

The number of 50+ seat regional aircraft in service has been increasing over the past decade. There has been particularly strong demand for 70+ seat turboprops and regional jets. Current market values and lease rates are discussed here along with potential future market trends.

Regional aircraft and engines; values, lease rates and market conditions

The worldwide fleet of regional aircraft has been expanding over the past decade. The number of in-service, regional aircraft with 50 or more seats has grown by nearly 40% since 2005.

The following analysis provides a summary of turboprop and regional jet (RJ) fleet developments and market trends from 2005 to 2015. It identifies current aircraft values and lease rates, along with engine values. Future market conditions are also considered.

Regional market trends

“There are clear indications that demand for regional aircraft has been growing over the past six to seven years,” claims Ameya Gore, assistant vice president of asset management at Acumen Aviation. “Major contributors to this increased demand include: economic growth following the 2009 recession; an increase in passenger traffic originating from clusters of secondary cities that surround major metropolitan cities; and an increased focus on fuel efficiency. Regional aircraft are also being used to cater for routes with thinner demand where their lower capacities are more suitable than the expanding seat numbers offered by narrowbody aircraft.”

The demand for different types of regional aircraft can vary by location. “Generally we have seen growth in all regions, but the strength of demand for different products has varied by region over time,” explains Mark Hughes, executive vice president of corporate finance at Falko Regional Aircraft Ltd. “For example, in the US we have seen significant demand in recent years to replace 50-seat aircraft with larger RJs. Emerging economies in Asia and South America have demonstrated strong

demand for large turboprops. North America and Europe remain the key markets for regional aircraft.”

“North America and Europe have been the hotbeds for RJs, accounting for almost 80% of the global fleet,” says Gore. “That dynamic is not expected to change drastically, but Asia and the Middle East are starting to show growth in demand.”

Capacity has also influenced demand trends in the regional aircraft market over the past 10 years. “Demand has been clearly biased towards larger turboprops and RJs to the detriment of smaller variants,” says Hughes.

Regional ownership trends

One significant development in the regional aircraft market in recent years is an increase in the number of aircraft owned by lessors.

Aircraft ownership

“The proportion of RJs in lessor portfolios has traditionally been small compared to narrowbody or widebody jets,” says Gore. “In recent years, however, the trend has changed, with more lessors adding RJs to their portfolios.”

“There has been a marked increase in interest from lessors,” explains Olga Razzhivina, senior ISTAT appraiser at Oriel. “While in the past only specialist lessors dealt with regional types, now even mainstream ones are interested.”

“Asset financiers have been struggling with competition in the mainstream narrowbody and widebody markets, so they have sought out other opportunities, including RJs and aircraft engines,” explains Gary Fitzgerald, managing director of aircraft finance boutique

Stratos. “In the past the regional market was more fragmented than it is today in terms of the number of aircraft types that were available. The market now appears to have condensed around some key products, including the Embraer E-Jets, ATR turboprops, and to a lesser extent the CRJ-900/1000. Operational consolidation is good for investors.

“The main driver for investors is the ‘economic triangle’ of upfront price, discounted lease cashflows, and residual value,” continues Fitzgerald. “Up-front pricing is known from day one, but only a portion of the lease cashflow is known at this stage and very little of the residual value is known. Predicting these values becomes the key driver for any decision to invest. What will the lease and sale market for a particular type look like in the future? How deep is the market? How liquid is the aircraft? In other words how transferable is it between new operators and jurisdictions? What are the replacement options? From what we have seen, the most investor-accepted regional aircraft are probably the E-Jets, in particular the E-190, and ATRs.”

Lessors have tended to show more interest in larger regional aircraft, especially larger RJs. “Most investors come to the regional sector from the larger narrowbody or widebody aircraft side, driven by increased competition in their original area,” explains Razzhivina. “They gravitate towards larger regional assets as these are more familiar and offer a larger unit price. Usual measures like fleet size and concentration are also important for investors.”

The proportion of regional aircraft on operating lease remains low, despite increased interest from investors. “The percentage of regional aircraft on lease is smaller,” says Razzhivina. “There are several reasons for this. There are a

The number of 70-seat turboprops in service nearly trebled between 2005 and 2015. These aircraft have benefitted from high fuel prices as operators favoured them over less efficient RJs. This market segment is dominated by the ATR72 and Q400.

smaller number of lessors in the regional segment and many of the US regional feeder airlines took RJs on financial leases or via enhanced equipment trust certificates (EETCs). Regional aircraft also have lower ownership costs, which could make them more accessible for outright purchase by operators.”

