

Regional jets have increased airline revenues in the US. Examination of regional airline data reveals a direct link between the use of jets and higher passenger load factors. The correlation is weaker in Europe and airlines also have to consider the higher operating costs.

# How do regional jets increase revenue?

**T**here is a view that regional jets instead of turboprops are guaranteed to increase revenue. If this true, there are two ways it can be achieved. Either, yield is improved directly by charging higher fares, or revenue is increased by maintaining fares, attracting more passengers and having higher load factors.

## Higher fares?

A survey of regional airlines carried out a few years ago discounted the possibility of airlines being able to charge higher fares. Of 15 airline presidents interviewed only one agreed he could charge a higher fare if he replaced a jet with a turboprop. This is not unexpected, since surveys conducted by airlines, airports and manufacturers all confirm the view that what matters most to the passenger is frequency, followed by ticket price, rather than aircraft type (or engine) being flown.

## More passengers?

*Aircraft Commerce* has carried out a study of the effect the introduction of regional jets has had on the traffic performance of several US operators. Since there is a great deal of published information in the US, it has been possible to quantify the effect directly.

Measuring the ability of operators to attract passengers has concentrated on airline load factors. This is considered the best way to examine the correlation between attracting passengers and the use of the regional jet. Load factor is fundamentally the measure of an airline's ability to fill available seats. The airline

business is complicated, however, and an airline can buy load factor simply by reducing fares.

## North America

### Comair

No examination of the regional jet phenomenon would have value without including an analysis of Comair, the world's flagship regional jet operator.

There are several factors involved in the airline business and Comair's success cannot be attributed solely to the Canadair RJ (CRJ).

To measure what proportion of the success is attributable to the regional jet, other factors have to be examined. The most obvious of these are growth of regional business in the US and the conditions unique to Comair's operation.

Growth in the regional airline business in the US is highlighted by analysing the data collected by the Regional Airline Association (RAA). All statistics point to significant growth from 1993 onwards.

The chart (*see page 34*) shows a steady increase in the number of passengers carried, revenue passenger miles (RPMs) and load factor for RAA airlines. The dip in 1995 can be attributed largely to the Roselawn ATR72 accident on 31 October, 1994. This caused a backlash against regional aircraft, and the turboprop in particular.

A substantial element of Comair's success can therefore be attributed to growth in the regional airline business.

In one way at least Comair was behind the field. Its load factor back in 1992 was only 43.3%, compared with an industry average of 48.4%. As the chart

(*see page 34*) shows, Comair has steadily increased its load factor in line with the rest of the industry, with the notable difference that Comair did not suffer the same dip in 1995 as all other carriers.

Since 1992, average industry load factors have been rising by about 1.5% per year, while Comair's load factors have had nearly doubled the growth at 2.9% per year to 63% in 1999. This growth allowed Comair subsequently to overtake the rest of the industry.

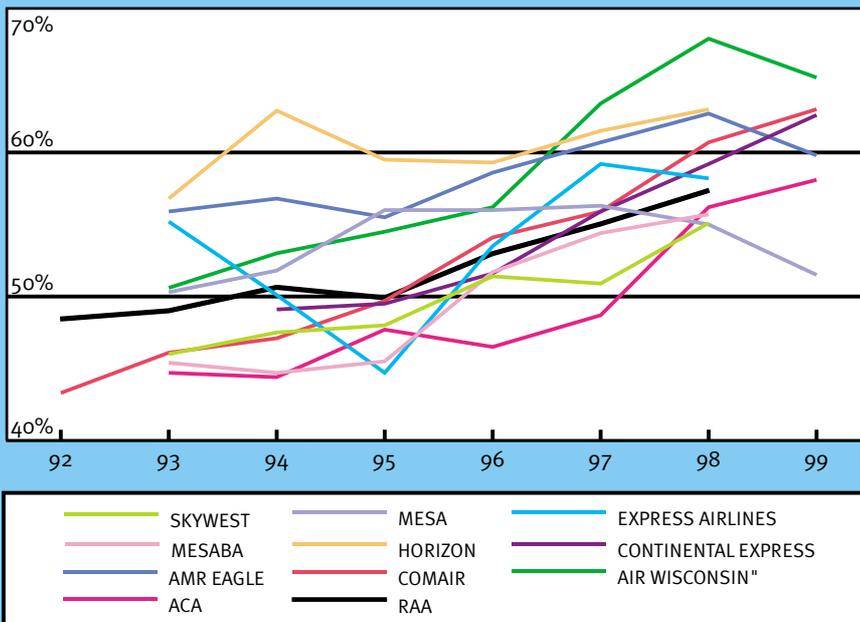
Unique conditions that exist in Comair's market can be seen by comparing the Comair experience with that of Delta Airlines. The difference between Delta's cost and yield per available seat-mile (ASM) has been basically constant for the past eight years. The same cannot be said for Comair. Although cost per ASM has been consistent with that at Delta, yield per ASM has declined.

