

There has been speculation that the new generation 70- to 110-seat jets would fill an as-yet unserved market of several hundred point-to-point routes. A closer examination of how these aircraft are being used, and how RJs are deployed, reveals a different role, but with strong potential.

The strong potential for 70- to 110-seat jets

With several US carriers planning to operate larger regional jets (RJs), and jetBlue entering the E-190 into service in November, the potential markets for 70- to 110-seat jets are attracting attention. Is there a large number of unserved city-pairs for which these aircraft could open new services, or will they just replace smaller and larger aircraft?

RJ explosion

OAG data provided by Back Aviation show how operations with RJs in the US have grown over the past five years. In September 2005, 102,296 flights were operated in the US with Embraer jets, which is 235% more than the number of flights in September 2000. A similar trend is seen with the CRJs, which had 125,000 operations in September 2005, 170% more than that in 2000.

Similar rises have been experienced in Europe over the same five-year period. The number of flights operated with CRJs increased by 73.1%, while the number of flights operated by Embraer jets increased by 33.1%.

In contrast, the decline in turboprop operations has corresponded to the increase in RJ services. For example, the number of Dash 8 operations in September 2005 was about 45% of the level in September 2000.

The expansion of 35- to 50-seat RJ operations and growth in popularity of these aircraft is well known. These aircraft have been part of a natural evolution of regional aircraft fleet development over the past 20 years. Regional operations in the US and Europe started with 20- to 35-seat turboprops and increased in seat size to 50 seats. Larger fleets were acquired as traffic volumes continued to grow. In the

case of some airlines and networks, 65- to 75-seat turboprops have been required, but the most recent development of the past eight to 10 years has been the widespread adoption of the new generation 35- to 50-seat RJs.

70- to 110-seat jets

Several larger RJs and small mainline jets have gradually come available over the past five years. The first of these was the 70- to 75-seat CRJ-700 series, which was then followed by the 86-seat CRJ-900. Embraer has more recently introduced the 75-seat E-170, 82-seat E-175, and 102-seat E-190. The 112-seat E-195 will go into operation in 2006. The group of 70- to 110-seat jets involves six aircraft types, although launch of the C series by Bombardier could increase this by one or two more.

Regional, first-, and second-tier airlines have already begun to use these Embraer aircraft. The number of 70- to 110-seat jets in operation is small, but provides some clues about how the industry may utilise them.

There are three clear markets these 70- to 110-seat jets could fill. The first of these is the replacement of 35- and 50-seat RJs which are either operated in markets with high traffic growth and high load factors, or on routes that are too long for smaller aircraft.

The second of these is the replacement of small mainline jets, such as the Fokker 100, 737-500/-600, 737-300/-700, A319, MD-87 and MD-82/-83. This is where load factors or passenger yields are low or weak. The new smaller and lighter jets will provide operators with lower trip and seat-mile costs, making thinner routes more profitable.

The third possible market is the opening of new services on city-pairs on which they have never been operated.

The extreme case would be routes that have never been served by any carriers. The theory is that these would be relatively long sectors, since shorter ones with lower levels of passenger demand would already be operated by smaller regional aircraft.

Regional jet deployment

The Airline Planning Group (APG) examined November 2005 airline schedules to see how three groups of RJs and small mainline Embraer jets are being deployed: the 50-seat RJs; the CRJ-100/-200 and ERJ-145; 70-seat RJs (CRJ-700); and the 75-seat E-170 and 85-seat E-175.

Analysis of the 1,630 50-seat RJs in operation (the ERJ-145 and CRJ-100/-200 series) shows that 1,340 are being operated in North America. APG's analysis shows that 66% are being operated on sectors of up to two hours on routes where the aircraft would be expected to be deployed, given their cabin size.

Perhaps surprisingly, APG's analysis shows that the remaining 34% of the aircraft, 458 units, are being deployed on routes longer than two hours and up to four hours. These flight lengths are inappropriate for these RJs, and so represent a large potential market for 70- to 110-seat jets. If 50-seat RJs were used up to a maximum of one and a half hours, then another 436 aircraft would have to be replaced by larger jets.

Analysis of the European market further reveals how some of these smaller RJs are being utilised inappropriately. First, the European fleet of 50-seat RJs is small compared to the US, at just 230 aircraft. Most of these, 185, are being used on routes of up to two hours. Only about 50 are being used on longer sectors.