Acumen believes the number of regional aircraft on operating lease will increase. “We expect that this will rise in coming years,” says Gore. “Airlines are realising the cost burden of aircraft at the end of their life cycles. Also, rapidly evolving technology is providing more and better aircraft options to choose from. The operating lease structure allows airlines to keep operating costs low and the fleet young.”

“Lease terms for new regional aircraft are typically in the 8-10-year range, with some going to 12 years,” explains Hughes. “This is not too different from narrowbodies. In the used market, average lease terms are probably a little shorter than the narrowbody market at about five years.”

Engine ownership

“Regional aircraft engine leasing has been steady and growing for the last decade,” claims Rob Fessler, executive vice president of sales and marketing at Magellan Aviation Group.

“As the number of regional aircraft in service has increased, so has the need to support operators when engines need maintenance,” says Dave Desaulniers, vice president of regional engines at Willis Lease Finance. “We provide engine leases to aircraft lessors, maintenance, repair and overhaul (MRO) organisations, original equipment manufacturers (OEMs) and directly to operators. Many regional operators do not want to tie up capital with owned spares, so lessors can offer cost-effective solutions. The growth in the regional aircraft fleet, access to low-cost capital, and the resulting good returns have fuelled investors’ increased interest in regional engines.”

Investor demand varies by engine type. “Investor appeal is always based on residual values and marketability,” explains Joseph O’Brien, executive vice president of sales at Engine Lease Finance Corporation. “Aircraft with the widest possible mission range and the largest user bases are the most attractive.”



“Larger regional engines, like the CF34-10, have primarily followed a buy-and-hold investment strategy, similar to narrowbody engines,” explains Desaulniers. “These investors are seeking good returns and long-term asset value retention. Due to their lower entry cost, CF34-8s have a mixture of buy-and-hold investors, as well as opportunistic investors focusing on asset turnover. Investors in turboprop engines have long-term interest, but individual assets move in and out of the portfolio quickly, since leasing is primarily short-term and there is a high frequency of shop visits compared to turbofan engines.”

Despite increased interest from investors, regional aircraft engine leasing remains a relatively specialised market.

“More investors have entered the market as the industry in general has attracted new players and capital, but regional engine leasing remains a niche market with nuances that are not commonly understood by, or of interest to, other investors,” says Fessler.

“In terms of RJ engines, the segment is rather small and dominated by General Electric (GE),” says O’Brien. “The RJ fleets are concentrated so the user base is not as large as you may think. Residual values are less robust than for narrowbody engines.”

Typical engine lease terms may vary by aircraft platform. “RJ engines can have similar lease terms to those of narrowbody aircraft,” says Desaulniers. “Leases can be as short as 30 days or up to 10 years or more. Long-term leases with turboprop engines do occur, but most leases are short term.”

Most regional aircraft are supported by a single engine family. “Regional

aircraft are too small, relatively cheap and have production rates that are too low to warrant engine competition,” says Razzhivina. “The chance to obtain 50% of the engine market for a relatively small fleet would not justify the research and development costs incurred by the engine manufacturer. The lack of engine options supports regional aircraft values since it prevents fragmentation of the fleet.”

Aircraft trends

The following analysis splits the regional aircraft fleet into turboprop and RJ categories to provide a focused review of market demand and value trends.

Where possible, current market values (CMVs) and lease rates have been identified for eight-year-old aircraft in half-life maintenance condition with half-life engines, since this is the earliest age at which regional aircraft are likely to be returned from an initial lease and become available on the used market.

The analysis has sought to identify the CMVs and lease rates for some of the most popular variants of each aircraft type. This includes some of the most common combinations of maximum take-off weight (MTOW) and engine variants. Other MTOW and engine variant combinations could be available.

Turboprop trends

The turboprop fleet is sub-categorised into 50- and 70-seat aircraft. In 2005 50-seat aircraft accounted for two-thirds of the combined 50- and 70-seat turboprop fleet (see table, page 10). By the end of 2015 this trend had reversed in favour of 70-seat turboprops.

REGIONAL AIRCRAFT FLEET TRENDS 2005 - 2015

Aircraft type	In-service			Stored		
	2005	2010	2015	2005	2010	2015
50-Seat turboprop	725	622	522	128	138	147
70-seat turboprop	372	698	1,073	51	66	93
50-seat RJ	1,519	1,453	1,082	67	174	390
70-90-seat RJ	481	931	1,217	79	67	45
90+ seat RJ	428	702	991	138	157	157
Total	3,525	4,406	4,885	463	602	832

50-seat turboprop

The number of in-service 50-seat turboprops declined from 725 in 2005 to 522 in 2015 (see table, this page).

This segment is currently dominated by variants of the ATR42 (202) and Dash 8-300 or Q300 (181). Both types can accommodate up to a maximum of 50 seats in a single-class configuration.

