

The size of the global widebody fleet has increased by more than one-third over the past 10 years. Twin-engined aircraft have seen the most demand. Current market values, lease rates and potential future market trends are discussed here.

Value and lease rate trends for used widebodies

The in-service fleet of passenger-configured widebodies has grown by 38% over the past 10 years. *Aircraft Commerce* has analysed widebody fleet developments and market trends from 2006 to 2016. Aircraft market values and lease rates are identified here. Engine values and potential future aircraft value trends are also considered.

Widebody market trends

Demand for widebody aircraft has fluctuated over the past 10 years.

“From 2006 to 2007, demand for widebody aircraft was on the rise,” explains Olga Razzhivina, senior ISTAT appraiser at Oriel. “Even the economic downturn in 2008/09 did not affect widebody demand to the same extent as it did for narrowbodies. Widebody demand has, however, been declining since mid-2015 due to different factors. This includes airlines fine-tuning capacity. An increased number of aircraft types and variants has allowed capacity to be more closely matched to demand.

“The demand for used widebody aircraft has been affected by traditional used-equipment operators changing strategy,” continues Razzhivina. “Airlines that would have previously provided a home for used widebodies are now ordering new aircraft, partly through export credit agencies (ECAs).”

Another trend is the increasing use of large twin-engine types on long-haul services. “Advances in engine, structures and wing technology mean that twin-engine aircraft now offer almost as much range as four-engine types, but with lower maintenance costs,” says Phil Seymour, chief executive officer and ISTAT certified appraiser at the International Bureau of Aviation (IBA). “The 777, A330 and latterly the A350 and 777X have seen strong demand to replace four-engine aircraft and account for growth. A380 and 747 sales have

been disappointing for the manufacturers and their long-term futures look poor.

“The availability of used twin-engine types, such as 777-200s, 777-200ERs, A330-200s and A330-300s, has led to long-term storage for some four-engined aircraft that are only 10-12 years old,” adds Seymour.

Aircraft ownership

“Some airlines have a 50/50 policy when it comes to the percentage of widebody aircraft they own or lease,” says Mark Lapidus, chief executive officer at widebody operating lessor Amedeo. “Others, such as Lufthansa, have a policy where they own most of their fleet. Some carriers will lease aircraft on a short-term or wet-lease basis to add capacity.”

“Fewer widebody than narrowbody aircraft are on operating lease,” says Amit Tyagi, chief technical officer at Acumen Aviation.

“A sample of the most popular widebody passenger models reveals that about 35% are on operating lease, compared to 50% of the most popular narrowbody types,” claims Jonathan McDonald, senior aviation analyst and ISTAT certified appraiser at IBA.

There are a number of factors that can make widebody aircraft less attractive to investors than narrowbodies.

“There are simply fewer widebodies than narrowbodies,” says Razzhivina. “The widebody market is also more segmented in terms of the number of sizes and variants available. The availability of multiple engine types on many models further increases market fragmentation.” This can make it harder to place used aircraft, so widebodies represent a higher residual value risk than narrowbodies.

“The greater popularity of narrowbodies is partly due to the values of new aircraft,” says Seymour. “A new 777-300ER will typically cost \$160 million, and an investor may prefer to have three narrowbodies with three

operators for the same price. This will spread the risk more than placing one large aircraft with a single operator.”

Maintenance costs are also a consideration. “Widebodies are primarily designed for long-haul routes and require heavy investments to ensure passenger comfort including state-of-the-art in-flight entertainment (IFE) systems,” says Tyagi. “Each widebody operator has their own needs regarding cabin interiors. Lessors are faced with a daunting challenge to keep cabin reconfiguration costs low as the aircraft mature and lease transitions between operators become due.”

“A widebody cabin reconfiguration can easily cost \$10-15 million when the aircraft is being transitioned from one carrier to another,” claims Seymour. “The lessee expects that the lessor will invest in that capital expenditure. It is not just about the cost, however. The lead time for engineering changes and buying materials like seats, galleys and toilets can mean an 18-month lag between what is wanted and what can be achieved.”

“In addition to interior reconfiguration, costs associated with heavy maintenance for the airframe, engines, landing gear and auxiliary power unit (APU) are considerably higher for widebodies than they are for narrowbody types,” says Tyagi. “This is one reason the widebody segment is more attractive to established lessors and investors, rather than new entrants.”

Despite the potential risks associated with widebody assets there are signs that interest from investors has been growing.

“Widebodies have certainly become more popular with lessors and investors,” says Razzhivina. “Original leasing models ruled out widebodies as investment candidates because they had lower liquidity than narrowbodies. More recently the quest for higher returns by new investors and existing players has caused a revision of this attitude.”

“An increase in the number of lessors in the narrowbody market has led to



more diluted return on investment,” explains Lapidus. “Larger lessors began to turn to widebody types as they chased higher yields.”

“The 767, 777 and A330 have been popular among investors,” says Tyagi. “The 787, A350 and 777X are the most popular investment candidates among next generation widebodies.”