There are only 60 of these aircraft operating outside of North America and Europe. This illustrates how popular these aircraft are on these two continents. Of the 1,630 aircraft in the global fleet, 526 are being operated on flights of more than two hours.

The 70- to 75-seat CRJ-700 series has been analysed in a similar way. Only 244 are in operation around the world, 213 with North American carriers. Only 89, less than half, operate on routes of up to two hours. The other 124 operate on longer missions, suggesting another possible replacement market for aircraft in the 70- to 110-seat jet category.

Only 29 CRJ-700s are allocated in Europe, where the majority of the aircraft fly a sector length between one hour and two hours. The CRJ700 series is virtually absent from other regions of the world. Of the global fleet of 244, 131 are being operated on sectors of more than two hours.

The E-170 and E-175 were introduced into service in the past year. There are now 97 aircraft in operation, the majority being E-170s. The E-170's biggest customers are USAirways Express, United Express, Swiss, LOT and Finnair. Only 19 E-175s have been ordered, by Air Canada and LOT.

A total of 75 of these two types operate in North America, 27 of which are used on routes less than two hours, and 48 on sectors of two to four hours. This clearly illustrates how the regional affiliates of United and USAirways are deploying the majority of their aircraft on longer routes than those selected for smaller RJs.

Another 20 aircraft are operated in Europe, but most of these are on routes of up to two hours.

This analysis gives an early indication of how the 70- to 110-seat jets might be deployed as their customers begin to take delivery of them in larger numbers. The use of the aircraft on longer routes indicates there is already a strong market for replacement of smaller RJs.

Network forecasting

The third possible market, as described, is deployment of these aircraft on routes not previously served by the operator or by any airline. Network forecasting is a technique used to predict potential passenger volumes on new services. "The route network is the 'heart' of an airline, and that is where the planning starts. Airlines try to take a macro view of their network. They take into account routes' different economic characteristics of their routes, new route opportunities and the development potential of connecting traffic," explains Ian Lowden, business development director at RGD. "They do this by using the most accurate market data available, usually Marketing Information Data Tapes (MIDT), to form a base and then project market size according to expected growth in consumer demand. They then use models to simulate market share based upon an operating schedule. The large network carriers have 'heuristic' models calibrated against historic market share data; while others have 'back of envelope' calculations that relate market share to capacity share. They then experiment with different schedules, aircraft type and number of aircraft. They may also throw in competitive reactions and different alliance or marketing partnerships. Also, the network planner has to think about slots, curfews, and

Schedule analysis reveals that out of the 1,340 50-seat RJs operating in North America, 458 are being deployed on routes with flight times of more than two hours. An additional number are being operated on shorter routes, but have very high load factors. Both groups of aircraft are candidates for replacement with 70- to 110-seat jets.

close liaison with their engineering and flight operations colleagues. The airline's aim is to reconcile the traffic opportunities with its aircraft size and fleet options."

While it has been suggested that 70- to 110-seat RJs could be acquired in large numbers to operate routes that have sufficient potential passenger volumes to justify two daily services, network forecasting will reveal how many of these routes potentially exist. A frequent criticism of the hub-and-spoke system in the US is that a large number of directly connected city-pairs are unserved, forcing passengers to use the less convenient services of flights that transit hubs.

North American market

APG analysed the North American market to examine the market potential for Embraer's 70- to 110-seat jets. This comes from three potential sources: upgrade of 50- and 70-seat RJs, to larger aircraft; the replacement of traditional mainline jet flying; and new market opportunities in operating unserved routes.

Evidence of the size of the North American market comes from a review of deployment of 70- to 110-seat Embraer aircraft in the short-term: this is the scheduled routings of E-170, E-175 and E-190 aircraft by their North American operators to fly in March 2006.

The routes that are scheduled to fly in March 2006 were analysed so as to categorise them into an upgrade of routes previously flown with RJs, the replacement of existing mainline jets in the 100- to 140-seat category, and new markets not previously flown.

The analysis derives load factors using data on passenger loads available from the US Department of Transport (DoT), showing all on-board statistics for all carriers in the US market, including passenger loads, seat capacities, and number of departures.

Based on this analysis, APG observed that for the schedules planned for March 2006, the E-170, E-175 and E-190 are being deployed on 113 routes. These will be operated with about 100 aircraft. These services can be categorised as follows:

Analysis of how 70- and 75-seat jets have been deployed in the US shows that about two-thirds are being utilised on routes with flight times of more than two hours.