The ATR42 fleet includes 100 -500 series, 80 -300 series, 21 -600 series and one -400 series aircraft. The Dash 8-300 fleet includes 86 Dash 8-311 series, 45 -315/B series, 32 -314/A series and 18 -301 series aircraft.

The largest ATR42 operators are Aeromar Airlines (14), HOP! (13), and Satena (12). The largest Dash 8-300 operators are Jazz (28), Air Nelson (23) and Eastern Australia Airlines (16).

Other in-service 50-seat turboprops include the Fokker 50 (87) and Saab 2000 (34).

“We do not foresee a lot of potential for 50-seat turboprops,” says Gore. “As traffic demands increase, seat capacity will need to increase proportionally.”

“Production rates of new 50-seat turboprops have virtually ceased, with the ATR42-600 now the only in-production aircraft,” explains Hughes. “Many operators view this aircraft as too sophisticated and expensive, so there has been almost no new supply, and operators are having to manage with an ageing fleet. Demand has remained firm and with limited supply this has created a strong market, particularly for the out-of-production Dash 8.

The age profile of the ATR42 fleet ranges from new -600 models to 30-year-old -300 series aircraft. The ATR42-500 fleet age profile ranges from three to 21 years. The Dash 8-300 fleet has an age profile ranging from six-year-old -311 series aircraft to 27-year-old -301 series airframes.

According to Oriel, the CMV for an eight-year-old ATR42-500 in half-life maintenance condition with half-life engines is \$9.55 million (see table, page 12). The aircraft would have an estimated monthly lease rate of \$85,000, compared

to a market value of \$9.05 million and monthly lease rate of \$90,000 for a similar vintage Dash 8-311.

The ATR42-600 is still relatively new. The oldest active aircraft is three years old; it is unlikely any will become available soon on the used market.

Gore says that lease rates for ATR42-500s could be in the \$75,000-130,000 range, depending on age and condition. This compares to \$145,000-160,000 for an ATR42-600 and \$60,000-95,000 for a Dash 8-300. He maintains that Fokker 50 monthly lease rates could be as low as \$27,000-37,000. The youngest Fokker 50s are already older than 18 years.

Despite current trends favouring 70-seat turboprops, there is a belief that demand will remain for 50-seat aircraft in the future. “50-seat turboprops are a niche product, but I believe they are an important niche that cannot be ignored by the manufacturers,” says Fitzgerald.

The 50-seat turboprop order backlog consists of 39 ATR42-600s.

“In the coming years the ATR42-600 will be the only viable product operated and owned in this segment,” claims Gore. “This will predominantly be with niche operators in geographic locations suited to the aircraft. 50-seat turboprops have been predominant in regions like the Indonesian islands and certain inland parts of Europe and North America, since they are very adaptable to high temperatures and altitude operations.”

“Future demand will be focused on larger 70-seat turboprops,” says Hughes. “There will still be a need for 50-seaters, but given very low production rates, operators are likely to gauge up to 70-seat aircraft when older 50-seaters need replacing. We expect most operators to be keen to keep the 50-seat turboprops they have. Demand should subsequently remain firm for aircraft coming on the market. This should see values and lease rates remaining firm, but as operators switch types, values will erode.”

Oriel estimates that an eight-year old ATR42-600 in a half-life maintenance condition with half-life engines will have a market value of \$8.54 million in 2020.

70+ seat turboprop

The number of 70-seat turboprops in service increased from 372 in 2005 to 1,073 in 2015. For the past decade this market has been dominated by the ATR72 and Q400.

The ATR72 typically seats 68-74 passengers in a single-class configuration. In December 2015 ATR announced that it had received certification for a high-density 78-seat configuration for the ATR72-600. The Q400 typically accommodates 70-78 seats in a single-class arrangement. In 2014 Bombardier launched an extra-capacity configuration of the Q400 that holds up to 86 seats.

There are currently 613 ATR72s and 455 Q400s in service. The ATR72 fleet includes 248 of the latest -600 series aircraft. The rest of the fleet comprises 312 -500 series, 32 -200 series and 21 -210 series aircraft.

The largest ATR72-500 operators are Wings Air (20), Jet Airways (15) and UTair (15). The largest ATR72-600 operators are Azul (49), Wings Air (28) and UNI Air (13). Horizon Air (52), Flybe (48) and Sunstate Airlines (31) are the largest Q400 operators.

“Ten years ago it looked like the large turboprops had lost out to RJs with orders and production numbers falling,” says Hughes. “Rising fuel prices and good basic operating economics, however, have brought the turboprops back into demand. The reduced supply of 70-seat turboprops in previous years resulted in strong market demand through 2015. Demand has been rising, but production rates have also increased to meet this.”

