an Airfinance Journal
special supplement

AIR INVESTOR 2017

Appraisers' views on 2017

Olivier Bonnassies speaks to six appraisers about the major events that are likely to impact the aviation finance world this year.

What was the most important event in 2016?

Stuart Hatcher, chief intelligence officer, IBA:

"On the macro side, the US election and Brexit vote were the talk of the year, with the main consequences still unknown. In both cases, the political establishment that normally retains the status quo was countered by a more vocal decentralised electorate. A nationalistic desire to halt the effects of globalisation by restoring local industry and reduce immigration took centre stage. Many fear that this will lead to a more isolationist approach from both the UK and US, which could materially affect gross domestic product, traffic, currency and oil prices.

"We have certainly seen an uptick on country risk analysis in our teams over the past six months – and not just for the usual suspects. Effects on a destabilised euro, US dollar currencies and a change in US foreign policy are all high on the agenda. While international carriers have a natural hedge to currency swings, there aren't many places to hide when most costs are in US dollar and it gets too strong."

David Tokoph, chief operating officer, MBA:

"The Brexit vote and election of Donald Trump were the most impactful events in 2016, which seem to usher in a new era of isolationism in the world's largest economies."

Rob Morris, global head of consultancy, Ascend:

"In the commercial aviation sector we did not see any major event which fundamentally impacted the market. However, we did observe a number of events – election of Trump, Brexit, the Opec production agreement and Delta's new pilot contract, which have potential to create headwinds for our sector."

Angus Mackay, principal, ICF International:

"The decision by CIT Group to sell its commercial aircraft leasing business to Chinese conglomerate HNA Group's Avolon, making the latter the third-largest global aircraft leasing business."

Gueric Dechavanne, vice-president, commercial aviation services, Collateral Verifications:

"The US presidential election."

Olga Razzhivina, senior Istat appraiser, Oriel:

"The US elections. The result may have significant consequences for world politics: potential change in US foreign policy, redrawing of the world political alliances and potential cessation of large-scale hostilities in the Middle East. This could be beneficial for world political stability and improved traffic flows. On the other hand, these changes could increase tensions in other parts of the world. US infrastructure projects may help domestic demand."

What will be the major event(s) in 2017?

Hatcher: "In 2017, we should start to see the actual effect of Trump's presidency and the early stages of Brexit negotiations. While it could end up being an anti-climax, currency movements and interest rate changes remain likely still."

Tokoph: "I believe the most important events that will impact the course of the world's economy will be the policy of Donald Trump's administration and the outcomes and policies of the upcoming elections in France and Germany. Coupled with Brexit, the policies of the new administrations will set the course for the next few years."

Morris: "It's impossible to predict a single major event in 2017, but increasing global instability (witness comments above about Trump, Brexit), slowdown in the Chinese economy (albeit previous slowdowns have had little impact on aviation growth), macro demand weakening at a global and regional level, increasing oil prices, increasing labour costs at airlines and increasing interest rates all have the potential to create headwinds in our sector."

Mackay: "The major event of 2017 would be the acquisition of a large leasing platform by a Chinese bank or insurance corporation. Further significant events would be continued interest rate rises and the curtailing of Opec and non-Opec oil production leading to higher fuel prices."

>>>

2016 saw a number of major events that impacted the aviation industry.

Razzhivina: "The European Union (EU) situation – it is not an event but there are several events to take place which can either strengthen or destabilise the EU, depending on their outcome. The events include: elections in France and now Italy, as well as the UK triggering Article 50 and consequent negotiations with the EU as a whole and member states individually. The UK has a very successful record of implementing the 'divide-and-conquer' doctrine."

Do you expect oil prices to continue creeping up in 2017?

Hatcher: "I see plenty of movement in pricing for 2017 – although that isn't new. While Opec members are finally discussing how to reduce production in an effort to take control of pricing once again, negotiations can quickly collapse still. As oil pricing became less dependent on Opec's influence over the last few years, their proposed reduction plan can be countered by an aggressive US move – especially if it serves to destabilise the Middle East and Russia at the same time. Low-cost oil producers will push through regardless. So while there will be greater volatility, the changes may be short and sweet."

Tokoph: "We expect a steady pick up in oil prices in 2017 but do not expect a major fluctuation from the $50 per barrel range that we saw at the end of 2016. Opec cuts have certainly helped to stabilise oil prices. However, the cuts in the latter part of 2016 have not had and will not have a drastic or immediate effect on oil prices."

Morris: "Yes, but creeping is the key word."

Mackay: "ICF believes current oil prices will remain relatively stable into 2017 with only minor increases anticipated, boding well for continued airline profitably over the period."

Razzhivina: "It is possible oil prices will remain hovering around the same level. While Opec might cut its production, relaxation of sanctions against Russia may bring more oil onto the market. Plus, with his inward-looking policies, Trump may authorise increased shale production in the US."

Do you expect interest rates to rise in 2017?

Hatcher:

"My view on interest rates has been up and down, much like oil prices. Late 2015, the expectation was that the rate would rise, and it did marginally, same for December 2016. The rises will remain very small, so development shouldn't be crippled. In the UK, the post-Brexit view pretty much destroyed any notion of a rise – but despite some concerns by [Bank of England governor Mark] Carney, the economy responded more favourably to the Brexit vote. Still, a rise may be on the cards. While inflation remains low still, higher hikes will be unlikely, but indications that inflation is rising (partially due to post-Brexit currency collapse), could see a small shift in the short term."

Tokoph:

"We do expect interest rates to rise as is signalled by the recent US Federal Reserve hike of 25 basis points in the US. The hesitation of the Fed to raise interest rates the past few years has put them in a position that may require further hikes; however, the strong dollar pre- and post-announcement may carry a lot of weight in determining the next increase."

Morris:

"Yes, but we expect the increases to be managed and marginal (so three or four 25-basis point rises through the year). We also expect to see the US dollar strengthen as we move through the year."

Mackay:

"Yes, and manifestly so with the recent interest rate rise announcement in December by the Fed."

Razzhivina:

"While minor rises are most likely, significant ones are unlikely. The US is likely to concentrate on stimulating its domestic market while the UK will be doing everything to alleviate negative consequences of Brexit."

Views on values

Air Investor has reviewed the values and lease rates of a representative selection of aircraft including models from each of the main manufacturers and covering a range of sizes and types. Values and lease rates are taken from aircraft profiles published in *Airfinance Journal* during 2016. The aircraft types considered are: Boeing 748-8, Airbus A380, Boeing 787-9, Airbus A350-900, Bombardier Q400, Embraer E190, Boeing 737-800 and A320-200.

THE APPRAISERS

For the selection of aircraft, *Airfinance Journal*'s regular panel of specialists provided independent views on values and lease rates. The panel comprises Istat appraisers and senior appraisers from a selection of consultancy companies:

Avitas
Martin O'Hanrahan, director, asset valuation

Collateral Verifications (CV)
Gueric Dechavanne, vice-president, commercial aviation services

MBA
Lindsey Webster, director asset valuations

Oriel
Olga Razzhivina, senior Istat appraiser

IBA
Jonathan Bautista-Trimming, aviation analyst

Youcef Berour Minarro, aviation analyst

Jonathan McDonald, senior aviation analyst

ICF International
Angus Mackay, principal

THE ASSUMPTIONS

Market value is based on the Istat definition – ie, the most likely trading price that may be generated for an aircraft under the market circumstances that are perceived to exist at the time in question. Market value assumes that the aircraft is valued for its highest, best use, that the parties to the hypothetical sale transaction are willing, able, prudent and knowledgeable, and under no unusual pressure for a prompt sale, and that the transaction would be negotiated in an open and unrestricted market on an arm's-length basis, for cash or equivalent consideration, and given an adequate amount of time for effective exposure to prospective buyers.

Lease rates are for indicative purposes. Monthly rental values will vary according to factors such as term and lessee credit rating.

>>>

Boeing 747-8

The Boeing 747-8 is a stretched version of the successful 747-400 variant of Boeing's largest aircraft. The latest generation of the 747 incorporates a new wing design and shares some of the technology of the 787 family. The 747-8 is powered by four General Electric GEnx-2B engines.