The lease term for a widebody can vary. “The length of an initial lease term will typically be eight to 12 years,” says Razzhivina. “More recently, six-year break options have started appearing, although these are not always reflected in the headline term. The break option gives airlines an opportunity to re-negotiate lease rates and return conditions, if not to terminate the lease early.”

Engine ownership

“Narrowbody engines have traditionally been more attractive to investors than widebody ones due to a larger installed fleet and broader customer base,” explains Martin Friis-Petersen, managing director MTU Maintenance Lease Services B.V. “These conditions make narrowbody engines more liquid assets. Nonetheless, there is a current trend towards investing in widebody engines as a way of deploying funds and ensuring a balanced portfolio. From an investor’s perspective, widebody engines have a higher risk profile than narrowbody engines, though risk and return often go together.”

“Widebody aircraft engine leasing has become more attractive to investors over the past 10 years, mainly because it has been following the trend in aircraft

leasing,” says Craig Welsh, senior vice president and chief commercial officer for Americas and Asia at Willis Lease Finance Corporation. “For airlines, widebody engine leasing is more about freeing up capital through a sale-and-leaseback transaction with prices two or three times higher than for narrowbody variants. Shifting the residual value risk to the lessor also plays a bigger role in widebody engine leasing, since the installed user base is much smaller, making future placement and disposal values more difficult to predict.

“It is no surprise that investors prefer engines on the more popular widebody types, because of the lower remarketing and residual value risk,” continues Welsh. “Other factors affecting popularity include the aftermarket policy of the original equipment manufacturer (OEM), whether the engine has a sole source position on the airframe and where the host aircraft is in its product lifecycle. “For example, the GE90-115B has been popular among investors because it is the sole engine type on the 777-300ER, which is the best-selling variant of the 777 product line. Conversely, the OEM policy of tight aftermarket control for some engine families has hurt residual values and investor appeal, because the cost of maintaining these engines for the secondary leasing market is prohibitive and difficult to monetise by parting-out in the used serviceable material segment.

“Lease terms for widebody engines range from 12 to 14 years in sale-and-leaseback structures,” adds Welsh. “Once they come off their initial lease and go into the short-term spot market, the terms can be as short as three months.”

The 777-300ER is the most popular large widebody. It is popular with investors due its varied user base, but there are concerns Boeing could lower new pricing ahead of the introduction of the 777X.

Aircraft value trends

Appraised 2016 current market values (CMVs) and lease rates have been identified for 10-year-old aircraft where possible, since this is the earliest age at which many widebodies are likely to appear on the used market. CMVs and lease rates are considered for older vintage aircraft (more than 10 years old). Potential future base values (FBVs) for mid-2020 indicate likely demand trends to the end of the decade. The FBVs assume a 1.5% rate of annual inflation. The tabulated CMVs, lease rates and FBVs used here were supplied by Oriel and are based on aircraft and engines in half-life maintenance condition.

The lease rates provided by Acumen Aviation account for all vintages and maintenance conditions. Acumen points out that lease rates for older widebody aircraft can vary dramatically depending on such factors as: age, duration of lease, return conditions, maintenance condition, jurisdiction and lessee credit.

The aircraft vintages used in this analysis are based on data from Flightglobal’s Fleets Analyzer. The age is based on the date of the aircraft’s first flight, or where this not known, the entry into service date, which usually closely corresponds to the first delivery date. The summary of widebody values includes the most common aircraft and engine combinations but is not comprehensive.

Medium-widebodies

Many medium-widebody types have seen a reduction in fleet size over the past 10 years with the exception of the A330-200, A330-300, 777-200ER and 777-200LR. The A330 family in particular has seen strong growth. The only medium-widebody types for which 10-year-old passenger airframes will be available in significant numbers in the next few years are the 767-300ER, 777-200ER, 777-200LR, A330-200 and A330-300. The only one of these types with an order backlog is the A330.

767-300ER

The 767-300ER can seat 236 in a typical two-class configuration, and there are 428 active and 67 stored passenger aircraft. The age profile of the fleet ranges from two to 29 years of age.

“The 767-300ER has been the most popular model in the 767 family,”

explains Eamonn Cronin, chief commercial officer at Acumen Aviation.

“Ten years ago there was strong demand for the 767-300ER,” explains McDonald at IBA. “Even the oldest aircraft were worth close to \$20 million, while a typical mid-1990s example could have been worth \$33 million. Delays to the 787 kept demand, and therefore values and lease rates, for 767-300ERs strong. In 2016 plenty of 767-300ERs are still in service, but many are now being replaced by 787s and some by A330s.”

“The 767-300ER has had a prolonged ‘Indian Summer’ due to 787 production delays,” says Razzhivina at Oriel. “The 767-300ER is now exiting most mainline fleets. It is an attractive freighter conversion candidate, but finding eligible aircraft with relatively low utilisation is an issue.”

According to Oriel typical CMVs for a 10-year-old 767-300ER in half-life maintenance condition with half-life engines could be \$23.55-26.00 million with lease rates of \$265,000-300,000 per month (see table, page 9). The FBV of a 10-year-old 767-300ER in 2020 is expected to be \$19.50-21.50 million.

