger side these variables are the aggregate Gross Domestic Product for all countries excluding the USSR, and the average cost of air travel as expressed in terms of the average passenger yield.

Between 1971 and 1981 the GDP in real terms grew by an average of 3.3% per annum (Fig 2). This ten year average was strongly affected by low growth rates following the drastic increases of oil prices in 1973 and 1979. The World Bank expects the growth of GDP in the next ten years to be higher than during the past decade² and our assumption is for a "likely" rate of 3.4% with "high" and "low" assumptions of 4% and 2.8%, respectively.

Average passenger yield in real terms declined by an average of 4% per annum between 1971 and 1981. This rate of decline occurred in spite of escalating fuel costs. For the next ten years fuel prices are not expected to increase dramatically when measured in real terms. Nevertheless our "likely" assumption is that yield will decline at a rate of only 1.5% per annum with a range of between 0 and 3%. The reasons for assuming this slower rate of decline in unit revenue are: load factors cannot keep on increasing as they did during the last ten years, and airlines will need to improve their overall revenue/cost ratio.

On the freight side the variables used in our econometric model are exports and average freight yield (Fig 3). The export variable is a derived index of the volume of international trade. This variable was chosen over other possible indicators of economic activity in view of the fact that nearly 75% of all air freight is international.

In accordance with International Monetary Fund data,³ the average rate of growth of the export variable was 4.8% per annum between 1971 and 1981. For the next ten years we assume the average rate of 4%, which is marginally higher than the corresponding rate for GDP. As regards freight yield the assumed future rate of decline is the same as for passenger yield, implying the balanced developments of the levels of passenger fares and freight rates.

The passenger and freight models (Table 1) are linear in the logarithmic form and the coefficients are derived from data concerning 1960 to 1981. Using the above assumptions concerning the changes in the independent variables for the 1982 to 1992 period, the future growth rates indicated by the models are: revenue passenger kilometers of 7.4% per annum and revenue freight tonne kilometers of 7.3% per annum.

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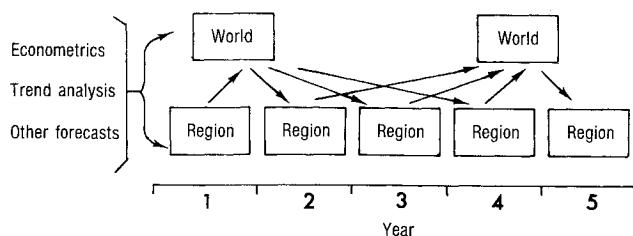


Fig 1 Traffic forecasting at ICAO

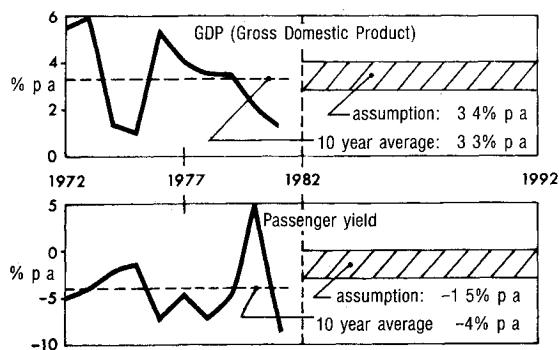


Fig 2 World GDP and passenger yield annual changes (real terms)

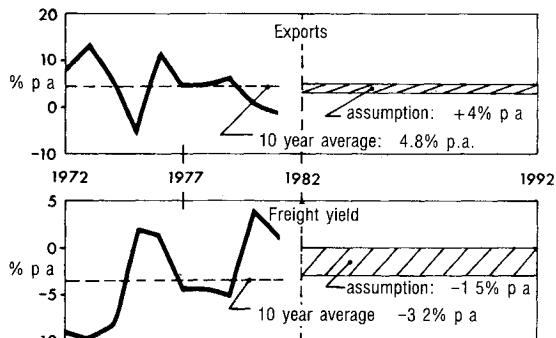


Fig 3 World exports and freight yield, annual changes (real terms)