Boeing offers the aircraft in two main variants: the 747-8 passenger or Intercontinental version, which is sometimes designated as the747-8I, and the 747-8 Freighter (747-8F). Delivery of the first freighter aircraft occurred in October 2011 and the passenger model began deliveries in 2012.

747-8F current market value ($m)					
Build year	2012	2013	2014	2015	2016
CV view	119.6	129.2	154.0	164.1	180.4
Oriel view	123.0	129.0	137.0	161.0	187.0

747-8I current market value ($m)					
Build year	2012	2013	2014	2015	2016
CV view	114.7	119.1	123.1	127.7	149.7
Oriel view	93.0	97.0	102.0	123.1	147.3

747-8F indicative lease rates ($m/month)					
Build year	2012	2013	2014	2015	2016
CV view	1.000	1.100	1.200	1.300	1.400
Oriel view	1.075	1.175	1.275	1.375	1.500

Values and lease rates as published in *Airfinance Journal* February 2016.

The 747-8 competes with the A380, although the Boeing aircraft is significantly smaller than its Airbus rival. Boeing claims that the 747-8 is around 10% lighter per seat and typically has a trip-cost reduction of 21% compared to its larger competitor. Neither aircraft has been particularly successful. The 747-8 and, to a lesser extent, the A380 are vulnerable to new twin-aisle models, such as the A350-900 and 777-9, which offer competitive seat-mile costs despite being smaller aircraft.

Future developments

Boeing has introduced some performance enhancements since the 747-8 entered service, but further significant developments look unlikely as production rates are being decreased.

Airbus A380

The Airbus A380 is the largest passenger aircraft built and the only one to feature two complete passenger decks. The aircraft was targeted at breaking Boeing's dominance of the very large passenger aircraft market and provided about 25% more seats than the 747-400.

According to Airbus's figures, the A380 has an 800-nautical mile range advantage over its Boeing competitor and offers 17% better operating economics. Boeing's launching of the 747-8 has narrowed the advantages, but to what extent is a matter of debate between the two manufacturers.

The baseline A380-800 passenger version was originally planned to be part of a family that would include a freighter model and a stretched passenger version, but these variants have been shelved.

After several delays and rescheduling of early production targets, the first A380 entered service in late 2007. In an attempt to overcome the early issues with the aircraft, Airbus has been improving the weight of the aircraft and there have been a number of technical upgrades. Despite these improvements, sales of the aircraft (and its Boeing competitor) have been lower than Airbus's forecasts.

A380-800 current market value ($m)					
Build year	2007	2009	2011	2013	2015
Avitas view	86	104	129	161	199
IBA view	115	132	154	186	225
ICF view	101	118	139	165	179

Assuming standard Istat criteria.

A380-800 indicative lease rates ($m/month)					
Build year	2007	2009	2011	2013	2015
Avitas view	0.85-0.95	1.16-1.31	1.32-1.47	1.50-1.65	1.67-1.81
IBA view	1.07-1.20	1.24-1.40	1.41-1.60	1.58-1.80	1.75-2.00
ICF view	1.00-1.15	1.10-1.25	1.25-1.35	1.40-1.60	1.60-1.80

Values and lease rates taken from *Airfinance Journal* February 2015

Future developments

There has been much discussion and speculation about the possibility of an improved new engine (Neo) version of the A380. Emirates, the aircraft's biggest customer by some margin, has publicly encouraged Airbus to build an updated version, but there have been mixed messages from the manufacturer, which appears to be undecided as to whether there is a sufficiently large market to justify the investment.

Boeing 787-9

The Boeing 787, marketed as the Dreamliner by the manufacturer, is a twin-engine, twin-aisle aircraft that typically seats between 240 and 330 passengers depending on the variant. The 787 was designed to be 20% more fuel-efficient than the 767 model.

Several major suppliers have key roles in the production of the 787 and their involvement has been blamed in part for the type's troubled development programme.

Although originally planned to enter service in 2008, the original 787-8 model did not gain US and European type certification until 2011, after which it entered service with lunch customer All Nippon Airways. Its early service history was also marred by a number of reliability issues.

The stretched 787-9 variant, which has a greater range than the original variant, first flew in 2013 and deliveries began in 2014.

Current market value ($m)			
Build year	**2014**	**2015**	**2016**
CV view	119.6	127.2	142.8
ICF view	122.0	130.0	138.5

Assuming standard Istat criteria.

Indicative lease rates ($'000s/month)			
Build year	**2014**	**2015**	**2016**
CV view	1,100	1,175	1,250
ICF view	950–1,100	1,000–1,125	1,050–1,175

Values and lease rates as published in *Airfinance Journal* May 2016.

Future developments

The next model of the family to enter service will be the 787-10, which is a further stretch of the original model. Kawasaki Heavy Industries, Boeing's Japanese production partner, began work on a section of the new model's fuselage in March, 2016.

The largest member of the 787 family will undergo final assembly at Boeing's production facility in North Charleston, South Carolina. Total 787 production for all models is planned to rise to 14 aircraft a month, with 787-9s and -8s being built in Everett, Washington State.

Airbus A350-900

The A350-900, given the suffix XWB (extra wide body) by the manufacturer, is the first model of Airbus' new family of widebody aircraft to enter service, beginning operations in January 2015. The A350 family also includes the smaller -800 model and the larger -1000 variant. The manufacturer says the A350-900 has a 25% lower fuel consumption than its current generation long-range competitors.

In May 2016 the US Federal Aviation Administration (FAA) approved the A350-900 for etops (extended-range twin engine operations) flights beyond 180 minutes diversion time.

Current market value ($m)			
Build year	**2014***	**2015**	**2016**
Avitas view	120.6	129.8	140.1
CV view	-	130.5	150.0
Oriel view	125.0	135.0	146.1

Assuming standard Istat criteria.

Indicative lease rates ($'000s/month)			
Build year	**2014***	**2015**	**2016**
Avitas view	0.95–1.05	1.01–1.11	1.07–1.17
CV view	-	1.05	1.20
Oriel view	1.00	1.05	1.15

* Build year 2014 / delivery 2015

Values and lease rates as published in *Airfinance Journal* June 2016.

Future developments

Airbus has launched an ultra long-range version of the A350-900. Designated as the A350-900ULR, the model offers increased fuel-carrying capacity of up to 165,000 litres and a higher 280-tonne maximum takeoff weight to enable non-stop flights of up to 19 hours.

>>>

Boeing 737-800

The 737-800 is the biggest selling member of the successful, so-called, next-generation (NG) family. The other members are the 737-600, the -700 and the -900ER models.

The 737-800 was the second member of the family and entered service in 1998, succeeding the 737-400. It incorporated a new, larger wing with increased fuel capacity and optional winglets, an enhanced electronic flight instrument system (Efis) and upgraded systems. The aircraft was equipped with CFM56-7B engines, which provided a step change in fuel efficiency compared to the older technology engines that powered the classic generation of 737s. The 737-800's most direct competitor is the slightly smaller Airbus A320.

The Boeing NG family has been continuously developed, notably with the addition of a blended winglets option.

In 2009 Boeing and CFM introduced the upgraded CFM56-7BE engine enhancement programme to coincide with airframe improvements. Boeing said at the time that the combination reduced fuel consumption by 2%. The interior has also been upgraded on several occasions, with the latest incarnation being marketed by Boeing as the Sky Interior.

Current market value ($m)					
Build year	2000	2004	2008	2012	2016
CV view	17.2	21.4	29.2	34.4	46.5
ICF view	15.7	20.8	27.4	35.7	46.3
Oriel view	13.2	16.2	21.4	29.2	46.2

Assuming standard Istat criteria.

Indicative lease rates ($'000s/month)					
Build year	2000	2004	2008	2012	2016
CV view	190	210	250	290	350
ICF view	170-210	200-250	230-280	270-350	330-400
Oriel view	165	185	225	265	335

Values and lease rates as published in *Airfinance Journal* September 2016.

Future developments

The 737-800 is being replaced by the similarly sized 737 Max 8 from Boeing's latest iteration of its single-aisle family, which will be powered by CFM Leap-1B engines. Boeing says the Max family "will deliver 20% lower fuel use than the first Next-Generation 737s". However, the advantage over the latest NG models is significantly smaller. The first Max aircraft are scheduled to enter service in 2017.