For older vintage 767-300ERs, Oriel estimates a potential CMV range of \$6.00-23.00 million with lease rates of \$150,000-260,000 (see table, page 10). IBA says the average lease rate for an early build 767-300ER would be \$160,000 with later higher spec examples still attracting lease rates of \$280,000. “The part-out of 767-300ER aircraft is becoming quite common now,” says McDonald. “Many airlines execute stub leases, which are shorter-term extensions at significantly reduced rates.”

“There are still a lot of good, later-build passenger-configured 767-300ERs that have received considerable investment such as the retrofitting of winglets,” continues McDonald. “These will still be quite attractive in the used passenger market. The freighter conversion market will also provide a home for a significant number of

passenger aircraft. We have heard through lessors that freighter companies like Amazon are actually helping bolster lease rates through demand for feedstock. Certain specifications may see less demand in the future than others. British Airways is set to retire its remaining RB211-524-powered 767-300ERs by the end of 2018. These are too niche and specialised for anyone else to take on.”

777-200ER

The 777-200ER will seat 313 passengers in a typical two-class layout. There are 363 active and 40 stored aircraft. The age profile of the fleet ranges from three to 19 years old.

“The 777-200ER is proving difficult to place on secondary lease,” says Razzhivina “Lease rates are far below expected levels and values are falling. Recovery is unlikely, since 2017 will see the first 777-300ERs coming off initial lease, thereby increasing supply in the market.”

Oriel estimates that CMVs for 10-year-old 777-200ERs would be \$28.55-34.85 million with lease rates of \$350,000-395,000 (see table, page 9). It forecasts a 2020 FBV range of \$30.00-37.00 million.

Oriel suggests that the CMV range for older vintage 777-200ERs will be \$19.00-30.00 million, with lease rates of \$250,000-370,000 (see table, page 10).

Acumen believes that current lease rates for all vintages of 777-200ER will be \$250,000-455,000.

“The impression we have from lessors is that high engine overhaul costs make it very difficult for a second-tier airline to operate 777-200ERs or -200s,” says Seymour at IBA.

777-200LR

The 777-200LR is the longest-range variant in the 777 family and can be configured with 317 seats in a typical two-class layout. Only a small number of

passenger-configured 777-200LRs were produced, and the fleet includes 55 active and one stored aircraft. The age profile of the 777-200LR fleet ranges from two to 11 years old.

There are no 10-year old examples in the 777-200LR fleet, but Oriel estimates that the FBV for a 10-year old aircraft in 2020 will be \$48.20-55.00 million (see table, page 9).

For older vintage 777-200LRs Oriel estimates a CMV range of \$45.00-50.00 million, with monthly lease rates of \$500,000-\$550,000 (see table, page 10).

A330-200/-300

The A330 family includes the -200 and larger -300 variants. The A330-200 has 247 seats in a three-class layout, while the -300 has an average of 277. There is a distinct gap in range capability between early- and later-build models of the A330-300, since older variants have lower certified weights. A330-300s manufactured between line numbers (L/Ns) 012 and 244 are considered to be low gross weight (LGW) aircraft. Those from L/N 256 onwards are high gross weight (HGW) examples. The first HGW A330-300 was manufactured in 1999.

There are 504 active and 35 stored A330-200s, and 617 active and 23 stored A330-300s in passenger configurations. The age profile of the A330-200 fleet ranges from new to 19-year-old aircraft. The A330-300 fleet also includes new examples, but the oldest airframe is now 23 years old. There are 42 A330-200s and 99 A330-300s on firm order.

“The A330-200 and -300 are still popular with airlines and lessors”, says Razzhivina. “After a somewhat painful adjustment following the first batch of lease returns the secondary market has been established. The values and lease rates for new and used A330-300s took a hit following the bankruptcy of SkyMark Airlines, but have now stabilised compared to other widebodies.”