Comair actually suffered more than a 20% drop in unit yield over this period, from 45 cents per RPM in 1992 to 35 cents per RPM in 1999. In simplistic terms, the regional jet could be seen to have clearly failed to enhance the revenue earning capability of its operator.

Such an observation fails to take account of the changing role of Comair. It went from a local service network, with an average sector length of 217nm, to a far-reaching partner of Delta Airlines. Sectors as long as Cincinnati to Nassau (over 1,050nm) are now operated, with a system average of 339nm.

So if it is not higher yield, then how has Comair achieved an overall increase in passenger revenue? The answer is in the carrier's ability to increase load factors while maintaining breakeven load factors. Comair has widened the gap

US Regional Airline Load Factor Data



between its breakeven load factor and actual load factor.

Comair's and Delta's load factors changed at similar rates, until 1996, when Delta's load factors began to stabilise, but Comair's kept rising. From 1996 to 1999 Comair's load factors rose by 8.9% to 63%, compared to an increase of 4.8% to 72.6% for Delta.

Superimposing the rate of change in load factors, it could be argued that the faster rate of increase at Comair is explained by the jet preference factor, after it had begun introducing CRJs in 1994. It could be argued that the higher increase in Comair's load factors means the regional jet is worth an additional load factor of about 7%.

## Higher load factors

While higher load factors are the result of using the CRJ at Comair, this increase cannot be explained simply by the fact that it is a jet and that passengers prefer these to turboprops.

A closer analysis of regional jet operations in the US reveals there are several reasons why airlines using regional jets have experienced higher load factors. The reasons behind these increases are: regional jets are larger and so have increased capacity, they are used on longer routes and thus have an increased catchment area and number of connections, and, finally, there has been a change in the commercial agreements between affiliated major and regional airlines.

Regional carriers in the US have not simply used regional jets as a one-for-one turboprop replacement on the same routes in the hope that passengers would prefer them to turboprops.

Passengers are still driven by schedule and fares. Where turboprops have been replaced on the same routes by regional jets, their larger size means they have increased ASMs. This increase in capacity has itself stimulated traffic. Analysis of traffic data of US regionals broken down by aircraft type over a network shows in most cases there is a correlation between the amount of traffic carried by each aircraft type and capacity offered by each. This has been shown by analysing the ASMs and RPMs of American Eagle, Continental Express and Atlantic Southeast Airlines.

When these airlines increased ASMs by adding regional jets larger than turboprops, however, they also had to lower their fares, which has stimulated a new tranche of traffic.

Perhaps the biggest contribution to higher load factors is the stimulatory effect of the increase in catchment area. Faster speed and so greater range from a hub for the same block time operated by a turboprop not only increases the number of cities served, but exponentially increases the number of potential connections as well. The effect is to increase the power of the hub, for both the regional and major carrier.

Regional jets have been used to open new and longer routes, supplement and replace turboprops and, in some cases, supplement and replace larger jets on routes operated by the major airline to which the carrier is affiliated. The degree to which regional carriers supplement and replace major airline routes with regional jets is determined by their scope clause agreements. Comair and Delta have a liberal scope clause agreement, Comair having supplemented and taken over a large number of Delta's routes.

Continental Express and American Eagle do not supplement their major airlines' routes and so have not experienced the same increase in load factors as Comair.

The effect on new connections made possible by regional jets is illustrated by the growth in Comair's network since it introduced the CRJ in 1992. In 1998, Comair operated to 67 local markets from Cincinnati, compared to 34 in 1991. The number of possible connections increased by a higher degree over the same period, with the stimulation of traffic being exponential when compared to the increase in sector lengths. The seats per departure also increased from 28 to 46.

Relationships between the US majors and their regional affiliates have evolved over the past eight years as regional jets have been introduced. The traditional method of revenue sharing was in most cases based on a pro-rating method. Regional airlines therefore had an interest in maintaining high yields and selling origin and destination fares. This kept load factors low, but covered high ASM costs of turboprops on short feeder routes.