Airbus A320-200

The A320 was Airbus's second major project in the commercial aircraft market. The European consortium had established a presence with the A300, but the A320 represented its entry into the single-aisle market. The first variant, the A320-100, was launched in 1984 and entered service in 1988, with the winglet equipped A320-200 taking over production from aircraft serial number 22. Some A320-100s were retrofitted to a -200 specification excluding winglets. The A320 was the first member of a family. The stretched A321 entered service in 1994, the smaller A319 in 1996, and the smallest model, the A318, in 2003.

The A320 typically seats 150 passengers in a two-class cabin, or up to 180 in a high-density layout. The A320 introduced fly-by-wire flight controls into the commercial market. Although controversial at the outset, the concept is now well established and is a key part of Airbus's family concept. The aircraft is available with either CFM International or IAE engines.

Current market value ($m)					
Build year	2000	2004	2008	2012	2016
CV view	14.8	20.9	27.9	33.7	43.1
ICF view	13.2	17.8	23.9	32.3	43.6
Oriel view	10.1	14.0	20.3	27.9	43.4

Assuming standard Istat criteria.

Indicative lease rates ($'000s/month)					
Build year	2000	2004	2008	2012	2016
CV view	155	195	235	275	335
ICF view	130-170	180-220	220-270	250-300	300-380
Oriel view	140	175	215	265	335

Values and lease rates as published in *Airfinance Journal* October/November 2016.

Future developments

The A320 has been regularly updated since its introduction into service. The current engine option (ceo) model equipped with Sharklets (wing-tip extensions) offers significantly better fuel efficiency than the original A320 models.

New engine option (neo) A320 models, which are being phased into production and airline service, offer a further step improvement in fuel efficiency over the A320ceo.

Embraer E190

Embraer's E190 is a member of its E-Jet family and is a stretch of the E170/175 models. The E190 is fitted with a larger wing, larger horizontal stabilizer and a more powerful engine – the General Electric CF34-10E – than the smaller models.

The E190 competes with the Bombardier CRJ1000 and fills a gap in the size category below the Airbus A320 and Boeing 737 families.

Embraer produces two models that can be described as 100-seaters, with the larger E195 having barely 10 more seats than the E190. The larger model has sold less well than E190.

Future developments

The success of the E190 has been in part because of the absence of a direct competitor for much of its production run.

Current market value ($m)						
Build year	2006	2008	2010	2012	2014	2016
CV view	16.5	17.7	20.0	23.0	26.9	33.9
MBA view	16.2	18.4	21.0	24.4	28.4	33.0
Oriel view	14.7	16.2	18.1	20.7	24.1	32.5

Assuming standard Istat criteria.

Indicative lease rates ($'000s/month)						
Build year	2006	2008	2010	2012	2014	2016
CV view	180	200	220	240	260	290
MBA view	167-179	180-194	195-209	215-230	237-254	262-281
Oriel view	170	180	190	210	235	280

Values and lease rates as published in *Airfinance Journal* April 2016.

However, Bombardier's new-technology CSeries models, plus the development of the A320neo and the 737 Max, have increased the competition, albeit that these new models are all somewhat larger than the Embraer aircraft.

The Brazilian manufacturer has responded by launching the developed and re-engined E2 family, of which the E190-E2 will be the first to enter service. The first E190-E2 was rolled out at Embraer's manufacturing facility in February.

Bombardier Q400

The Bombardier Dash 8-400 model, known as the Q400, is the latest member of the Dash 8 family and is the only model that remains in production. The original Dash 8-100/200, built by de Havilland Canada, entered service in 1984, with the stretched -300 version entering service in 1989. The Q400 is a further stretched version powered by Pratt & Whitney Canada PW150A engines. These powerplants provide in excess of 4,500 shaft horse-power during cruise, facilitating a speed of about 350 knots - around 50 knots (100 km per hour) faster than conventional turboprops. The high levels of cabin noise associated with turboprop aircraft are countered by the use of an active noise and vibration system. The resultant lower noise levels are emphasised by Bombardier's adoption of the Q (for quiet) prefix in the aircraft's designation. The Q400's high speed and lower cabin noise levels help make it a viable competitor to regional jets on longer sectors than is the case for more conventional turboprops. The increased speed does, however, come at the expense of higher fuel burn, making the aircraft less competitive on the shorter sectors that are the normal domain of turboprops.

Current market value ($m)				
Build year	2000	2005	2010	2015
ICF view	7.3	10.2	14.3	20.4
IBA view	7.0	9.5	13.0	19.3
Oriel view	6.8	8.7	12.2	18.7

Assuming standard Istat criteria.

Indicative lease rates ($'000s/month)				
Build year	2000	2005	2010	2015
ICF view	75-90	115-135	155-175	175-200
Oriel view	85	110	135	175

Values and lease rates taken from *Airfinance Journal* July/August 2016

Future developments

The Q400 has undergone continuous development. A package of upgrades in 2008 focussed on the cabin and included improved lighting, windows and overhead bins. The landing gear was upgraded and small fuel burn and maintenance improvements were incorporated in what Bombardier referred to as next generation (NextGen) models. In 2016, Bombardier began offering the Q400NextGen in a 90 passenger high density variant. ∧

Boeing's 737-800 reaches summit

Airfinance Journal's annual poll does not reflect well on aircraft values, although investors still have confidence in current-generation models.

The results of this year's poll suggest that aircraft values are on the descent. With a few notable exceptions, the majority of aircraft have performed worse than they did in last year's poll.

The results, collected from appraisers, lessors and other investors, show that aircraft values are expected to drop over the next 12 months.

"We have finally begun to tip over," said Ray Sisson, the former chief executive officer of Awas, in October, adding:

"I thought based on historical aviation cycles it would happen in 2018 and 2019, but low fuel prices, large orders and low interest rates have caused a glut of widebody aircraft."

"This is an oversupply-led situation," he said, predicting a drop in aircraft values because of "indigestion on orders". Investors who answered this year's poll seem to agree with him.

Single-aisle aircraft – still on top

Boeing's 737-800 is the top aircraft this year. Its high results reflect the aircraft's wide operator base, successful history in service and liquid secondary market.

Poll respondents emphasised the investment case for this aircraft type, describing it as the "best product for leasing" and the "most popular and marketable aircraft of any type". There are more than 190 operators for the aircraft type, according to *Airfinance Journal*'s Fleets.

It is followed by both generations of Airbus's A320 family: the A321neo, A320neo and current engine option A320 and A321. These aircraft rank highly for the same reasons: investors are comfortable that operators can be found for the aircraft throughout their life cycle and that residual values will hold.

Another top-performing narrowbody is the 737 Max 8, even though it is yet to enter service. The Max has attracted more than 3,300 orders ahead of its entry into service, which makes lessors and investors confident that it will be as successful as its predecessor.

The fact that current-generation and new-generation aircraft have taken top positions shows that investors are still confident in the residual values of current-generation aircraft, despite the recent or imminent arrival of new-engined variants.

The high number of 737-family and A320-family aircraft still in operation means that the secondary

SINGLE AISLE

Aircraft Type	Residual value	Value for Money	Operational success	Remarketing Potential	Overall score	Last year's score	Difference from last year
737-800	4.64	4.33	4.85	4.62	4.61	4.48	0.13
A321neo	4.48	4.48	n/a	4.40	4.45	4.52	-0.07
A320neo	4.42	4.29	4.33	4.50	4.39	4.52	-0.13
A320	3.97	4.19	4.71	4.11	4.25	4.33	-0.08
A321	3.87	4.15	4.43	4.07	4.13	4.22	-0.09
737 Max8	4.55	4.50	3.00	4.36	4.10	4.63	-0.53
CS300	3.33	3.60	n/a	3.33	3.42	2.77	0.66
737-700	3.00	3.27	3.69	3.19	3.29	2.85	0.44
737 Max9	3.36	3.50	3.00	3.00	3.22	3.88	-0.66
737-900ER	3.08	3.50	2.83	2.83	3.06	3.64	-0.58
737 Max7	3.16	3.10	4.00	3.14	3.04	3.17	-0.13
A319	2.93	2.92	3.43	2.86	3.04	2.69	0.35
CS100	2.07	3.60	2.56	2.78	2.75	2.67	0.08
A319 neo	2.75	2.55	n/a	2.64	2.64	2.77	-0.13
737-600	1.18	2.11	1.70	1.36	1.59	1.51	0.08
A318	1.09	1.50	1.09	1.18	1.22	1.35	-0.13

Source: *Airfinance Journal*'s annual Investor Poll. Responses are collected annoymously from a wide range of aircraft operators and investors.

market for these types will remain strong for some time. Even if Airbus and Boeing were suddenly to end production tomorrow, these aircraft could remain in operation and be traded in the secondary market for years to come.