The ATR72's age profile varies from new ATR72-600s to 26-year-old ATR72-200s. The ATR72-500 is the most likely variant to be traded on the secondary market in the near term, with a fleet age profile ranging from three to 20 years. The age of the Q400 fleet ranges from new aircraft to 17-year-old examples.

The CMV for an eight-year-old ATR72-500 in half-life maintenance condition with half-life engines is estimated to be \$9.9 million (see table,

page 12). This aircraft would have lease rates of \$95,000 per month, compared to a CMV of \$11.75 million and lease rates of \$125,000 for a similar vintage Q400. The youngest ATR72-600s are still only four years old, so it is unlikely that any used ones will be traded in the next several years.

Gore at Acumen says that monthly lease rentals for ATR72-500s can range from \$70,000 to \$150,000, depending on age and condition, while a Q400 is in the \$100,000-195,000 range.

The 70-seat turboprop order backlog includes 35 Q400s and 263 ATR72-600s, five of which are for the combi variant.

“Demand for 70-seat turboprops remains firm, but many operators have completed their ATR72 fleet renewals. This has left weaker demand for new aircraft at a time when production rates are at their highest,” explains Hughes. “Many lessors are sitting on 2016/17 delivery positions without a committed customer. In the short term this is affecting values and pricing on the ATR72-600 market, but also filtering through to the younger, used ATR72-500 market where both values and lease rates are softening. Demand for Q400s is more in balance.”

Acumen believes that lease rates for large turboprops will decline. “Lease

rates are expected to fall by the end of the decade as the E-Jets E2, C Series and MRJ aircraft enter the market from 2017 onwards,” claims Gore.

Oriel estimates that an eight-year-old ATR72-600 will have a market value of \$10.72 million in 2020, compared to \$10.6 million for a Q400 (see table, page 12).

Turboprop engines

Some of the main turboprop engine variants and their CMVs in half-life maintenance condition have been summarised (see table, page 14).

The PW123E is used on one-third of the active Dash 8-300 fleet, while the PW127B is operated on later high-performance models of the Fokker 50. The PW127E equips a large number of the ATR42-500 fleet, while the PW127F is applicable to both the ATR42 and ATR72-500. The PW127M is used on ATR42 and ATR72-500 and -600 series aircraft, and the PW150A is the sole engine option for the Q400.

Values range from \$1 million for a PW123E to \$2 million for a PW150A (see table, page 14).

Willis Lease reports that there has been cyclical demand, steady engine values and minor pressure on rental rates

for the PW127E, PW127F and PW127M. It claims demand has been strong for the PW123E, with steady engine values and consistent lease rates. Willis Lease reports cyclical demand, steady engine values and cyclical rental rates for the PW150A.

“Willis Lease expects lower demand for the PW127E/F through 2020, along with engines offered on ATR42-300s and ATR72-200s,” explains Desaulniers. “The PW127M will lead the PW100 segment with the growing number of ATR72-600s in service. PW150A demand will continue to be cyclical with Q400 production rates limited.”

Regional Jet trends

The RJ fleet is sub-categorised into 50-seat, 70-90-seat and 90-plus seat aircraft. There has been a shift towards larger aircraft in the RJ market. In 2005, 50-seat RJs accounted for more than 60% of all in-service RJs with 50 or more seats, but by the end of 2015 they accounted for just one third of the fleet. The number of in-service 70-90- and 90-plus seat RJs has grown significantly.

50-seat RJs

The number of in-service 50-seat RJs decreased from 1,519 in 2005 to 1,082 in

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REGIONAL AIRCRAFT USED VALUES BASED ON EIGHT-YEAR-OLD AIRCRAFT

Aircraft Type	MTOW (lbs)	Engine	Market Value (\$-m) 2015	2020	Lease rate (\$-m) 2015
50-seat turboprop					
ATR42-500	41,005	PW127E	9.55	N/A	0.085
ATR42-600	41,005	PW127M	N/A	8.54	N/A
Dash 8-311	42,990	PW123E	9.05	N/A	0.090
70-seat turboprop					
ATR72-500	49,603	PW127F	9.90	N/A	0.095
ATR72-600	50,705	PW127M	N/A	10.72	N/A
Q400	63,930	PW150A	11.75	10.60	0.125
50-seat RJ					
CRJ-200LR	53,000	CF34-3B1	N/A	N/A	N/A
ERJ-145LR	48,502	AE3007 A1	3.50	N/A	0.055
70-90-seat RJ					
CRJ-701ER	75,000	CF34-8C1	11.25	N/A	0.125
CRJ-702ER	75,000	CF34-8C5B1	N/A	9.44	N/A
CRJ-900ER	82,500	CF34-8C5	13.00	10.78	0.155
CRJ-900LR	84,500	CF34-8C5	N/A	10.82	N/A
E-170LR	82,012	CF34-8E5A1	13.00	N/A	0.155
E-170LR	82,012	CF34-8E5	12.86	11.53	0.155
E-175LR	85,517	CF34-8E5	15.00	13.20	0.165
90+ seat RJ					
SSJ100-95	101,150	SaM146 1s17	N/A	6.23	N/A
CRJ-1000ER	91,800	CF34-8C5A1	N/A	11.47	N/A
E-190AR	114,199	CF34-10E6	18.95	16.41	0.185
E-195LR	108,024	CF34-10E7	17.50	16.38	0.190
E-195LR	111,973	CF34-10E5A1	N/A	15.79	N/A
E-195AR	115,280	CF34-10E7	18.20	16.89	0.190