Revenue sharing has now evolved into a system of 'cost-plus' operation. The major airlines have become more responsible for selling seats and have lowered fares to stimulate sales and load factors, which has become more important with the introduction of larger aircraft. Because of the power of jets to increase hub connections, the major airlines are also selling a higher proportion of connecting fares, which also explains why unit yields have fallen.

## Air Wisconsin

Air Wisconsin has actually gone against industry trends, with a fleet of BAe 146s and acquired turboprops. These were added as a result of the acquisition of bankrupt Mountain Air Express in February 1998 and included 15 Dornier 328 turboprops.

If the jet preference factor is real then load factors at the airline should be expected to drop. Between 1993 and 1998 (Air Wisconsin became an all-jet operator in 1993) there was a steady growth in load factor (*see chart, this page*), which kept Air Wisconsin well above the industry average. In 1998, load factors peaked, but were significantly down for 1999, evidence that a drop in load factor followed the introduction of turboprop equipment.

## American Eagle

From 1993 to 1998 AMR Eagle's load factor was consistently 5-6% higher than the RAA average (*see chart, this page*). It is surprising that despite the



introduction of the first ERJ-145 in February 1998, the airline has suffered a fall in load factor. This is explained by American Eagle not supplementing American's routes with its ERJ145s in the same way Comair has supplemented Delta with the CRJ.

### Atlantic Coast

Atlantic Coast Airlines has been vocal in its plans to increase its regional jet fleet. It has placed an order for Fairchild 328Jets.

This enthusiasm is the result of the dramatic effect the introduction of the regional jet has had on the airline's performance. Load factor was well below industry average between 1993 and 1997, and growing at a slower rate than the industry average (see chart, page 34). There was a dramatic increase in load factor in 1998, from 48.7% to 56.2%, coinciding with the introduction of its Canadair RJs.

### Continental Express

In 1996, Continental Express ordered 25 ERJ-145s with options on a further 175. The effect on traffic performance was almost instantaneous. The carrier went from a lacklustre 52% load factor for 1996, well below the RAA average, to 63% for 1999 (see chart, page 34). The rate of increase was about 3.7% per year higher than Comair's. Continental's number of firm orders for the ERJ-135/-145 now stand at 200, following the conversion of options at the Singapore Air Show.

Continental's experience with the ERJ-145 has convinced it of the regional jet concept, and is taking it a step further with widespread introduction of the ERJ-135 to replace the 19-seat Beech 1900D.

### Express Airlines

Although it is one of the last turboprop-only operators in the US, Express Airlines is taking delivery of its first Canadair RJ in April 2000.

There is no load factor data on which to make a direct comparison between jets and turboprops, but the experience of Express Airlines is interesting for another reason. It shows a carrier that has improved its load factors from less than 45% in 1995, the year after Roselawn, to nearer 60% in 1998 (see chart, page 34). This improvement has been achieved with turboprops and by improving existing service. The Express Airlines experience suggests jets are not the only way of increasing revenue.

### Horizon

Horizon is committed to a mixed fleet of both regional jets and turboprops. Horizon's belief in the turboprop is demonstrated by it being the only customer for the Dash 8-400Q in North America.

Horizon was one of the earliest regional jet operators in the US, with a fleet of F.28s. This may explain why its load factor performance has always been well above the industry average (see chart, page 34).

Comair's success with the regional jet has been the basis by which the use of jets has been judged. After first introducing the Canadair RJ in 1992, its average yield fell by 10 cents per RPM, its average sector length increased from 217nm to 339nm and its passenger load factor climbed from 43.3% to 63% in 1999.

### Mesa Air Group

Mesa's results (see chart, page 34) highlight a very different picture to that experienced by Comair. From 1993 to 1997, load factors closely followed the RAA average, but declined in 1998 and 1999. This is despite Mesa introducing its CRJ fleet during 1997-99.

Mesa's problems during the second half of the 1990's make it difficult to draw any firm conclusions about the effect the regional jet has had on its operation. The only real conclusion is that the Canadair RJ has not acted as a magical solution to its problems.

### Skywest

Skywest and Comair commenced regional jet operations at about the same time and both saw a rise in load factor (see chart, page 34), but Comair's growth was more rapid. Skywest has never achieved the wide gap between the breakeven load factor and actual load factor that has made Comair so profitable.