According to *Airfinance Journal's* Fleets, there are 5,700 737-family aircraft and 6,810 A320-family aircraft currently in service.

An increase in fuel prices could change this dynamic. If prices are low, the operating efficiency of newer aircraft is less significant than if fuel returns to its former heights. A 10% fuel saving at $40 a barrel is less crucial to an airline's bottom line than the same percentage at $90 a barrel. Some investors say older aircraft models have been granted a lease of life by the relatively low price of fuel in recent years.

The smaller members of these aircraft families – the 737-700 and A319 – have performed well this year, but expectedly worse than the larger aircraft in their respective programmes.

The 737-700 and 737 Max 7 scored 3.29 and 3.04, respectively, while the 737-800 and 737 Max 8 scored 4.61 and 4.10. Similarly, the A319 and A319neo scored 3.04 and 2.64, respectively, compared to 4.25 and 4.39 for the A320 and A320neo.

Many airlines have been up gauging to higher-capacity narrowbodies in the past few years, as passenger demand grows. As a result, mid-size and larger narrowbodies are growing in popularity at the expense of smaller aircraft.

CSeries

The past 12 months have been crucial to Bombardier's newest aircraft programmes.

The overall scores for the CS100 and CS300 have improved this year, which matches the progress that the manufacturer has made since the publication of last year's poll. The aircraft have reportedly performed well in service, and there is far more confidence in the whole programme than there was last year, after a $1 billion investment by the government of Quebec and a number of key orders.

In the past 12 months, Bombardier has won several major orders from well-respected airlines. With an order for 45 CS300s from Air Canada in February and an order for 75 CS100s from Delta Air Lines in April, the programme's backlog rose to 325. Having targeted a backlog of 300 aircraft by the entry into service, this was an important milestone for the company.

However, to rank as highly as similarly sized products from Airbus and Boeing, Bombardier still has to convince aircraft investors that its products will be liquid enough to trade freely after the end of the first lease.

John Plueger, chief executive officer of Air lease (ALC), says the lessor would consider placing an order if airline customers expressed enough interest in the type.

> **"It's not the first lease for an aircraft type that I worry about – it's the second, third and fourth."**
>
> **John Plueger, CEO of Air Lease**

"The CS300 is a great airplane," he says, "but the question that faces any and all lessors is the customer base. We deal in high-capital items, and it's not the first lease for that aircraft type that I worry about – it's the second, third and fourth. And what is the customer base that is available for the second, third and fourth lease of that aircraft type?"

He adds: "Bombardier has made progress, with [orders from] Delta and Air Canada, but certainly needs a lot more work to approach in any way, shape or form the customer base that Airbus and Boeing enjoy."

Widebodies – remarketing concerns

The overall scores of twin-aisle aircraft are mostly flat or down compared to last year, which respondents say reflects fears of illiquidity in this market segment. There are fears that lessors will struggle to find homes for certain widebodies as they come off their first leases.

Concerns about remarketing difficulties may explain why overall scores for most widebodies have declined this year, says David Tokoph, chief operating officer at Morton Beyer & Agnew (MBA).

"There's a lot of publicity around the difficulty of placing 777-200ERs and a lot of publicity about placing A330s with Rolls-Royce engines. There's also the impending retirement of A380s, which are a concern. You have the first one starting next year, as well as the announcement by Emirates of 777-300ER retirements," he adds. "All this downward pressure is starting to come into the market."

Although Boeing's new-technology 787-9 has performed strongly this year, taking first place in the twin-aisle segment with an overall score of 4.18, many respondents have concerns about the secondary market for other aircraft types.

Boeing's 777-300ER, for example, has slipped down the table over the past two years. Having scored 3.72 last year, and 4.07 overall the year before, the aircraft achieved just 3.32 this year.

This decline is because of fears about the aircraft's remarketing potential, for which it scored 2.50 this year. In contrast, it scored 4.43 for operational success, explaining why it is one of the world's most successful widebody programmes in history, with almost 700 in service, according to Fleets.

The scores for Airbus's A350-900, the second-highest performer on the twin-aisle side, tell a similar story. The highest individual score for this aircraft type is operational success, for which it earned 4.20. Its lowest was remarketing potential, earning 3.54 and pulling its overall score down to 3.88.

Airbus and Boeing have recently announced cuts to the production rates of various widebody models, which may satisfy investors if it helps benefit residual values.

The 777 will drop from 8.3 a month to five a month in August 2017, as orders for the 777X draw sales away from the current-generation model. Airbus plans to slash A380 production by more than half to one aircraft a month in 2018, while Boeing even considered ending production on the 747 if it is unable to attract more orders.

Production rate cuts may be good news for current owners of widebody aircraft, adds MBA's Tokoph.

"There's a perception that the stopping of the 747-8 line will sustain -400 values on the freighter side for a period to come," he says. Such perceptions may explain why overall scores for the 747 models are flat or up despite the decline in production rate and the increasing average age for the in-service fleet.

Regional aircraft – deals to be found?

ATR's larger models come out top for in-production regional aircraft this year. The ATR72-600 wins overall, with an average score of 3.77, followed closely by the smaller -500 variant. Both aircraft are popular with airlines on shorter routes, say respondents.

However, there are concerns about oversupply in this market. Respondents to the poll brought up the issue of oversupply because of over-ordering by leasing companies.

On a third-quarter results call, Avation's chief executive officer, Jeff Chatfield, argued that the manufacturer's attempts to sell to US and China were leading to overproduction.

"The ATR market is oversupplied – there are too many aircraft being manufactured. The reason for that, I think, is ATR have a programme to

TWIN AISLE

Aircraft Type	Residual value	Value for Money	Operational success	Remarketing Potential	Overall score	Last year's score	Difference from last year
787-9	4.25	4.00	4.65	3.81	4.18	4.31	-0.13
A350-900	3.96	3.82	4.20	3.54	3.88	4.17	-0.29
787-8	3.46	3.55	3.88	3.46	3.59	4.12	-0.53
777-9	3.50	3.57	n/a	3.38	3.48	4.42	-0.94
777-8	3.15	3.43	4.00	3.13	3.43	3.94	-0.51
767-300ER	3.17	3.60	3.92	3.00	3.42	3.76	-0.34
787-10	3.50	3.63	n/a	3.11	3.41	4.44	-1.03
A350-1000	3.67	3.63	n/a	2.90	3.40	3.61	-0.21
A330-300	2.86	3.83	4.12	2.77	3.39	3.37	0.02
777-300ER	2.97	3.38	4.43	2.50	3.32	3.72	-0.40
A330-900 neo	3.10	3.56	n/a	2.78	3.14	3.42	-0.28
A330-200	2.27	3.23	3.46	2.21	2.79	2.92	-0.13
A330-800 neo	2.80	3.11	n/a	2.00	2.64	2.97	-0.33
777-200ER	1.86	3.17	3.42	1.81	2.56	2.78	-0.22
747-400	1.54	2.82	3.83	1.67	2.46	2.19	0.27
777-200LR	2.14	2.83	2.50	2.04	2.38	2.56	-0.18
A380	1.50	3.09	3.19	1.31	2.27	2.08	0.19
A350-800	2.20	2.56	n/a	1.90	2.22	2.75	-0.53
767-200ER	1.45	2.67	2.55	1.64	2.08	2.72	-0.64
767-400ER	1.82	2.44	2.09	1.80	2.04	2.54	-0.50
747-8 pax	1.42	2.60	1.82	1.36	1.80	1.75	0.05
A340-600	1.21	2.25	1.50	1.23	1.55	1.52	0.03
A340-500	1.14	2.04	1.25	1.15	1.40	1.36	0.04

Source: *Airfinance Journal's* annual Investor Poll. Responses are collected annoymously from a wide range of aircraft operators and investors.

introduce their aircraft in the US market. There's also an initiative to ATR to enter the Chinese market," says Chatfield.