Source: Oriel

Oriel current market values and future base values, assuming 1.5% inflation. All values are for aircraft in half-life maintenance condition with half-life engines. N/A - indicates values not available due to fleet age profile. The fleet is either too old or too young to provide a value for an eight-year-old aircraft.

2015 (see table, page 10). During the same period the number of parked aircraft increased from 67 to 390.

This segment has been dominated by the CRJ-100/-200 and ERJ-145 aircraft families. Both typically accommodate 50-seats in a single-class configuration. There are currently 554 CRJ-100/-200s and 528 ERJ-145s in service.

Both of these aircraft families include a number of different variants. There are only 38 active CRJ-100s. The most popular active CRJ-200 variants are the CRJ-200LR (340) and the CRJ-200ER (168). The most popular ERJ-145 variant is the ERJ-145LR (309).

Many of these aircraft are flown by regional operators in the US. They operate regional feeder services on behalf of major carriers, linking secondary cities with hub airports under capacity purchase agreements (CPAs). The largest operators of active CRJ-200s are SkyWest Airlines (158), ExpressJet Airlines (72) and Air Wisconsin (71). The largest ERJ-145 operators are ExpressJet (182), Envoy (86) and Trans States Airlines (59).

“Demand for 50-seat RJs fell steadily

over the past decade,” says Hughes. “This was initially driven by high fuel prices, but was exacerbated by loosening of scope clause limitations in the US.”

The size and number of regional aircraft operated under CPAs with major US airlines can be restricted by scope clause provisions that provide some job security for mainline airline pilots. In the past, scope provisions limited the capacity of aircraft operating under CPAs to 50-seats. More recently these have been relaxed to allow the use of RJs with up to 76 seats. This has contributed to the reduction in active 50-seat RJs and increased demand for 70-90-seat types.

“The recent fall in fuel prices has led to some recovery for 50-seat RJs, but pilot shortages at US regional carriers have prevented full use of all available aircraft, partly because resources are being focused on larger RJs,” he explains.

“Values for 50-seat RJs have been in free-fall in recent years with very few buyers and many sellers,” continues Hughes. “There has also been strong competition among lessors, which has kept pressure on lease rates. ERJ aircraft

values have probably been hit harder, since most of the AE3007 engines for this fleet are enrolled in Rolls-Royce’s TotalCare programme, limiting the ability to part out the aircraft to underpin the market value.”

The age profile of the ERJ-145 fleet ranges from four to 19 years. There are few aircraft less than eight years old, and most of these are the LI variant which are only certified for operation in China. These aircraft may have different market values to the rest of the fleet. The age profile of the CRJ-100/-200 fleet ranges from nine to 23 years.

Oriel estimates that an eight-year-old ERJ-145LR in half-life maintenance condition with half-life engines would have a CMV of \$3.50 million and a monthly lease rate of \$55,000 (see table, this page); while the youngest available CRJ-200LR would have a CMV of \$2.95 million and a monthly rate of \$60,000.

“Industry statistics indicate a very comparable current lease rate of \$27,000-\$55,000 per month for CRJ-200s and ERJ-145s,” claims Gore. This means it is possible to lease 50-seat RJs at cheaper

rates than some 50-seat turboprops.

“Demand will continue to fall as US major carriers focus on larger aircraft for regional feeder services,” says Hughes. “There will be a natural plateau where routes are still flown by 50-seat RJs because this capacity best fits passenger demand. There is a long-term demand for some 50-seat RJs, but this will be much smaller than the numbers produced. The most sought-after aircraft will be the youngest, with the highest specifications and best maintenance condition.”

There are no 50-seat RJs on order.

70-to 90-seat RJs

The number of in-service 70- to 90-seat RJs increased from 481 to 1,217 from 2005 to 2015 (see table, page 10).

This category is broadly split between two closely matched groups of aircraft with similar capacities. The E-170 and CRJ-700 offer 66-78 seats, depending on configuration. The E-175 and CRJ-900 offer 76-90 seats.