Table 1 Models of world scheduled air traffic, 1960-1981

Passenger traffic	
1n RPK	= -6.65 + 1.79 ln GDP - 0.77 ln P yield ^a (t=9.2) (t=4.1)
Freight traffic	
1n FTK	= 0.375 + 1.62 ln EXP - 0.48 ln F yield ^a (t=8.4) (t=1.6)

^aYield and GDP data in real terms

As already indicated these results of the econometric analysis were used as a starting point for more detailed assessment of prospective traffic growth for the airlines in six major regions of the world. Following this process we have arrived at the forecasts in Tables 2 and 3 which cover all ICAO states including the USSR.

Broadly speaking the anticipated world growth rates for the next ten years are only marginally lower than those for the last ten years. Because of the recent economic recession and the setback which air transport has suffered since 1979 it seems fair to assume that we are at the bottom of a cyclical fluctuation of growth rates around the long term trend. It is from this low point that we begin counting the future.

Regarding the passenger forecast the overall future growth rate of 7% per annum should be seen as a 'most likely' rate within a range extending from 5% per annum to 9% per annum.

Comparing regions, only North American carriers are expected to achieve a higher average growth rate than that of the past ten year period. For Asia/Pacific and the Middle East the slowdown will be more pronounced than elsewhere but these two regions will still remain more expansive than others.

The overall growth rate for freight of 7.5% per annum should be seen as a 'most likely' rate within a range from 6 to 9% per annum. Again we anticipate a slowdown in all regions except North America that will be particularly marked for the Asia/Pacific region which had an exceptionally high rate during the past decade.

Over a span of ten years, differing growth rates can lead to quite significant shifts in the geographical distribution of the world's air traffic. Our forecast implies that the volume of international passenger traffic will approach that of domestic traffic by 1992 and international freight traffic will approach 80% of all freight traffic (Table 4).

Among the regions, Europe (including the USSR) and North America will become less dominant while all other regions are expected to get increased shares of the world traffic. The Asia/Pacific region is expected to surpass both North America and Europe with respect to freight traffic within the next ten years.

The Competitive and Regulatory Environment

The state of the art of forecasting and the availability of data permit us to evaluate only some of the most basic factors which affect the future traffic development. There are numerous other factors which are unpredictable or cannot be assessed because too little is known about them.

One element of uncertainty in long term traffic forecasting relates to the competitive and regulatory environment which varies very much from one part of the world to another. Changes in this environment will influence the structure of air transport and particularly the relationship between scheduled and nonscheduled traffic which may be illustrated by the two examples shown in Fig. 4.

Table 2 Passenger forecasts

Scheduled traffic	Revenue pass kms (billions)		Average annual growth (%)			
	1982	1992	1972	1982	1982	1992
World						
Total	1 144	2 250		7.4		7.0
International	499	1,095		9.2		8.0
Regional totals						
Africa	34	85	11.3		9.5	
Asia/Pacific	188	490	14.1		10.0	
Europe	388	700	6.6		6.0	
Latin Am /Car	58	130	9.7		8.5	
Middle East	34	90	15.7		10.0	
North America	443	755	5.3		5.5	

Table 3 Freight forecasts

Scheduled traffic	Revenue tonne kms (millions)		Average annual growth (%)			
	1982	1992	1972	1982	1982	1992
World						
Total	30 960	63 250	7.5	7.5		
International	22,490	49,350	10.4	8.0		
Regional totals						
Africa	1 030	2 700	13.3	10.0		
Asia/Pacific	7 040	20 000	18.7	11.0		
Europe	11 040	19,000	7.0	5.5		
Latin Am /Car	1 870	4 250	10.4	8.5		
Middle East	1 300	3 100	11.7	9.0		
North America	8 680	14 200	2.6	5.0		