Despite these concerns, the aircraft's popularity with operators has boosted its scores. With an operational score of 4.18 for the ATR72-600 and 4.08 for the 72-500, the respondent who described the turboprop as the "go-to aircraft for shorter routes" seems justified.

Embraer's E2 programme is another strong performer. Despite not yet having entered service, investors are confident in the demand for this aircraft family. Embraer's best-performing aircraft are its new-generation models – with the E175-E2 making it into the top 20 – as well as the larger E190-E2.

However, values for the current generation of aircraft are flat or lower than last year. Overall scores for the E170, E175 and E195 were down by 0.06, 0.20 and 0.11, respectively.

"Residual values for used E-jets are proving to be a lot lower than many buyers probably anticipated five to seven years ago, but this means that used E-Jets at current prices now represent great value for money," says Mark Hughes, executive vice-president corporate finance at Falko.

Although some regional aircraft are winning investors over, the minor regional original equipment manufacturers (OEMs) are still met with international scepticism.

Sukhoi's SSJ100, for example, is still one of the worst ranked aircraft. Respondents have little faith in its residual value prospects, its operational success or its remarketing potential. Although some airlines may have success with the aircraft in their fleet, the customer base is too small for most investors to give it a second look.

Although the SSJ100 received some good publicity this year with the entry into service of the first of 15 aircraft with Irish airline CityJet, investors are not convinced by its residual value, remarketing potential or value for money.

There are similar problems for Mitsubishi's MRJ, Comac's C919 and ARJ21 and Irkut's MC-21. Issues such as programme risk, limited manufacturer support and thin orderbooks have dissuaded all but a few investors. Without large orders from high-profile customers, these manufacturers will remain unable to compete with the larger OEMs. ^

METHODOLOGY

The poll asked respondents to rate aircraft types from one to five in four categories (one is worst and five is best). The categories were: residual value, value for money, operational success and remarketing potential. Only current production and in-development models were included in the questionnaire. The operational success category was omitted for aircraft in development.

The overall ranking is the mean value of the three categories. Responses were completed on the understanding they would remain anonymous. ^

ENGINE CHOICE

Some respondents argue that rating certain aircraft types without reference to the choice of engine manufacturer is unhelpful, because values can vary dramatically between the engine variants.

However, given that the poll focuses on new production and in-development models, the issue is becoming less critical because fewer aircraft types are offered with a choice of engines from different manufacturers.

Among the more popular models, only the A320 and 787 families offer a choice. The trend to single source engine suppliers is confirmed by the absence of an alternative powerplant on new widebody programmes such as the 777X and the A330neo. Should an A380neo be launched, it seems unlikely there would be more than one engine supplier. ^

REGIONAL

Aircraft Type	Residual value	Value for Money	Operational success	Remarketing Potential	Overall score	Last year's score	Difference from last year
ATR72-600	3.54	3.70	4.18	3.67	3.77	4.04	-0.27
E175-E2	3.42	3.20	n/a	3.10	3.68	3.53	0.15
ATR72-500	3.29	3.58	4.08	3.15	3.53	4.00	-0.47
E190-E2	3.73	3.44	n/a	3.30	3.49	3.71	-0.22
Q400	3.47	3.38	3.54	3.57	3.49	3.30	0.19
ATR42-500	3.45	3.50	3.50	3.15	3.40	3.67	-0.27
E190	3.12	3.40	3.86	2.93	3.33	3.31	0.02
E195-E2	3.45	3.33	n/a	3.00	3.26	3.66	-0.40
ATR42-600	3.18	3.50	3.36	2.91	3.24	3.81	-0.57
E175	2.93	3.15	3.71	3.13	3.23	3.43	-0.20
E195	2.69	3.07	3.29	2.79	2.96	3.07	-0.11
CRJ900	2.64	2.75	3.46	2.71	2.89	2.99	-0.10
E170	2.53	3.17	3.00	2.67	2.84	2.90	-0.06
CRJ705	2.30	2.67	2.70	2.40	2.52	2.33	0.19
CRJ700	2.14	2.58	3.08	2.00	2.45	2.38	0.07
MRJ	2.63	2.57	n/a	2.13	2.44	n/a	n/a
ERJ-145	1.67	2.21	3.04	1.71	2.16	1.72	0.44
CRJ200	1.44	2.50	2.92	1.73	2.15	1.39	0.76
CRJ1000	2.07	2.69	2.00	1.79	2.14	2.47	-0.33
C919	1.71	2.67	n/a	1.29	1.89	n/a	n/a
SSJ-100	1.67	2.38	2.00	1.50	1.89	1.94	-0.05
ERJ-140	1.14	2.00	2.21	1.36	1.68	1.56	0.12
MC-21	1.57	2.17	n/a	1.29	1.67	n/a	n/a
ARJ21	1.33	1.80	1.60	1.33	1.52	n/a	n/a

Source: *Airfinance Journal's* annual Investor Poll. Responses are collected annoymously from a wide range of aircraft operators and investors.

The numbers

Aircraft data index

The following pages include key data for current production commercial aircraft. Aircraft that have not yet entered service are not included, because the information available has not been confirmed by in-service experience. The information provided is based on a number of key assumptions as detailed in the following.

Technical characteristics

The operating empty weight (OEW) is based on the manufacturers' figures where available or *Airfinace Journal* estimates. Actual in-service weights are likely to be higher than those quoted.

Fuels and times

The figures shown for fuels and times are *Airfinance Journal*'s estimates based on a variety of sources. They are intended to reflect 60% passenger load factors, international standard atmosphere (ISA) conditions en-route, zero winds and optimum flight levels.

Indicative maintenance costs

The maintenance figures are intended as a guide to the order of magnitude of reserves associated with the various aircraft types. The figures are intended to reflect mature costs with no account taken of warranty effects and other reductions associated with new aircraft.

The C-check and heavy-check reserves are based on typical check costs and intervals. No allowance is made for cabin refurbishment. The cost quoted for component overhaul excludes inventory support.

Unless stated, the engine costs refer to the most common engine type for the aircraft model in question.

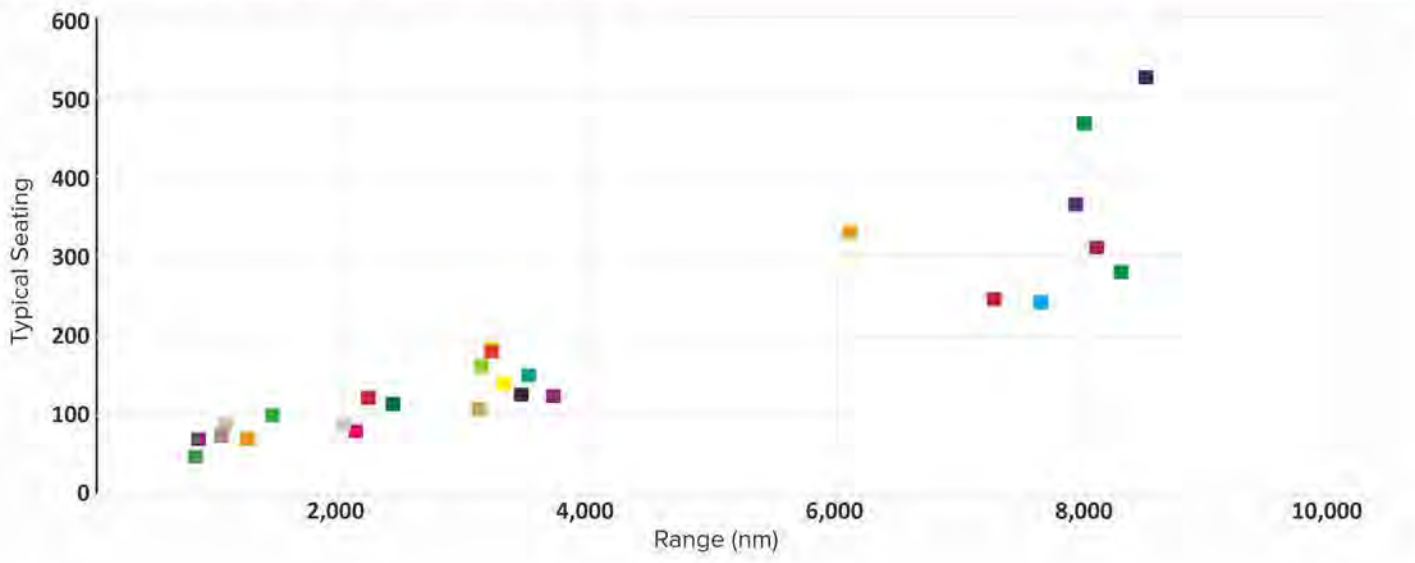
The information used to estimate the indicative maintenance reserves has been collected from a wide variety of sources. While *Airfinance Journal* has made every effort to normalise the data, direct comparisons between aircraft types may be misleading.