- 21 markets, representing about 16 aircraft, were being served by RJs one year ago.
- 67 markets, or about 50 aircraft, were being served by mainline jets one year ago.
- Only 25 markets, or about 30 aircraft, are new markets to the airlines. Moreover, only 11 of these 25 markets are routes that are completely new to the industry.

This clearly shows that most deployments of 70- to 110-seat Embraer jets have replaced mainline jets or RJs in pre-existing markets. Of 113 markets and 100 aircraft, 88 of the markets and 66 of the aircraft are used in this way.

In the case of new markets, the first observation is that stage lengths tend to be longer than for RJs and average about three hours per flight. Moreover, nearly all these new markets are dedicated to further development of hubs or focus cities. At present it does not seem that these aircraft will be used for development of so called point-to-point markets, or routes not previously served.

APG conducted further analysis of the long-term market potential for 70- to 110-seat jets in the US, which reveals there are many potential future deployments of these aircraft.

- Analysis of current operations shows that 728 50 to 70-seat RJs that are used in the US are either operating on routes with block-times of more than 2.5 hours (where they have comfort issues), or US DoT data shows they are operating with load factors higher than 75%, and so are spilling demand. This spill will increase as markets grow over time. These 728 aircraft represent about half the current RJ deployments, and could therefore be replaced with the larger Embraer jets, or the Bombardier C series.
- The replacement of mainline jets is probably a smaller market, although this may depend on relative unit cost performance in consideration of regional versus mainline labour rates and other factors. US DoT data show that 338 mainline jets with 100 to 140 seats in US are either being



operated with load factors of less than 65%, or on stage lengths less than 1,600 miles.

- Examination of airline route networks, schedules and network forecasting analysis reveals that the potential for a large number of point-to-point services in the US is a myth. Nearly every sizeable city has a well-developed hub, and nearly all meaningful markets have non-stop services. There are only 78 markets in the US without non-stop service that have a potential direct service demand of more than 70 passengers per day (and a distance of less than 1,600 miles).

New markets will be developed, but there is limited evidence to suggest there are a large number of underserved point-to-point markets. New markets are more likely to take the form of development of existing hub or focus cities to include additional destinations. This is similar to Jet Blue's push to further develop its JFK hub. Air Canada has a strategy of using the new aircraft to further develop networks and add frequencies to other existing services.

APG's analysis of existing aircraft deployments shows there are more than 650 RJs being used on services lasting more than two hours. These are prime candidates for replacement with 70- to 110-seat jets, which is supported by the fact that two-thirds of E-170s and E-175s in North America are used on routes with flight times of more than two hours. The analysis also clearly shows that 65-70% of these aircraft have been used to replace RJs and mainline jets.

To summarise the analysis and OAG

data overall; there are a total of 1,080 aircraft that are either 50-seat RJs and CRJ-700s operated on routes with flight times of more than two hours, or are mainline jets operating with load factors less than 65%. The market for new routes is smaller, but may support another 200 aircraft. This totals about 1,300 aircraft.

Europe and Asia

In Europe, a market for 70- to 110-seat jets is also derived from replacing mainline jets. Finnair, which operates three E-170s, with a further nine on order, is using the aircraft for this purpose. "We first replaced MD-80s with A319s on the mainline routes, but the A319 is still too large on some sectors. We have therefore replaced some A319s with the smaller E-170s," says Colin Molloy, vice president of aircraft trading, at Finnair. "We now have a mixed fleet on our mainline operations, including the A319s and E-170s. The E-170 is not a regional jet, because it fills the same role as the A319 and the two fly on mainline routes."

Flybe, one of Europe's largest low fare airlines, confirmed an order for 14 E-195s, with an option on a further 12. "We recently undertook a fleet rationalisation plan within Flybe to ensure that we can sustain the huge growth we have had over the past two years," says David Attenburrow. "The E-195 will begin to replace our BAe 146s plus the three wetleased 737-300s from Astraes. The E-195's impressive performance includes 25% lower fuel burn, significantly lower maintenance costs, longer range, faster speed and a lower noise footprint than the BAe 146.



The E-195 therefore complements the unique Flybe low-cost regional airline business model. The E-195 will easily cover our longer services into Spain and Portugal. It also allows the company to assess the commercial viability of longer-range routes into Europe that had previously been inaccessible.”