“Since they are still in production

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WIDEBODY AIRCRAFT USED VALUES BASED ON TEN-YEAR-OLD AIRCRAFT

Aircraft type	Engine	CMV-2016 (\$-m)	FBV-2020 (\$-m)	Lease rate - 2016 (\$-m)
Medium widebody				
767-300ER	CF6-80C2B6F	23.55-25.95	19.50-21.50	0.265-0.300
767-300ER	CF6-80C2B7F	23.59-26.00	19.50-21.50	0.265-0.300
767-300ER	PW4062	23.80-26.00	N/A	0.265-0.300
777-200ER	GE90-94B	31.55-34.85	33.00-37.00	0.350-0.395
777-200ER	GE90-90B	N/A	32.50-36.50	0.350-0.395
777-200ER	PW4090	28.55-31.85	30.00-34.00	0.350-0.395
777-200ER	Trent 892	30.35-33.65	N/A	0.350-0.395
777-200ER	Trent 895	29.55-32.85	N/A	0.350-0.395
777-200LR	GE90-110B1L2	N/A	49.00-54.00	0.520-0.580
777-200LR	GE90-115B	N/A	48.20-53.00	0.520-0.580
777-200LR	GE90-115BL1	N/A	50.00-55.00	0.520-0.580
A330-200	CF6-80E1A3	27.75-30.75	32.00-35.00	0.305-0.345
A330-200	CF6-80E1A4	N/A	31.50-34.50	0.305-0.345
A330-200	CF6-80E1A4B	27.75-30.75	32.00-35.00	0.305-0.345
A330-200	PW4168A	27.00-30.00	N/A	0.305-0.345
A330-200	PW4168A-1D	27.00-30.00	31.50-34.50	0.305-0.345
A330-200	PW4170 Advantage 70	N/A	32.00-35.00	0.305-0.345
A330-200	Trent 772B-60	28.00-31.00	32.50-35.50	0.305-0.345
A330-200	Trent 772B-60EP	N/A	33.25-36.25	0.305-0.345
A330-200	Trent 772C-60	28.25-31.25	N/A	0.305-0.345
A330-200	Trent 772C-60EP	N/A	33.50-36.50	0.305-0.345
A330-300	CF6-80E1A3	35.50-39.50	N/A	0.315-0.355
A330-300	CF6-80E1A4	35.00-39.00	38.00-42.00	0.315-0.355
A330-300	CF6-80E1A4B	35.50-39.50	38.30-42.30	0.315-0.355
A330-300	PW4168A	34.75-38.75	N/A	0.315-0.355
A330-300	PW4168A-1D	N/A	37.60-41.60	0.315-0.355
A330-300	Trent 772-60	N/A	N/A	0.315-0.355
A330-300	Trent 772B-60	35.75-39.75	38.65-42.65	0.315-0.355
A330-300	Trent 772B-60EP	N/A	39.40-43.40	0.315-0.355
A330-300	Trent 772C-60EP	N/A	39.70-43.70	0.315-0.355
Large widebody				
A340-600	Trent 556A2-61	22.00-24.50	16.50-18.50	0.315-0.355
777-300ER	GE90-115BL	60.50-66.50	66.50-73.50	0.650-0.730
777-300ER	GE90-115BL1	61.20-67.70	N/A	0.650-0.730
777-300ER	GE90-115BL2	N/A	67.00-74.00	0.650-0.730
A380-800	GP7270	103.00-110.00	84.50-93.50	0.990-1.100
A380-800	Trent 970-84	103.00-110.00	84.50-93.50	0.990-1.100
A380-800	Trent 972-84	N/A	86.50-95.50	0.990-1.100

Source: Oriel

All values are for aircraft in half-life maintenance condition with half-life engines. Future base values, assume 1.5% inflation and are based on mid 2020 estimate.

there is still a lot of value in the Airbus A330-200 and -300, at least for the younger airframes,” says Seymour. “Older early LGW A330-300s, however, are being replaced by newer aircraft. Philippine Airlines has replaced all of its CF6-80E1-powered early A330-300s with new Trent 700-powered examples.”

According to Oriel the CMV of a 10-year-old A330 will be \$27.00-31.25 million for a -200 series and \$34.75-39.75 million for a -300 variant (see table, this page). For the same vintage, lease rates are estimated at \$305,000-345,000 per month for an A330-200, and \$315,000-355,000 for a -300 series.

Oriel estimates that the FBVs of 10-year-old A330-200s and -300s in 2020 will be \$31.50-36.50 million and \$37.60-43.70 million respectively.

For older vintage aircraft Oriel estimates CMVs of \$18.00-27.00 million for A330-200s, and \$10.00-35.00 million for A330-300s. It suggests lease rates would be \$250,000-325,000 for older

A330-200s and \$200,000-335,000 for A330-300s (see table, page 10).

“By the end of the decade the P2F conversion programme should be in place for A330s,” says Seymour. “This should help passenger aircraft find new roles. The A330-800 and -900neo models are potential successors to the current A330 variants. These will not have had much of an impact on the market prospects for A330-200s and -300s by 2020.”

Older medium widebodies

The remaining in-service medium-widebody types are classed as older variants. They are all out of production and in most cases the youngest are more than 10 years old.

767-200ER

There are only 15 767-200ERs remaining in passenger service, with another 29 in storage. The age profile of

the remaining fleet is 14-34 years of age.

“Demand for the 767-200ER has waned considerably since 2006,” says McDonald. “Few are left in passenger service, and it is becoming a rare sight.”

Oriel estimates that the CMV for a 767-200ER could be \$1.00-2.00 million (see table, page 10).

According to Acumen, lease rates for 767-200ERs have declined substantially and are currently \$40,000-120,000.

767-300

This early 767 variant had lower certified weights and fuel capacity so it offered less range than the more popular 767-300ER.

There are 53 767-300s left in passenger service, and 11 in storage. The age of the fleet varies from 15 to 29 years.