It should also be noted that maintenance costs of a particular type are highly dependent on the route structure, operating environment and maintenance philosophy of the airline with which the aircraft is in service. As such our estimates are difficult to reconcile with the numbers provided by manufacturers.

Seating/range

The numbers quoted for seating capacity are based on the manufacturers' selling standards. Large variations are possible, particularly for widebody aircraft. The ranges shown are for still-air conditions, optimum flight levels and are based on the typical seating figure and the operating empty weight quoted by the manufacturer. Ranges in airline operation are likely to be significantly less than the figures quoted.

Seating and range for current production aircraft



A319

SEATING/RANGE		
Max seating	145	
Typical seating two class	124	
Max range (Non ER version)	3,700	nm

TECHNICAL CHARACTERISTICS		
MTOW	64	tonnes / 76 tonnes
OEW	40	tonnes
MZFW	58	tonnes
Fuel capacity	23,860	litres / 29,840 litres
Engines	CFM56-7B/V2500	
Thrust	22,000	lbs (98kn)

FUELS AND TIMES		
Block fuel 200Nm	1,710	kg
Block fuel 500nm	3,140	kg
Block fuel 1000 Nm	5,620	kg
Block time 200Nm	54	minutes
Block time 500Nm	94	minutes
Block time 1000Nm	160	minutes

FLEET (INCLUDING ACJS)		
Entry into service	1996	April
In service	1,379	
Operators (current and planned)	172	
In storage	44	
On order	79	
Built peak year (2005)	142	
Estimated production 2017	25	
Average age	11.4	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$60-65	per flight hour
Higher checks reserve	$55-60	per flight hour
Engine overhaul	$95-100	per engine flight hour
Engine LLP	$120-125	per engine cycle
Landing gear refurbishment	$35-40	per cycle
Wheels brakes and tyres	$120-130	per cycle
APU	$75-80	per APU hour
Component overhaul	$210-220	per flight hour

A320ceo

SEATING/RANGE		
Max seating	180	
Typical seating two class	150	
Max range (Non ER version)	3,500	nm (6,500 km) (with sharklets)

TECHNICAL CHARACTERISTICS		
MTOW	73.5	tonnes / 78 tonnes
OEW	42	tonnes
MZFW	61	tonnes / 62.5 tonnes
Fuel capacity	24,210	litres / 27,200 litres
Engines	CFM56-5B/V2500	
Thrust	25,000	lbs (120kn)

FUELS AND TIMES		
Block fuel 200Nm	1,850	kg
Block fuel 500nm	3,390	kg
Block fuel 1000 Nm	6,080	kg
Block time 200Nm	54	minutes
Block time 500Nm	94	minutes
Block time 1000Nm	160	minutes

FLEET		
Entry into service	1988	March
In service:	3,945	
Operators (current and planned)	267	
In storage	106	
On order	361	(plus 3,112 A320neo)
Built peak year (2013)	352	
Estimated production 2017	148	
Average age	8.6	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$60-65	per flight hour
Higher checks reserve	$55-60	per flight hour
Engine overhaul	$100-105	per engine flight hour
Engine LLP	$120-125	per engine cycle
Landing gear refurbishment	$35-40	per cycle
Wheels brakes and tyres	$120-130	per cycle
APU	$75-80	per APU hour
Component overhaul	$210-220	per flight hour

A320neo

SEATING/RANGE		
Max seating	195	
Typical seating	150	(12+138)
Typical range	3,500 Nm (6,500km)	nm (5,950 km) (with sharklets)
TECHNICAL CHARACTERISTICS		
MTOW	79	tonnes / 93.5 tonnes
OEW	44	tonnes
MZFW	64	tonnes/73.8 tonnes
Fuel capacity	26,730 litres	litres / 29,840 litres
Engines	Leap-1A/PW1100G	
Thrust	27,000 lbbs	kn (25-27,000 lbs)
FUELS AND TIMES		
Block fuel 200Nm	1,570	kg
Block fuel 500nm	2,880	kg
Block fuel 1000 Nm	5,170	kg
Block time 200Nm	54	minutes
Block time 500Nm	94	minutes
Block time 1000Nm	160	minutes
FLEET (INCLUDING -100S)		
Entry into service	2016	April
In Service:	46	
Operators (current and planed)	69	
In Storage	0	
On order	3,227	(plus 1,022 A21neo)
Average age	less than one year	
Estimated production 2015	201	
Average age	6.8	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES

Insufficient data available

A321-200

SEATING/RANGE		
Max seating	236	
Typical seating two class	185	
Maximum range (Non ER version)	3,200	nm (5,950 km) (with sharklets)
TECHNICAL CHARACTERISTICS		
MTOW	89	tonnes / 93.5 tonnes
OEW	48	tonnes
MZFW	71.5	tonnes/73.8 tonnes
Fuel capacity	23,860	litres / 29,840 litres
Engines	CFM56-5B/V2500	
Thrust	27,000	lbs - 33,000lbs (120-148kn)
FUELS AND TIMES		
Block fuel 200Nm	2,310	kg
Block fuel 500nm	4,230	kg
Block fuel 1000 Nm	7,590	kg
Block time 200Nm	54	minutes
Block time 500Nm	94	minutes
Block time 1000Nm	160	minutes
FLEET (INCLUDING -100S)		
Entry into service	1996	April
In service:	1,300	
Operators (current and planned)	110	
In storage	27	
On order	254	
Built peak year (2016 estimate)	204	
Estimated production 2017	201	
Average age	6.0	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$65-70	per flight hour
Higher checks reserve	$60-65	per flight hour
Engine overhaul	$115-120	per engine flight hour
Engine LLP	$120-125	per engine cycle
Landing gear refurbishment	$35-40	per cycle
Wheels brakes and tyres	$120-130	per cycle
APU	$75-80	per APU hour
Component overhaul	$210-220	per flight hour

A330-200

SEATING/RANGE		
Max seating	406	
Typical seating	246	(two class)
Maximum range (Non ER version)	7,270	nm (13,450 km)
TECHNICAL CHARACTERISTICS		
MTOW	230	tonnes / 240 tonnes
OEW	121	tonnes
MZFW	168	tonnes/170 tonnes
Fuel capacity	139,090	litres
Engines	PW4000	/CF6-80E1/Trent 700
Thrust	68,000	lbs - 72,000lbs (303-316kn)
FUELS AND TIMES		
Block fuel 1,000 Nm	12,720	kg
Block fuel 2,000 Nm	23,710	kg
Block fuel 4,000 Nm	45,680	kg
Block time 1,000 Nm	184	minutes
Block time 2,000 Nm	299	minutes
Block time 4,000 Nm	529	minutes
FLEET (INCLUDING FREIGHTER VERSIONS)		
Entry into service	1998	April
In service:	532	
Operators (current and planned)	109	
In storage	58	
On order	33	
Built peak year (2013)	51	
Estimated production 2017	11	
Average age	8.6	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$105-110	per flight hour
Higher checks reserve	$95-100	per flight hour
Engine overhaul (Trent)	$260-275	per engine flight hour
Engine LLP (Trent)	$240-245	per engine cycle
Landing gear refurbishment	$150-155	per cycle
Wheels brakes and tyres	$375-380	per cycle
APU	$105-110	per APU hour
Component overhaul	$420-425	per flight hour