The most popular types in this category are the CRJ-900 (353) and E-175 (322), followed by the lower-capacity CRJ-700 (315) and E-170 (180). There are several different variants for each of these types. The most common CRJ-900s are the CRJ-900ER (186) and CRJ-

900LR (117).

The most popular E-175 variants are the E-175LR Enhanced (147) and E-175LR (143). The CRJ-701ER (184) and E-170LR (58) account for the most active aircraft by variant in those two aircraft series. The combined fleet of CRJ-900s, E-175s, CRJ-700s and E-170s accounts for 96% of the in-service 70-90-seat RJ fleet. The remainder consists of a small number of Fokker 70s (39), BAe 146-100s (6) and Fokker 28s (2).

The largest operators of 70-90-seat RJs are SkyWest (180), Republic Airlines (127) and Mesa Airlines (114). The 10 largest operators are all US regional airlines. Between them they operate 844 70-90-seat RJs. This means that nearly 70% of the fleet is being used to operate regional feeder services for major US carriers under CPAs. The E-175 and CRJ-900 are proving particularly popular under the relaxed scope provisions, with both aircraft being operated with two-class 76-seat configurations.

“The 70-90-seat RJ market has probably been the best performing RJ segment in the last decade, with the E-170, E-175, CRJ-700 and CRJ-900 all benefiting,” says Hughes. “This is the result of: airlines upsizing from smaller aircraft; major airlines rightsizing with large RJs complementing narrowbodies

on off-peak or lower-demand sectors; scope clause changes; and replacement of ageing aircraft.

“Scope clause relaxation has been the main driver for demand for E-175 and CRJ-900 aircraft that ideally suit 76-seat operations,” adds Hughes. “The success of other products has been driven from outside the US.”

“The growth in post-2009 recession passenger demand combined with the relaxation of scope clauses in the US has been instrumental in spiked demand for RJs with 70 or more seats,” says Amit Kumar Tyagi, chief technical officer and appraiser candidate at Acumen Aviation.

“Good general demand has allowed Embraer and Bombardier to maintain new aircraft pricing for the E-170, E-175, CRJ-700 and CRJ-900, with lease rates for new aircraft also remaining firm,” claims Hughes. “We are only now seeing a secondary market develop for these aircraft, where initial indications suggest values and lease rates will need to fall from the book values that many operators carry on their balance sheets.”

The CRJ-900 fleet age profile ranges from new aircraft to 12-year-old airframes. The E-175 fleet ranges from new to 10-year-old aircraft.

Oriel estimates a CMV of \$13 million for an eight-year-old CRJ-900ER with a

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REGIONAL AIRCRAFT ENGINE VALUES - HALF-LIFE CONDITION

Engine	Aircraft	2015 Market value (\$-m)
Turboprop		
PW123E	Dash 8-300	1.00
PW127B	Fokker 50	1.10
PW127E	ATR 42-500	1.10
PW127F	ATR 42/72-500	1.25
PW127M	ATR 42/72-500 & -600	1.40
PW150A	Q400	2.00
RJ		
Tay 650-15	Fokker 100	0.90
AE3007A1	ERJ 145	2.00
CF34-3B1	CRJ-100/-200	1.30
CF34-8C1	CRJ-700	3.00
CF34-8C5	CRJ-700/-900	3.70
CF34-8C5B1	CRJ-700	3.40
CF34-8C5A1	CRJ-900/-1000	3.80
CF34-8E5	E-170/-175	3.80
CF34-8E5A1	E-170/-175	4.00
CF34-10E5A1	E-190/-195	6.40
CF34-10E6	E-190/-195	6.00
CF34-10E7	E-190/-195	7.00
SalM1461S17	SSJ100-95	3.00

Source: Oriel

monthly lease rate of \$155,000 (see table, page 12). This compares to a CMV of \$15 million and lease rates of \$165,000 per month for an E-175LR.

The CRJ-700 fleet age profile ranges from new to 16-year-old aircraft. This compares to the E-170 fleet with an age range of new to 13-year-old aircraft. The CMV for an eight-year-old CRJ-701ER is estimated to be \$11.25 million with a lease rate of \$125,000 per month (see table, page 12). This compares to a CMV of \$12.86-13.0 million and a lease rate of \$155,000 per month for an E-170LR. In contrast, Oriel estimates that the youngest available Fokker 70, which offers similar capacity to the CRJ-700 and E-170, would have a CMV of just \$2 million and a lease rate of \$40,000 per month. The youngest Fokker 70 in service is already more than 18-years-old.