“767-300s and 767-200ERs left lessor fleets some time ago,” says Razzhivina. “Both fleets have reduced considerably and most aircraft are leaving

OLDER VINTAGE WIDEBODY AIRCRAFT USED VALUES

Aircraft type	Engine	CMV-2016 (\$-M)	Lease rate - 2016 (\$-m)
Medium widebody			
767-200ER	CF6-80A2	1.00-2.00	N/A
767-200ER	CF6-80C2B8F	1.00-2.00	N/A
767-200ER	JT9D-7R4D	1.00-2.00	N/A
767-200ER	JT9D-7R4E4	1.00-2.00	N/A
767-200ER	PW4052	1.00-2.00	N/A
767-200ER	PW4060	1.00-2.00	N/A
767-300	CF6-80A2	1.50-2.50	N/A
767-300	CF6-80C2B6	1.50-2.50	N/A
767-300	JT9D-7R4D	1.50-2.50	N/A
767-300	PW4056	1.50-2.50	N/A
767-300	PW4060	1.50-2.50	N/A
767-300ER	CF6-80C2B4	6.00-23.00	0.150-0.260
767-300ER	CF6-80C2B7F	6.00-23.00	0.150-0.260
767-300ER	PW4052	6.00-23.00	0.150-0.260
767-300ER	PW4062	6.00-23.00	0.150-0.260
767-300ER	RB211-524H	6.00-23.00	0.150-0.260
767-300ER	RB211-524H2	6.00-23.00	0.150-0.260
767-400ER	CF6-80C2B8F	18.00-20.00	N/A
777-200	GE90-76B	12.00-20.00	0.200-0.280
777-200	GE90-90B	12.00-20.00	0.200-0.280
777-200	PW4074	12.00-20.00	0.200-0.280
777-200	PW4084	12.00-20.00	0.200-0.280
777-200	Trent 875	12.00-20.00	0.200-0.280
777-200	Trent 892	12.00-20.00	0.200-0.280
777-200ER	GE90-85B	19.00-30.00	0.250-0.370
777-200ER	GE90-94B	19.00-30.00	0.250-0.370
777-200ER	PW4084	19.00-30.00	0.250-0.370
777-200ER	PW4090	19.00-30.00	0.250-0.370
777-200ER	Trent 884	19.00-30.00	0.250-0.370
777-200ER	Trent 895	19.00-30.00	0.250-0.370
777-200LR	GE90-110B1L	45.00-50.00	0.500-0.550
A300-600	CF6-80C2A3	0.50-2.00	N/A
A300-600R	CF6-80C2A5	1.50-2.50	N/A
A300-600R	CF6-80C2A5F	1.50-2.50	N/A
A300-600R	PW4158	1.50-2.50	N/A
A310-300	CF6-80C2A2	0.50-1.50	N/A
A310-300	CF6-80C2A8	0.50-1.50	N/A
A310-300	PW4152	0.50-1.50	N/A
A310-300	PW4156A	0.50-1.50	N/A
A330-200	CF6-80E1A3	18.00-27.00	0.250-0.325
A330-200	CF6-80E1A4B	18.00-27.00	0.250-0.325
A330-200	PW4168A	18.00-27.00	0.250-0.325
A330-200	PW4168A-1D	18.00-27.00	0.250-0.325
A330-200	Trent 772B-60	18.00-27.00	0.250-0.325
A330-300	CF6-80E1A2	10.00-35.00	0.200-0.335
A330-300	CF6-80E1A4B	10.00-35.00	0.200-0.335
A330-300	PW4164	10.00-35.00	0.200-0.335
A330-300	PW4168A-1D	10.00-35.00	0.200-0.335
A330-300	Trent 768-60	10.00-35.00	0.200-0.335
A330-300	Trent 772B-60EP	10.00-35.00	0.200-0.335
A340-300	CFM56-5C2	5.00-13.00	0.125-0.215
A340-300	CFM56-5C4/P	5.00-13.00	0.125-0.215
A340-500	Trent 553-61	15.00-18.00	N/A
A340-500	Trent 553A2-61	15.00-18.00	N/A
Large widebody			
A340-600	Trent 556-61	20.00-22.00	0.300-0.340
A340-600	Trent 556A2-61	20.00-22.00	0.300-0.340
777-300	PW4090	20.00-30.00	0.250-0.320
777-300	Trent 892	20.00-30.00	0.250-0.320
777-300	Trent 892B	20.00-30.00	0.250-0.320
777-300ER	GE90-115BL	60.00-62.00	0.650-0.700
747-400	CF6-80C2B1F	3.00-16.00	0.125-0.225
747-400	PW4056	3.00-16.00	0.125-0.225
747-400	RB211-524G2	3.00-16.00	0.125-0.225
747-400	RB211-524H2-T	3.00-16.00	0.125-0.225

Source: Oriel
Oriel current market values are for aircraft in half-life maintenance condition with half-life engines.
- Older vintage accounts for all aircraft over 10 years of age.

existing operators for parting-out.”

Oriel estimates CMVs of \$1.50-2.50 million for 767-300s (see table, this page).

Acumen suggests that lease rates could be \$50,000-125,000.

767-400ER

The 767-400ER features a 21-foot fuselage stretch over the 767-300ER, so it can seat up to 267 passengers in a typical two-class configuration. The largest member of the 767 family was not produced in large numbers, so only 37 aircraft were delivered, all of which are still in passenger service. The age profile of the fleet is 14 to 16 years of age.