Table 4 Percentage distribution of world traffic

Scheduled traffic	Passenger kms		Freight tonne kms	
	1982	1992	1982	1992
All international	43.6	48.7	72.7	78.0
All domestic	56.4	51.3	27.3	22.0
World total	100	100	100	100
Carriers of:				
Africa	2.9	3.8	3.4	4.3
Asia/Pacific	16.4	21.8	22.7	31.6
Europe	33.9	31.1	35.7	30.0
Latin Am /Car	5.1	5.9	6.0	6.7
Middle East	3.0	4.0	4.2	4.9
North America	38.7	33.4	28.0	22.5

The most important nonscheduled passenger market is in Europe where in terms of passenger kilometers the international nonscheduled traffic exceeds the scheduled traffic and has done so for the last 12 years. This traffic is predominantly of the inclusive tour type between northern Europe and the Mediterranean and has flourished because of low prices and liberal government regulations. Unless the regulatory environment in Europe changes dramatically the development of intra European scheduled traffic will remain largely unrelated to this nonscheduled traffic.

In the North Atlantic region the development of scheduled and nonscheduled passenger traffic is more closely interrelated. Between 1970 and 1977, when the competitive situation among scheduled carriers was stable, nonscheduled traffic accounted for 25 to 30% of the total passenger volume. After 1977, when there was no IATA agreement for the North Atlantic and the Laker Skytrain had started, many charter operators pulled out when a large proportion of their clientele was attracted by new discount fares.

Differences in the prevailing competitive and regulatory environment also have a bearing on the general levels of air transport operating costs in the regions and result in differing levels of fares and rates.

Looking at the average cost per passenger kilometer for the 16 different international route groups shown in Fig 5 (Ref 4) it is apparent that the variations in average cost levels are much too great to be explained by differences in traffic patterns and operational factors alone. The magnitude of the spread strongly suggests that in some areas the scheduled services could be provided at lower cost if sufficient incentives and organizational flexibility were provided. If such changes come about these areas could experience a more vigorous traffic growth than forecast.

The Importance of Airline Profitability

It is well recognized that airline profitability is a prerequisite for continued growth since the availability of

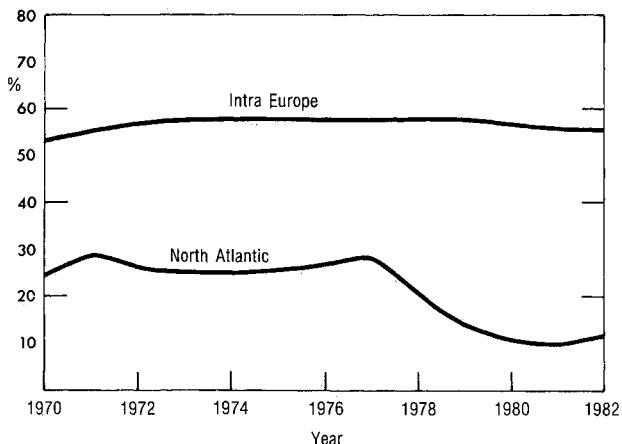


Fig 4 Nonscheduled share of total international passenger traffic (scheduled and nonscheduled).

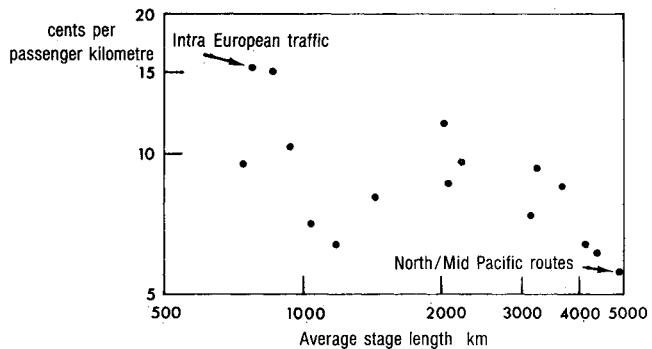


Fig 5 Average costs for passenger service, major international route groups, 1980

both internal and external airline financing depends on the profitability of the operations. However the possible existence of a direct relationship between financial results and traffic development is a largely unexplored issue, which could be significant at least in short to medium term forecasting.

In an attempt to cast a bit of light on this issue we shall first relate the annual changes in airline passenger capacity to the operating profit levels for the world's airlines during the period of 1960 to 1982 (Fig 6).