A330-300

SEATING/RANGE		
Max seating	440	
Typical seating	300	(two class)
Maximum range (Non ER version)	6,100	nm (11,300 km)
TECHNICAL CHARACTERISTICS		
MTOW	230	tonnes / 240 tonnes
OEW	121	tonnes
MZFW	173	tonnes/175 tonnes
Fuel capacity	97,530	litres
Engines	PW4000	/CF6-80E1/Trent 700
Thrust	68,000	lbs - 72,000lbs (303-316kn)
FUELS AND TIMES		
Block fuel 1,000 Nm	13,120	kg
Block fuel 2,000 Nm	24,460	kg
Block fuel 4,000 Nm	47,120	kg
Block time 1,000 Nm	184	minutes
Block time 2,000 Nm	299	minutes
Block time 4,000 Nm	529	minutes
FLEET		
Entry into service	1993	December
In service:	624	
Operators (current and planned)	72	
In storage	28	
On order	143	
Built peak year (2014)	74	
Estimated production 2017	57	
Average age	7.4	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$105-110	per flight hour
Higher checks reserve	$95-100	per flight hour
Engine overhaul (Trent)	$260-275	per engine flight hour
Engine LLP (Trent)	$240-245	per engine cycle
Landing gear refurbishment	$150-155	per cycle
Wheels brakes and tyres	$375-380	per cycle
APU	$105-110	per APU hour
Component overhaul	$420-425	per flight hour

A350-900

SEATING/RANGE		
Max seating	475	
Typical seating	311	
Maximum range	8,100	nm (15,000 km)

TECHNICAL CHARACTERISTICS		
MTOW	268	tonnes
OEW	116	tonnes
MZFW	192	tonnes
Fuel capacity	138,000	litres
Engines	Trent XWB	
Thrust	84,000	lbf (374kn)

FUELS AND TIMES		
Block fuel 1,000 Nm	11,810	kg
Block fuel 2,000 Nm	22,010	kg
Block fuel 4,000 Nm	42,410	kg
Block time 1,000 Nm	179	minutes
Block time 2,000 Nm	291	minutes
Block time 4,000 Nm	512	minutes

FLEET		
Entry into service	2014	
In service:	53	
Operators (current and planned)	40	
In storage	none	
On order	573	
Built peak year (2016 estimated)	45	
Estimated production 2017	97	
Average age	0.8	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$105-110	per flight hour
Higher checks reserve	$95-100	per flight hour
Engine overhaul	$260-265	per engine flight hour
Engine LLP	$240-245	per engine cycle
Landing gear refurbishment	$150-155	per cycle
Wheels brakes and tyres	$375-380	per cycle
APU	$105-110	per APU hour
Component overhaul	$420-425	per flight hour

A380

SEATING/RANGE		
Max seating	853	
Typical seating	525	three class
Maximum range	8,500	nm (15,700 km)

TECHNICAL CHARACTERISTICS		
MTOW	560	tonnes
OEW	277	tonnes
MZFW	361	tonnes
Fuel capacity	320,000	litres
Engines	GP7200	/Trent 900
Thrust	70,000	lbs (311kN)

FUELS AND TIMES		
Block fuel 1,000 Nm	26,590	kg
Block fuel 2,000 Nm	50,580	kg
Block fuel 4,000 Nm	104,290	kg
Block time 1,000 Nm	146	minutes
Block time 2,000 Nm	265	minutes
Block time 4,000 Nm	501	minutes

FLEET		
Entry into service	2007	October
In service:	176	
Operators (current and planned)	17	
In storage	2	
On order	127	
Built peak year (2012)	30	
Estimated production 2017	5	
Average age	3.9	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$160-165	per flight hour
Higher checks reserve	$145-150	per flight hour
Engine overhaul	$190-195	per engine flight hour
Engine LLP	$195-200	per engine cycle
Landing gear refurbishment	$200-205	per cycle
Wheels brakes and tyres	$565-570	per cycle
APU	$155-160	per APU hour
Component overhaul	$575-580	per flight hour

ATR42-600

SEATING/RANGE		
Max seating	50	@30in
Typical seating	48	@30in
Maximum range	800	nm (1,480 km)

TECHNICAL CHARACTERISTICS		
MTOW	18.6	tonnes
OEW	11.5	tonnes
MZFW	16.7	tonnes
Fuel capacity	5,700	litres
Engines	PW127M	
Thrust	2,160	shp

FUELS AND TIMES		
Block fuel 100Nm	340	kg
Block fuel 200 Nm	560	kg
Block fuel 500 Nm	1,210	kg
Block time 100Nm	33	minutes
Block time 200Nm	55	minutes
Block time 500Nm	122	minutes

FLEET		
Entry into service	2012	1996 for -500
In service	27	
Operators	17	
In storage	3	
On order	35	
Built peak year (2014)	11	
Estimated production 2017	14	
Average age	2.3	year

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$35-40	per flight hour
Higher checks reserve	$25-30	per flight hour
Engine overhaul	$95-100	per engine flight hour
Engine LLP	$25-30	per engine cycle
Landing gear refurbishment	$20-25	per cycle
Wheels brakes and tyres	$35-40	per cycle
Propeller	$15-20	per propeller hour
Component overhaul	$115-120	per flight hour

ATR72-600

SEATING/RANGE		
Max seating	74	@30in
Typical seating	70	@30 inch pitch
Maximum range	825	nm

TECHNICAL CHARACTERISTICS		
MTOW	22.8	tonnes/23 tonnes
OEW	14	tonnes
MZFW	20.8	tonnes/21 tonnes
Fuel capacity	6,370	litres
Engines	PW127M	
Thrust	2,475	shp

FUELS AND TIMES		
Block fuel 100Nm	370	kg
Block fuel 200 Nm	610	kg
Block fuel 500 Nm	1,310	kg
Block time 100Nm	36	minutes
Block time 200Nm	58	minutes
Block time 500Nm	125	minutes

FLEET		
Entry into service	2011	1998 for -500
In service	299	
Operators	66	
In storage	37	
On order	256	
Built peak year 2015	108	
Estimated production 2017	89	
Average age (ATR72-500)	2.4	year

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$35-40	per flight hour
Higher checks reserve	$25-30	per flight hour
Engine overhaul	$100-105	per engine flight hour
Engine LLP	$30-35	per engine cycle
Landing gear refurbishment	$20-25	per cycle
Wheels brakes and tyres	$35-40	per cycle
Propeller	$15-20	per propeller hour
Component overhaul	$125-130	per flight hour

Boeing 737-700

SEATING/RANGE		
Max seating	149	@30in
Typical seating	126	@34/32
Maximum range	3,440	nm (6,370 km) (with winglets)
TECHNICAL CHARACTERISTICS		
MTOW	70.1	tonnes (77.6 for ER version)
OEW	38	tonnes
MZFW	54.7	tonnes
Fuel capacity	26,020	litres / 40,580 litres
Engines	CFM56-7B	
Thrust	26,300	lbs (116 kn)
FUELS AND TIMES		
Block fuel 200Nm	1,810	kg
Block fuel 500nm	3,190	kg
Block fuel 1000 Nm	5,590	kg
Block time 200Nm	54	minutes
Block time 500Nm	94	minutes
Block time 1000Nm	160	minutes
FLEET		
Entry into service	1998	January
In service:	1,070	(includes 737-700C)
Operators (current and planned)	86	
In storage	23	
On order	80	
Built peak year (2004)	111	
Estimated production 2017	12	
Average age	12.1	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$65-70	per flight hour
Higher checks reserve	$50-55	per flight hour
Engine overhaul	$115-120	per engine flight hour
Engine LLP	$120-125	per engine cycle
Landing gear refurbishment	$45-50	per cycle
Wheels brakes and tyres	$70-75	per cycle
APU	$80-85	per APU hour
Component overhaul	$210-220	per flight hour

Boeing 737-800

SEATING/RANGE		
Max seating	189	@30in
Typical seating	162	@34/32
Maximum range	3,115	nm (5,767 km) (with winglets)
TECHNICAL CHARACTERISTICS		
MTOW	79	tonnes
OEW	41.1	tonnes
MZFW	61.7	tonnes / 62.7 tonnes
Fuel capacity	26,020	litres / 40,580 litres
Engines	CFM56-7B	
Thrust	27,300	lbs (121kn)
FUELS AND TIMES		
Block fuel 200Nm	2,000	kg
Block fuel 500nm	3,530	kg
Block fuel 1000 Nm	6,190	kg
Block time 200Nm	54	minutes
Block time 500Nm	94	minutes
Block time 1000Nm	160	minutes
FLEET		
Entry into service	1998	April
In service:	4,178	
Operators (current and planned)	200	
In storage	59	
On order	709	
Built peak year (2015)	398	
Estimated production 2017	270	
Average age	6.9	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$65-70	per flight hour
Higher checks reserve	$50-55	per flight hour
Engine overhaul	$115-120	per engine flight hour
Engine LLP	$120-125	per engine cycle
Landing gear refurbishment	$45-50	per cycle
Wheels brakes and tyres	$70-75	per cycle
APU	$80-85	per APU hour
Component overhaul	$210-220	per flight hour