According to Oriel the CMV for a 767-400ER is \$18.00-20.00 million (see table, this page).

777-200

The 777-200 has lower certified weights and fuel capacity than the -200ER and -200LR variants, so it has less range. There are 73 777-200s left in passenger service and five in storage. The fleet is mainly 11-22 years old. The main operators are carriers in the Asia Pacific and United Airlines.

“The 777-200 is unlikely to find new significant markets,” says Razzhivina.

Oriel estimates CMVs of \$12.00-20.00 million for 11-22-year-old 777-200s, with monthly lease rates of \$200,000-280,000 (see table, this page).

Acumen suggests that lease rates for 777-200s could be \$175,000-300,000.

A300-600/-600R

There are just 10 A300-600s left in passenger service. There are also 13 active and 17 stored examples of the longer-range -600R variant. The age profile of the A300-600 fleet ranges from 24 to 29 years of age, while the A300-600R fleet is 14 to 27 years old.

“The A300-600 series is an increasingly rare passenger aircraft, with Iran Air one of the last major operators,” says Seymour. “From 2006 to 2011 these aircraft were quite popular P-to-F candidates, but most of the passenger feedstock has already been converted. Most of the residual value lies in the CF6-80C2A5 and PW4158 engines, although there is not much of a market for these once they have been liberated from the airframe.”

Oriel estimates CMVs of \$0.50-2.00 million for an A300-600, and \$1.50-2.50 million for an A300-600R (see table, this page).

“Lease rates for A300-600s have been decreasing due to poor demand, and are currently \$45,000-95,000 per month,” suggests Tyagi at Acumen.

NARROWBODY AIRCRAFT ENGINE VALUES - HALF-LIFE CONDITION

Engine	Active Aircraft	1Q2016 Market value (\$-m)
Trent 553	A340-500	3.77
Trent 556	A340-500/-600	3.77
Trent 768-60	A330-300	4.79
Trent 772B-60	A330-200/-300	9.02
Trent 884	777-200ER	7.63
Trent 892B	777-200ER/-300	9.42
Trent 895	777-200ER	9.94
Trent 970-84	A380-800	12.72
GP7270	A380-800	10.86
PW4052	767-300ER	2.02
PW4056	767-200ER/-300/-300ER & 747-400	2.44
PW4060	767-300/-300ER	2.74
PW4062	767-300ER	2.93
PW4152	A310-300	1.66
PW4156A	A310-300	2.03
PW4158	A300-600R	2.21
PW4164	A330-300	3.89
PW4168A	A330-200/-300	8.08
PW4170 Advantage 70	A330-200/-300	9.02
PW4084	777-200/-200ER	6.62
PW4090	777-200ER/-300	8.38
CF6-80A2	767-200/-200ER/-300	0.92
CF6-80C2A2	A310-300	1.35
CF6-80C2A5	A300-600R	2.11
CF6-80C2A8	A310-300	1.53
CF6-80C2B1F	747-400	1.61
CF6-80C2B4F	767-300ER	1.62
CF6-80C2B6F	767-300ER	1.87
CF6-80C2B7F	767-300ER	2.06
CF6-80C2B8F	767-200ER/-400ER	3.21
CF6-80E1A2	A330-300	8.38
CF6-80E1A3	A330-200/-300	10.47
CF6-80E1A4	A330-200/-300	8.83
GE90-90B	777-200/-200ER	11.66
GE90-94B	777-200ER	13.65
GE90-110B1L	777-200LR	23.02
GE90-115BL	777-200LR/-300ER	24.52
CFM56-5C2F	A340-300	1.59
CFM56-5C4/P	A340-300	3.14
RB211-524H/H2	767-300ER/747-400	2.48
RB211-524G	747-400	1.46
RB211-524H2-T	747-400	2.99

Value source: Avitas Bluebook of Jet Engine Values, 2016 edition. Values are for engines in half-life maintenance condition.

A310-300

There are 35 active and 13 stored A310-300s in passenger configuration, ranging from 18 to 29 years of age.

“Like the A300, the A310 is becoming a rare passenger aircraft,” says McDonald. “The operator base is dominated by Iran Air, Pakistan International Airlines (PIA), Air Transat and SATA Air Acores; although PIA is now replacing its aircraft. Most A310-300s were delivered from 1986 to 1993, so the fleet has long been ripe for replacement. It used to be economical to have a low-capacity widebody, but today the economics are not as attractive.”

Oriel estimates CMVs of \$0.50-1.50 million for A310-300s (see table, page 10).

Acumen says that lease rates have declined due to poor demand. It speculates that lease rates for A310-300s would be \$25,000-90,000 per month.

A340-300/-500

According to Airbus the A340-300 will typically accommodate 277 seats, while the longer-range and larger A340-500 will hold 293. There are 120 passenger-configured A340-300s left in service, with 27 in storage. The A340-500 was produced in smaller numbers, and there are only five aircraft still in operation, with a further 20 in storage.

Most of the A340-300 fleet is 11-24 years old. The A340-500 fleet includes 10 aircraft that are eight to 10 years of age. The oldest example is 13 years old.