So why hasn't Skywest's growth been as rapid? It could be argued that this is because Skywest did not follow up its initial order for 10 CRJs with further orders for a long time. Skyjet is also based at Salt Lake City, which may explain its inability to attract the same amount of traffic that Comair does at Cincinnati. Skywest is relatively late in entering into a cost-plus agreement with Delta, and so not yet experienced the stimulatory effect this will have on traffic.

### US operator summary

Comparing Comair's load factors with those of other US regional carriers it is clear that there is a definite advantage to regional jet operators. Reported load factors for RAA airlines make it clear that those with the greatest proportion of regional jets in their fleets are in general likely to have the highest load factors.

If load factor is plotted against the proportion of regional jets in the fleet, there is a trend linking regional jets with increased passenger load factor. Based on this data, an all-regional jet fleet would be expected to have a 12% higher load factor compared to an all-turboprop fleet.



*Continental Express has experienced one of the best results of employing regional jets. In just three years to 1999 its passenger load factor rose from 52% to 63% after introducing the ERJ-145 in 1997. Its satisfaction with regional jets over turboprops is highlighted by its massive order for ERJ-135/145s. It has now placed 200 firm orders for the types, with 75 ordered at the 2000 Singapore Air Show.*

## Europe

A link between load factor and the regional jet is harder to prove for European regional airlines. The belief that the airlines themselves are not convinced of the pulling power of regional jets is supported by the fact that they are continuing to expand their turboprop fleets. Regional jets are only required for specific parts of their network.

There has been a steady increase among European regional association (ERA) airlines in the percentage of jets in the fleet. From 1992 to 1999 the proportion of jets in the fleet increased from 17.4% to 39.1%.

At the same time load factors have increased from 52.2% to just 57.3%. Assuming this increase in load factor is solely due to the increase in the proportion of jets, by extrapolation the load factor difference between an all-jet fleet and an-all turboprop fleet could be as high as 26%. This is simplistic, however, since some of this increase is due to growth and other market forces.

The most extensive European operator of the regional jet is Lufthansa

Cityline. Since 1995, load factor at the airline has grown from 53.6% to 57.9%, a rise of 4.3%. Most of this growth has been achieved with an all-jet fleet; the last Fokker 50 was retired in February 1997. Over the same period average ERA load factor has grown from 54.7% to 57.3%, a rise of 2.6%. Many of these airlines, however, also operate jets. It is a simplistic approach, but with or without the regional jets Lufthansa CityLine could have expected a similar rise in load factors to the rest of the European operators (2.6%) because of growth. The effect of the regional jets can only realistically be attributed to the difference between 2.6% and 4.3%, just 1.7%.

Using this 1.7% increase, the experience of Lufthansa CityLine compared with the ERA average suggests that compared to an all-turboprop operator, an-all jet fleet will therefore benefit from an average 10% higher load factor.

The majority of European carriers have been operating larger regional jets, BAe 146/RJ and Fokker 70/100s, alongside turboprops for a number of

years. While the ERA members included 79 Canadair RJs and 39 Embraer ERJ-145s in their fleets, the most popular regional jet was the BAe 146/Avro RJ, with 144 in service. The overall attitude, however, is that the turboprop still remains the most suitable type for a proportion of the network.

The major difference between airlines is if a part of their operation is suitable for the turboprop, and whether or not these services and their aircraft are passed to another subsidiary.

An analysis of Canadair RJ and Embraer ERJ-145 customers highlights that many regard the turboprop as an essential part of their operations.

European regional airlines can therefore be split broadly into two groups: those that now have all-jet fleets and those that have mixed fleets with turboprops.

The majority of European carriers have mixed fleets. These include Air Littoral, Air Nostrum, Alitalia Express, Brit Air, British Midland Commuter, Brymon Airways, Proteus, Jersey European, KLM Exel, Skyways and Tyrolean.

Air Littoral has a fleet of ATR42s, Canadair RJs and Fokker 70s. Air Nostrum uses Fokker 50s, but has also ordered five Canadair RJs. Alitalia Express has ATRs and has ordered six ERJ-145s.

Brit Air has ATRs, 17 Canadair RJs and five Fokker 100s. British Midland Commuter was exclusively a Saab 340 operator until it ordered 10 Embraer ERJ-145s in 1998. Brymon Airways has ordered ERJ-145s, but will always operate turboprops because of the airfields it flies from.

Proteus, Jersey European, KLM Exel, Skyways and Tyrolean have all ordered ERJ-145s or Canadair RJs in recent years, while continuing to operate turboprops.