The graph shows that changes in both available seat kilometers and operating profits have varied substantially from year to year and that there seems to be some similarity in the patterns of these two variables.

A correlation between the operating profit for the year and the growth in available seat kilometers during that year is not

Table 5 Airline financial results vs traffic increases, 1961 1982

Correlation global operating results vs changes in available seat kilometers (Δ ASK) during the same or subsequent years	
Same year	$R^2 = 0.13$
1 year later	$R^2 = 0.45$
2 years later	$R^2 = 0.60$
3 years later	$R^2 = 0.17$

in itself very interesting since it could mean simply that cost fluctuations are lagging behind traffic and revenue fluctuations thus resulting in more profitable results in the years of rapid expansion. However the correlation between the two variables becomes interesting when we look at the effect of introducing a time lag for one variable against the other.

As shown in Table 5 there is virtually no correlation between the operating results for a year and Δ ASK for that same year or an earlier year. However the operating results and the Δ ASK's one or two years later show a greatly improved correlation. This suggests not only that the variables are statistically related but also that Δ ASK is the dependent variable. In other words when the financial situation is good the airlines become more aggressive in further developing their business.

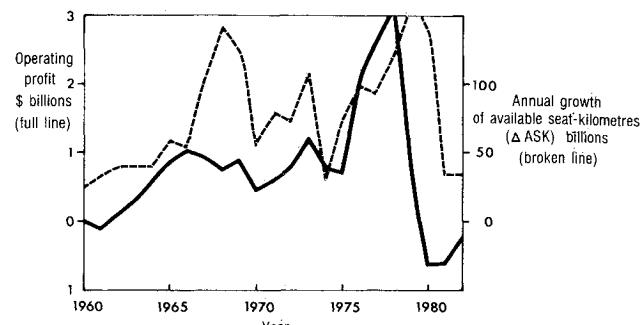
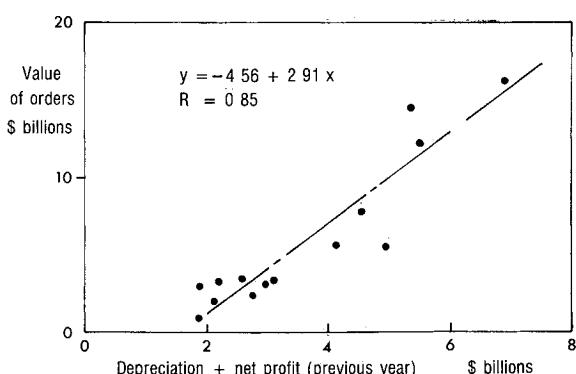
The direct impact of financial results on airline growth may also be illustrated by relating the value of new aircraft orders to the financial surplus arising from current operations (Fig. 7).

In this case we have chosen the net profit plus depreciation as the variable representing the industry's ability to generate funds during any one year with total value of commercial aircraft orders placed during the following year represented by the dependent variable. In the graph we have plotted these two variables against each other for the last 14 years.

The value of commercial aircraft orders in any one year obviously depends on a number of factors for example whether or not major manufacturers have recently launched new aircraft types. Nevertheless the statistical relationship shown in the graph is quite clear.

When one bears in mind that aircraft acquisition is the basic means of sustained traffic growth, one sees that the driving forces behind decisions to acquire aircraft constitute an interesting issue. On this issue, there appears to be a statistical relationship between financial results and new aircraft ordering but so far we have been unable to find one between airline industry projections of future capacity needs and the flow of orders for new aircraft.

In conclusion the experience with our earlier long term traffic forecast gives us a fair amount of confidence in the

**Fig 6** World traffic growth vs airline profit levels**Fig 7** Annual commercial aircraft orders vs airline financial surplus

approach we are taking. It is true that no forecast can be more accurate than the assumptions on which it is based and that there are many unpredictable or unexplored factors which together could have a major impact on future traffic developments. Nevertheless, traffic predictions are necessary and the forecasts which have been outlined here represent our best effort to assess what the future holds.

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