“Values and lease rates for A340s have collapsed and will not recover,” says Razzhivina.

“Four-engined aircraft fell out of favour following the global financial crisis of 2008 and the sharp rise in fuel prices,” says McDonald. “Operators have offloaded A340-300s in substantial quantities, with limited placement

prospects, resulting in a very active part-out sector for A340-300s. Those operators requiring the lift, and subsequently lease extensions, have renegotiated rentals at very low rates.”

Oriel estimates CMVs of \$5.00-13.00 million for 11-24-year-old A340-300s with monthly lease rates of \$125,000-215,000 (see table, page 10).

“Typical monthly lease rentals for A340-300s are well below \$200,000, and rates of \$170,000 are now quite normal,” claims McDonald. “We have not seen as many trades for the A340-500, but it is becoming increasingly rare following retirements by key operators including Emirates, Singapore Airlines (SIA) and Thai Airways.

Oriel estimates CMVs of \$15.00-18.00 million for 11-13-year-old A340-500s (see table, page 10).

“We see little prospect of a recovery for A340-300s and A340-500s regardless of fuel prices,” says McDonald. “It seems a substantial proportion of the operators of these aircraft have already committed to fleet phase-outs and replacements.”

Large-widebody

The youngest large widebody types likely to become available on the used market in the next few years are the A340-600, 777-300ER and A380. The latter two types remain in production, but the A340-600 is not.

Older out-of-production large widebody variants that may become available on the secondary market include the 747-400 and 777-300.

777-300ER

The 777-300ER is the best selling member of the 777 family, as well as the most popular large widebody aircraft. It can accommodate 396 seats in a typical two-class arrangement.

There are 662 777-300ERs in passenger service, with one in storage and an order backlog for 126. The age profile of the fleet ranges from new to 13-year-old airframes. The 777-300ER has been the main replacement for the 747-400.

“The 777-300ER has a good, varied operating base,” says Seymour. “Availability and storage have historically been low or non-existent, all of which points to strong residual values.”

“The 777-300ER was very popular with the lessor and investor community until about a year ago,” says Razzhivina. “The aircraft is still prominent in lessor fleets, but investor interest has cooled amid concerns about used values and lower new pricing as Boeing tries to fill production before the 777X arrives.”

Oriel estimates CMVs of \$60.50-67.70 million for a 10-year-old 777-300ER, with monthly lease rates of

\$650,000-730,000 (see table, page 9). It estimates 2020 FBVs of \$66.50-74.00 million. For older vintage airframes, Oriol estimates CMVs of \$60.00-62.00 million with lease rates of \$650,000-\$700,000 (see table, page 10).

A380-800

The A380 is the largest commercial passenger aircraft. Airbus claims it can seat 544 in a four-class arrangement. There are 193 A380-800s in passenger operation, with two in storage and a further 124 on order backlog. Although the first A380 did not enter service until 2007, the earliest operational examples are now 10 years old, since they first flew in 2006. The age profile of the current fleet ranges from new to 10-year-old airframes.

“The A380 has not sold as many units as expected,” says Razzhivina. “Despite growing traffic and low oil prices, airlines are cautious about very large widebodies. While some have indicated they will consider used A380s, top-up orders are only coming from the Middle East. Values and lease rates have been stable so far. The A380 is likely to remain a niche aircraft used on trunk routes.”

“The first A380s due to return from lease are five units operated by SIA,” says

Lapidus. “Their initial lease terms will expire in late 2017 and early 2018. It is possible SIA may exercise its option to extend the leases. If these five A380s become available on the secondary market, any resulting demand and value trends will not be representative of the wider A380 fleet, since the earlier models have some unique features, like lower certified weights and range capabilities.”

Just before going to press SIA announced that it will not be extending the lease of its first A380. Uncertainty surrounds potential secondary market demand for the A380 and the effect this could have on values and lease rates.

“Due to the limited number of A380 operators it is anticipated that there will be a high level of risk involved in the second lease terms,” says Cronin.

Amedeo is positive that there will be secondary market demand for A380s and believes the availability of used aircraft will lead to a new group of operators. “The A380 offers the lowest operating costs per seat today,” says Lapidus. “It can stimulate demand and improve airlines’ profitability. The A380 offers a unique product, as consumer preferences and branding become more important to airlines.”

Oriol estimates CMVs of \$103.00-110.00 million for a 10-year-old A380 with lease rates of \$0.99-1.10 million (see

table, page 9). Oriol suggests that the FBV for a similar vintage A380 in 2020 could be \$84.50-95.50 million.

Acumen believes that A380 lease rates will decline if there is genuine difficulty in placing used aircraft.

A340-600

The A340-600 accommodates 346 passengers in a typical three-class layout. There are 72 A340-600s in passenger service, with 17 in storage. The fleet ranges in age from six to 15 years old.