Tyagi says that lease rates for CRJ-700s range from \$90,000 to \$200,000, depending on age and maintenance condition. He adds that monthly lease rates for E-170s and E-175s can range from \$110,000 to \$245,000.

There are 547 70-to 90-seat RJs on order. This includes variants of the CRJ-700 (10), E-170 (3), CRJ-900 (36), and E-175 (175). There are also a number of new types on order including the E-175 E2 (100) and the MRJ90 (223).

“Future demand in the 70-90-seat RJ

market remains uncertain,” says Hughes. “US carriers have placed sufficient orders to maintain demand for new aircraft in the short-to-medium term, but with Bombardier shifting focus to the C Series and Embraer’s E-Jets E2 family more focused towards 90-plus seats, there could be further fleet changes and shifts in demand by operators.”

By 2020 it is estimated that the market value for a typical eight-year-old CRJ-900 will be \$10.78 million for a CRJ-900ER and \$10.82 million for a CRJ-900LR (see table, page 12). This compares to an estimated value of \$13.2 million for an E-175LR.

In the lower-capacity range an eight-year-old CRJ-702ER will have a market value of \$9.44 million in 2020, compared to \$11.53 million for an E-170LR (see table, page 12).

90-plus seat RJs

The fleet of in-service 90-plus seat RJs has more than doubled from 428 aircraft in 2005 to 991 in 2015 (see table, page 10).

There is a slight variation in capacity in this segment. The most popular type is the E-190 (497) which accounts for half of the in-service fleet of 90-plus seat RJs. The most popular in-service E-190 variants are the E-190AR (255) and the

E-190LR (184).

The E-190 typically accommodates 96-114 seats, depending on configuration. In terms of capacity, the closest in-production competition is provided by the SSJ100-95 with 87-108 seats, and the CRJ-1000 with 97-104 seats. There are currently 54 SSJ100-95s and 43 CRJ-1000s in-service. There are also a number of older out-of-production RJs with similar capacity options to the E-190, including the Fokker 100 (118), Avro RJ85 (50) and BAe146-200 (21).

Following the E-190 the next most popular 90-plus seat RJ is the E-195. There are currently 139 E-195s in service. The largest member of the E-Jet family can typically accommodate 100-124 seats. In terms of capacity its closest competition, discounting small narrowbodies, comes from the Avro RJ100 (53) and BAe146-300 (16), which accommodate 112 seats in single class, but are both out of production. The most popular in-service variants of the E-195 are the E-195AR (72) and E-190LR (66).

The largest in-service fleets of 90-plus seat RJs are operated by Azul (87), jetBlue Airways (60) and Tianjin Airlines (45). Azul has the largest global fleet of E-195s (65) but also operates E-190s (22). jetBlue and Tianjin also operate E-190s.

“The 90-plus seat RJ is a unique product that has evolved as a result of increasing demand on regional routes and the shifting interest of the market towards larger narrowbody aircraft,” says Tyagi. “There has been demand to fill the void created by the phasing-out of 737-300/-400/-500s, between 70-seat RJs and 150-plus-seat A320 and 737 Next Generation (NG) series aircraft.”

The age profile of the E-190 fleet ranges from new to 10-year-old aircraft. Oriel estimates that the CMV for an eight-year-old E-190AR is \$18.95 million with lease rates of \$185,000 per month (see table, page 12).

The oldest SSJ100-95s and CRJ-1000s are only five- and six-years-old, so it will probably be a few years until they become available in any significant numbers on the secondary market.

Older out-of-production types in the E-190’s immediate capacity range have considerably lower CMVs and lease rates. According to Oriel, the youngest available RJ85s and Fokker 100s would have respective CMVs of \$2.75 million and \$2.25 million and lease rentals of \$55,000 and \$50,000 per month. Fleet data suggest that the youngest RJ85 and Fokker 100 aircraft in-service are more than 13 and 19-years-old respectively.

The age profile of the E-195 fleet ranges from new to nine-year-old aircraft. The CMV for an eight-year-old E-195 could range from \$17.5 million for an E-195LR to \$18.2 million for an E-195AR (see table, page 12). Lease rates would be

The 70- to 90-seat RJ market has seen some of the strongest growth over the past 10 years. Aircraft including the CRJ-900 and E-175 have proven popular with US regional carriers. The growth in this market corresponds with a relaxation in the size of aircraft that can be operated on behalf of major US airlines. Many now permit the operation of RJs with up to 76 seats.

\$190,000 per month for both variants. In comparison, Oriel estimates that the youngest available RJ100 would have a CMV of \$3.5 million and lease rates of \$70,000 per month.

“For several years values and lease rates for used E-195s have been soft,” says Hughes. “Operators like Flybe have found it difficult to exit E-195s due to very limited secondary market demand.”