In the Asia Pacific, where the regional markets are under-developed, the story is somewhat different from those in North America and Europe. The common characteristics of markets in the Asia Pacific are high demand, little service and several start-up airlines. Although the demand in these markets will be high, no one knows when the demand on a particular route will reach a level high enough to accommodate a mainline jet.

Start-up airlines are usually granted traffic rights to fly to secondary cities, which are under-served. The uncertainty of the demand implies great risk. The best policy for a start-up to minimise its risk is to start operations with RJs and change to larger jets as the market matures. Hong Kong Express is an example of an airline that has followed this policy. “According to the agreement reached by the Hong Kong civil aviation authority and the Civil Aviation Authority of China (CAAC), there are 30 routes that can be operated by two airlines,” says Andrew Tse, chief executive officer at Hong Kong Express. “We are going to fly ten of these routes, where Dragonair is already flying. Since we are a start-up, the demand is uncertain. We would like to fly with small aircraft as a first step to test the water and minimise risk. We can quickly increase frequencies using the E-170 as passenger traffic grows. Our target customers are business passengers, which require high-frequency service. We

provide flights early in the morning and late in the afternoon from Hong Kong to Hangzhou and Ningbo, which meets our target passengers’ demand. Our strategy seems successful. Growth rate on Hong Kong-Hangzhou is more than 30%.”

Momentum

There are three main reasons why the market for these 70- to 110-seat jets will emerge in the US, which is clearly the biggest potential market. The first reason is pilot union scope clauses. Mainline carriers introduced scope clauses to limit the number and size of jets allowed in the affiliates’ fleet plans. Scope clauses also put restrictions on the number of point-to-point services, the stage length of services, block hours to be flown, and the amount of hub-to-hub flying allowed by regional affiliates.

With many US major carriers in financial trouble, however, mainline pilot unions have begun to relax scope clauses in exchange for concessions from their airlines. Having reached agreement with its pilots unions, in September 2004 Air Canada confirmed a firm order for 15 50-seat CRJ200s, 15 75-seat CRJ705s and agreed ‘conditional orders’ for an additional 15 CRJ200s. The airline also firm up orders for 45 E-190s.

America West has managed to get flexibility in its pilot’s contract that allows use of CRJ-700s/-900s on medium-sized routes. The airline has been able to use these aircraft partially to replace mainline jets.

The second, and more prevailing stimulant for this demand is the development of regional airlines. US legacy carriers have restructured their relationships with their regional affiliates,

jetBlue has recently taken delivery of its first E-190s. The airline is using the aircraft on routes on the USA’s Eastern seaboard which are either underserved or are overpriced.

with regional airlines increasing the size of their route networks and operations.

In 2004 North American regional airlines’ available seat-mile (ASM) capacity was 96.9% higher compared to 2000. This growth is due to increases in average sector length. This is an indication that most of the routes transferred from the majors to the regionals were in the medium-haul class, and could be flown more efficiently by smaller RJs. Many of the shorter trip distance piston and turboprop flights have either been replaced by larger aircraft or discontinued altogether. Regional carriers were profitable in 2004, collectively reporting a net profit of \$433 million.

The development of networks to serve longer routes, the dropping of shorter routes, strong traffic growth and positive profit margins are all strong indicators that the potential for 70- to 110-set jets in the US is high.

A third indicator of a strong potential market is that following a low-cost strategy is likely to stimulate demand for these jets. jetBlue will explore the regional markets on the USA’s Eastern seaboard with its low-cost advantage, using the E-190. “We will continue to add E-190 markets from New York in addition to the services we have already started with the aircraft to Boston, Richmond and Austin. We select new routes where the market is under-served or overpriced. The A320 is too large on some potential routes, but the E-190 fits well. The trip cost is lower than the A320’s, so there is less risk for us to start a new route on the smaller aircraft. We use the E-190 to fly under-served routes where there is no non-stop service other than jetBlue,” says Adam Green, manager route planning, at JetBlue. “Although some legacy carriers are downsizing their fleets, we do not think they will constitute a substantial threat to us because of our unique low-cost structure. The E-190s have lower unit costs than 50-seat RJs, which make our services on these routes viable.”

Summary

APG’s analysis indicates the potential market for 70- to 110-seat jets is in excess of 1,300 aircraft. Realising this potential, however, depends on how easily major airlines can re-negotiate their scope clauses to allow these aircraft into their fleets. [AC](#)