“The A340-600 has been out of production for seven years. Some operators have phased it out, or are in the process of doing so,” says McDonald. “Virgin Atlantic has halved its fleet, China Eastern has long since stopped operating it, and we know the odd ex-Hainan Airlines aircraft has been parted out. The secondary market seems rather limited. While a few secondary placement opportunities might exist here and there, the A340-600 may follow a similar trend to the A340-300 where much of the used market involves the part-out sector.”

Oriol estimates CMVs of \$22.00-24.50 million for a 10-year-old A340-600 with lease rates of \$315,000-355,000. (see table, page 9). It estimates 2020 FBVs of 16.50-18.50 million. For an older vintage aircraft Oriol estimates

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CMVs of \$20.00-22.00 million, and monthly lease rates of \$300,000-340,000.

“There are very few takers for the A340-600 and this has led to a reduction in lease rentals,” says Cronin. Acumen estimates that lease rates for A340-600s could be \$250,000-330,000 per month.

747-400

There are 174 747-400s still in passenger service, and 68 in storage. There are also six longer-range -400ER variants in service. Value trends for the 747-400ER are not considered here as the fleet of this variant is so small.

The age profile of the 747-400 fleet ranges from 11 to 27-year-old airframes.

“Like the A340 variants, demand for the 747-400 has been falling due to its high fuel consumption and lower economic viability for extended operations,” says Tyagi.

“The 747-400 has seen its popularity fall,” says Razzhivina. “Most first-tier airlines have retired it from their fleets or have plans to do so. Freighter conversions have fizzled out and are unlikely to restart. Some airlines downsized to A330s or similar aircraft. Range and capacity requirements are better served by a mix of 777s, A330s, A350s and A380s. 747-400 values and lease rates are falling and will reach scrap levels.”

“We do not believe many retiring passenger 747-400s will find new homes,” says Seymour. “Most will be parted out.”

Oriel estimates CMVs of \$3.00-16.00 million for 747-400s, with lease rates of \$125,000-225,000 (see table, page 10).

Acumen suggests that 747-400 lease rates could start from as little as \$90,000 per month.

777-300

The 777-300 has lower certified weights and fuel capacity, so it offers shorter range than the more successful -300ER.

There are 52 777-300s in passenger service, with four in storage. The age profile of these aircraft ranges from a single 10-year-old example to 18-year-old airframes.

“Although some 777-300s have been leased to Russian operators, most are likely to be parted out,” says Razzhivina.

“We’ve seen a few former Japan Airlines (JAL) PW4090-powered 777-300s go for part-out,” says McDonald. “We understand that Emirates is due to phase its aircraft out soon, although Cathay Pacific is apparently interested in taking those on.”

Oriel estimates CMVs of \$20.00-30.00 million for 11-18-year-old 777-300s, with monthly lease rates of \$250,000-320,000 (see table, page 10).

Widebody engines

Values have been summarised for some of the most common widebody engine variants (see table, page 12). These are based on engines in half-life condition and were provided by Avitas. Values range from \$920,000 for a CF6-80A2, to \$24.52 million for a GE90-115BL.

“An increase in the number of retirements for 747-400s, 767-300s, A300s, A310s and A340-300s means demand has declined for engines used on those aircraft,” explains Welsh at WLFC. “These include the PW4000-94, CF6-80A2, CF6-80C2 and the CFM56-5C4. Some argue that demand for these variants has been buoyed over the past

There is uncertainty regarding the size of the potential secondary market for used A380s. SIA has recently confirmed that it will not extending the lease for its oldest A380, when it expires in 2017.

couple of years due to delays to the 787 and A350 entering service. There is also the argument that the drop in fuel costs, coupled with low values, has extended the useful life and economic viability of these aircraft.”

The Trent 500 and Trent 800 have also seen demand fall. The Trent 500 powers the A340-500 and A340-600, while the Trent 800 is an option on the 777-200, 777-200ER and 777-300. None of these types remains in production, and in most cases the active fleets are beginning to contract.

The highest values are associated with engines that remain in production.

The widebody engine variant with the highest half-life value is the GE90-115BL which powers the 777-300ER, the most popular large widebody in service. WLFC says that demand and value trends remain stable for this engine variant.

Evidence suggests that demand and values trends also remain stable for the two A380 engine options: the Trent 900 series and GP7270.

The Trent 700, PW4000-100 and CF6-80E1 series all power the A330 family. Although certain variants from each series remain in production there are mixed messages concerning demand and value trends. WLFC indicates that demand, values and lease rates are beginning to trend down for PW4000-100 series engines due to recent aircraft retirements and part-outs. Other sources suggest that demand and values for all three A330 engine options remain stable.

“Airlines will still need to access spare engines,” says Friis-Petersen. “The spare engine ratio for in-production variants is proportionally lower compared to more mature engine types. Airlines used to have spare engine coverage for 15% of their installed fleets. This figure is now 10% and we think it will fall to 7-8% for newer engine types, due partly to greater OEM coverage in the aftermarket.

“Airlines are managing spare engines more efficiently through options on the spot market, such as the short-term leasing solutions offered by MTU Maintenance Lease Services,” adds Friis Petersen. “Lease demand and related values remain strong while engines are in production, as the active fleet and the number of shop visits keeps growing.” 

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