“The E-190 and E-195 have been the most popular 90-plus seat RJs and have commanded the highest lease rentals,” says Tyagi. “In contrast, demand and lease rental values are extremely low for the Fokker 100. The SSJ100-95 has secured orders and has a significant order backlog, suggesting a potential for future lease transactions as deliveries start.”

“The 90-plus seat RJ market is an uncertain segment,” says Hughes. “We have a range of new technology products coming, including the CS100, E-190-E2 and E-195-E2, as well as attractively priced small narrowbodies, such as the A319, which offer very competitive economics on a cost-per-seat basis. As airlines have generally been up-gauging aircraft size on renewal, we expect there to be a continuing demand in this sector.”

There are 350 90-plus seat RJs on order, including 20 CRJ-1000s, 76 SSJ100-95s, 66 E-190s, 77 E-190-E2s, 21 E-195s and 90 E-195-E2s. The CS100 might also compete in this 90-plus seat sector, although Bombardier refers to it as a single-aisle aircraft rather than an RJ. The CS100 will have a capacity of 108-133 seats, depending on configuration. There are 48 CS100s on order.

By 2020 it is estimated that the CMV for a typical eight-year-old E-190AR will be \$16.41 million (see table, page 12). This compares to a CMV of \$11.47 million for a CRJ-1000 and \$6.23 million for an SSJ100-95. Estimated 2020 values for a used E-195 are \$15.79-16.89 million, depending on variant and specifications.

RJ engines

Some engine variants and their CMVs in half-life maintenance condition have been summarised (see table, page 14).

Values range from \$900,000 for a Tay 650-15 to \$7.0 million for a CF34-10E7 (see table, page 14).



About 70% of in-service RJs with 50-plus seats are powered by engines from General Electric's CF34 family.

The CF34-3 series powers the CRJ-100/-200 fleet. The CF34-3B1 is the most common variant and equips the entire CRJ-200 fleet. “Demand for the CF34-3B1 has been very cyclical over the past 10 years, resulting in lower values and cyclical lease rates,” claims Desaulniers.

The CF34-8C series powers Bombardier's CRJ-700, CRJ-900 and CRJ-1000 aircraft. It includes the CF34-8C5, which equips 40 CRJ-700s and 322 CRJ-900s; the CF34-8C1, which equips 143 CRJ-700s; the CF34-8C5B1, which powers 132 CRJ-700s; and the CF34-8C5A1, which equips 43 CRJ-1000s and 31 CRJ-900s. “Demand for the CF34-8C5 and -8C5B1 is primarily for short-term leases while there have been some long-term lease opportunities,” explains Desaulniers. “Demand for these two variants has been cyclical and has primarily come from the US. There has been a minor drop in values due to the limited potential for lease transactions, but lease rates have remained consistent.”

The CF34-8E series powers Embraer's E-170 and E-175 aircraft, and includes the CF34-8E5 that currently equips 152 E-170s and 309 E-175s, and the CF34-8E5A1 that is operating on 28 E-170s and 13 E-175s. “Demand for the CF34-8E5 and -8E5A1 has been low over the past 10 years,” reports Desaulniers.

“Market values have remained consistent, especially following the recent surge in E-175 orders in the US and lease rates have been higher than for the CF34-8C5.”

The CF34-10 series equips E-190 and

E-195 aircraft. The active E-190 fleet features 183 aircraft with CF34-10E6 engines; 167 with the CF34-10E5; 99 with the CF34-10E5A1; 27 with the CF34-10E7; and 21 with the CF34-10E6A1. The E-195 fleet features 74 aircraft with CF34-10E7 engines; 30 with CF34-10E5A1s; and 21 with CF34-10E5s. The remaining aircraft are equipped with CF34-10E6 and -10E6A1 engines. “Demand for the CF34-10 has been moderate, with values remaining stable,” explains Desaulniers. “There has been an upward trend in lease rates.”

Other active engine families in the RJ market include Rolls-Royce's AE3007, that equips the entire ERJ-145 fleet; Rolls-Royce Tay 650, that powers the Fokker 100; and the PowerJet SaM146, that equips the SSJ100-95. The most common in-service variants of these engine families are the AE3007 A1, Tay 650-115 and SaM146 1S17.

The AE3007 A1 has seen low demand and low fixed rental rates in recent years.

“In the next five years, 50-seat RJ engines will continue to lose value,” suggests Desaulniers. “Demand for CF34-3B1s will be opportunistic. Investments and leasing of CF-8C5 engines will also be opportunistic. CF34-8E5 engines may see increased sale and leaseback interest, since the E-175 E2 is not due to enter service until 2020. Short-term lease placements will be sporadic, however, since the market is focused on the US following recent E-175 orders.” **AC**

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