British Regional Airlines (BRAL), Crossair, European Regions Airlines (ERA), Luxair, Portugalia, Regional Airlines and Rheintalflug either already have all-jet fleets or will become all-jet operators in a few years.

BRAL has ordered ERJ-145s to replace its turboprops, on account of the regional jets' popularity with passengers.

Crossair has placed its future firmly

European airlines are divided between those that have become all-jet operators and ones with mixed fleets. Mixed fleet carriers still regard turboprops as an important part of their operation.

in the hands of the regional jet, with orders for 15 ERJ-145s and 60 ERJ-170s. European Regional Airlines is a Spanish start-up operator with a fleet of two ERJ-145s.

Luxair has started operating ERJ-145s and will withdraw its Fokker 50s by 2002.

Rheintalflug was one of the launch customers for the Dash 8-400, but has since allowed this order to lapse and has ordered two Embraer ERJ-145s. Its fleet of Dash 8s will be reduced on delivery of ERJ-145s, and Rheintalflug will be an all-jet airline within a few years.

## Summary

Out of the 24 European CRJ and ERJ-145 operators, Brit Air, BRAL, Crossair, Luxair, Regional and Rheintalflug are committed to becoming all-jet operators in the short- to medium-term. ERA and Lufthansa CityLine are already jet-only operators. This leaves 12 as long-term mixed fleet operators. These 24 operators are the ones most committed to the regional jet.

Several others are committed to turboprop-only fleets, including Augsburg Airways, SAS Commuter and Wideroe.

The fact that the turboprop remains a suitable product within Europe is confirmed by examination of ATR's order book during 1999, with orders for 30 aircraft from 11 operators, eight of which were European. The Dash 8-400Q had 58 orders during 1999 from eight operators, five of which were European.

## Economics

One important issue is what increase in load factor is required to overcome the higher operating cost of the regional jet?

The closest European equivalent to Comair is Lufthansa Cityline. It is no coincidence that this carrier's operations are based in one of the highest yield environments in the world, with yields 50% higher than Comair's.

The latest data for the two carriers (1998) highlights differences between the US and Europe.

Comair carried about 25% more passengers than Lufthansa Cityline, but the RPM gap between the two is marginal. This is due to the greater

average sector length flown by Lufthansa Cityline. The European carrier is still able to command nearly 50% higher yields.

Taking the Comair and Lufthansa CityLine data gives a typical operation as being one with the following characteristics:

	US	European
Average sector	290nm	340nm
Average yield	\$113	\$197

If we take this data and apply it to operating costs of fleets of ATR42-500s and ERJ-145s we can arrive at a figure for the required increase in load factor for the jet over the turboprop.

As with any calculation involving the comparison of turboprops versus jets, it is important to understand the effect aircraft utilisation will have. If the regional jet is assumed to be capable of increased sector utilisation then its overall economics will be better than those of the turboprop, making it less important whether more passengers are carried. For many operations this will not be the case, and the regional jet will have 15% higher ASM operating costs. In passenger breakeven terms this means that the regional jet will require 3.8 more passengers, or 7.6% higher load factor, per sector to match the overall profitability of a 50-seat turboprop.

As well as the higher cost structure within Europe, there are also higher yields. The overall effect in terms of passengers required to break even is similar to that in the US. Assuming that the regional jet gets no utilisation advantage from its faster speed, it will have 13% higher operating costs. This means that the regional jet will require

3.2 more passengers to match the turboprop (equivalent to a 6.4% higher load factor).

## Conclusion

1 The replacement of a turboprop with a regional jet would not be a justification for a direct-yield increase through higher fares. What really matters to the passenger is frequency of service followed by ticket price.

1 Revenue enhancement has to be the result of gaining high passenger load factor and the use of the regional jet's greater marketable range.

1 If higher load factors are not possible, a regional jet becomes just an expensive way to replace a turboprop.

1 Comair's achievements should never be understated, but it is an oversimplification to believe that these were solely the result of replacing turboprops with regional jets.

1 Comair's experience appears to justify a benefit to the regional jet in the order of a 7% higher load factor.

1 An analysis of the load factors of several US regional operators tends to show 12% increase in load factor for an all-regional jet versus all-turboprop fleet.

1 In Europe there is much less consensus over the traffic increase provided by the regional jet.

1 Lufthansa CityLine's experience appears to justify a 10% higher load factor for a fleet of regional jets operating in Europe.

1 US and European data suggests that where the regional jet is unable to gain an increased utilisation from its higher speed capability it will need a 7% higher load factor to break even. 