Boeing 737-900ER

SEATING/RANGE		
Max seating	215	
Typical seating	180	
Maximum range	3,200	nm (5,920 km)
TECHNICAL CHARACTERISTICS		
MTOW	85.1	tonnes
OEW	42.5	tonnes
MZFW	67.8	tonnes
Fuel capacity	29,660	litres
Engines	CFM56-7B	
Thrust	27,300	lbs (121kn)
FUELS AND TIMES		
Block fuel 200Nm	2,080	kg
Block fuel 500nm	3,660	kg
Block fuel 1000 Nm	6,420	kg
Block time 200Nm	54	minutes
Block time 500Nm	95	minutes
Block time 1000Nm	160	minutes
FLEET		
Entry into service	2001	
In service:	409	
Operators (current and planned)	21	
In storage	3	
On order	102	
Built peak year (2014)	73	
Estimated production 2017	44	
Average age	3.7	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$70-75	per flight hour
Higher checks reserve	$50-55	per flight hour
Engine overhaul	$115-120	per engine flight hour
Engine LLP	$120-125	per engine cycle
Landing gear refurbishment	$45-50	per cycle
Wheels brakes and tyres	$70-75	per cycle
APU	$80-85	per APU hour
Component overhaul	$210-220	per flight hour

Boeing 747-8I

SEATING/RANGE		
Max seating	605	
Typical seating	467	three class
Maximum range	8,000	nm (14,815 km)
TECHNICAL CHARACTERISTICS		
MTOW	447.7	tonnes (987,000lbs)
OEW	218	tonnes
MZFW	295	tonnes
Fuel capacity	238,610	litres
Engines	GEnx-2B67	
Thrust	66,500	lbs
FUELS AND TIMES		
Block fuel 1000Nm	20,370	kg
Block fuel 2000Nm	38,760	kg
Block fuel 4000Nm	79,910	kg
Block time 1000Nm	146	minutes
Block time 2000Nm	265	minutes
Block time 4000Nm	501	minutes
FLEET		
Entry into service	2011	(2010 for freighter)
In service:	33	plus 69 freighters and 5 BBJ s
Operators (current and planned)	22	including freighters and BBJs
In storage	3	
On order	2	plus 4 freighters and 2 BBJ s
Built peak year (2013)	28	
Estimated production 2017	9	
Average age	3.0	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES (747-400 FIGURES)		
C-check reserve	$155-160	per flight hour
Higher checks reserve	$115-120	per flight hour
Engine overhaul	$165-170	per engine flight hour
Engine LLP	$255-260	per engine cycle
Landing gear refurbishment	$160-165	per cycle
Wheels brakes and tyres	$750-755	per cycle
APU	$105-110	per APU hour
Component overhaul	$505-510	per flight hour

Boeing 777-200LR

SEATING/RANGE		
Max seating	440	
Typical seating	301	three class
Maximum range	9,395	nm (17,395 km)
TECHNICAL CHARACTERISTICS		
MTOW	347.5	tonnes (766,000lbs)
OEW	137	tonnes
MZFW	191	tonnes
Fuel capacity	181,280	litres/202,570 litres
Engines	GE90-110B1	/GE90-115BL
Thrust	110,000	lbs - 115,300lbs (489 -512 kN)
FUELS AND TIMES		
Block fuel 1,000 Nm	14,140	kg
Block fuel 2,000 Nm	26,350	kg
Block fuel 4,000 Nm	50,780	kg
Block time 1,000 Nm	152	minutes
Block time 2,000 Nm	277	minutes
Block time 4,000 Nm	525	minutes
FLEET		
Entry into service	2005	
In service:	57	
Operators (current and planned)	14	
In storage	2	
On order	none	
Built peak year (2009)	16	
Estimated production 2017	none	
Average age	7.6	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$125-130	per flight hour
Higher checks reserve	$90-95	per flight hour
Engine overhaul	$290-295	per engine flight hour
Engine LLP	$450-455	per engine cycle
Landing gear refurbishment	$160-165	per cycle
Wheels brakes and tyres	$480-485	per cycle
APU	$105-110	per APU hour
Component overhaul	$410-415	per flight hour

Boeing 777-300ER

SEATING/RANGE		
Max seating	550	
Typical seating	365	three class
Maximum range	7,930	nm (14,685 km)
TECHNICAL CHARACTERISTICS		
MTOW	351.5	tonnes (775,000lbs)
OEW	168	tonnes
MZFW	238	tonnes
Fuel capacity	181,280	litres
Engines	GE90-115BL	
Thrust	115,300	lbs
FUELS AND TIMES		
Block fuel 1,000 Nm	15,610	kg
Block fuel 2,000 Nm	29,840	kg
Block fuel 4,000 Nm	60,900	kg
Block time 1,000 Nm	152	minutes
Block time 2,000 Nm	277	minutes
Block time 4,000 Nm	525	minutes
FLEET		
Entry into service	2003	for ER (1997 for original -300)
In service:	701	plus 60 non ER models
Operators (current and planned)	46	
In storage	1	
On order	125	
Built peak year (2013)	80	
Estimated production 2017	65	
Average age	5.0	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$125-130	per flight hour
Higher checks reserve	$90-95	per flight hour
Engine overhaul	$290-295	per engine flight hour
Engine LLP	$450-455	per engine cycle
Landing gear refurbishment	$160-165	per cycle
Wheels brakes and tyres	$480-485	per cycle
APU	$105-110	per APU hour
Component overhaul	$410-415	per flight hour

Boeing 787-8

SEATING/RANGE		
Max seating	350	
Typical seating	242	
Maximum range	7,650	nm to 8,200 nm (14,200 km to 15,200km)
TECHNICAL CHARACTERISTICS		
MTOW	227.9	tonnes (502,500lbs)
OEW	110	tonnes
MZFW	172	tonnes
Fuel capacity	126,920	litres
Engines	Genx	/Trent 1000
Thrust	64,000	lbs (280 kN)
FUELS AND TIMES		
Block fuel 1000Nm	10,170	kg
Block fuel 2000Nm	18,970	kg
Block fuel 4000Nm	36,540	kg
Block time 1000Nm	178	minutes
Block time 2000Nm	265	minutes
Block time 4000Nm	510	minutes
FLEET		
Entry into service	2011	
In service:	316	
Operators (current and planned)	50	
In storage	5	
On order	128	
Built peak year (2014)	103	
Estimated production 2017	31	
Average age	2.5	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$110-115	per flight hour
Higher checks reserve	$80-85	per flight hour
Engine overhaul	$290-300	per engine cycle
Engine LLP	$300-305	per engine cycle
Landing gear refurbishment	$75-80	per cycle
Wheels, brakes and tyres	$100-105	per cycle
APU	$105-110	per APU hour
Component overhaul	$315-320	per flight hour

Boeing 787-9

SEATING/RANGE		
Max seating	408	
Typical seating	280	two class
Maximum range	8,300	nm (14,370 km)
TECHNICAL CHARACTERISTICS		
MTOW	252.7	tonnes (557,000lbs)
OEW	120	tonnes
MZFW	181	tonnes
Fuel capacity	138,700	litres
Engines	GEnx1B	/Trent 1000
Thrust	71,000	lbs (320 kN)
FUELS AND TIMES		
Block fuel 1000Nm	10,480	kg
Block fuel 2000Nm	19,500	kg
Block fuel 4000Nm	37,630	kg
Block time 1000Nm	178	minutes
Block time 2000Nm	265	minutes
Block time 4000Nm	510	minutes
FLEET		
Entry into service	2014	
In service:	172	
Operators (current and planned)	52	
In storage	2	
On order	478	
Built peak year (2016)	127	
Estimated production 2017	122	
Average age	0.9	

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$110-115	per flight hour
Higher checks reserve	$85-90	per flight hour
Engine overhaul	$305-310	per engine cycle
Engine LLP	$315-320	per engine cycle
Landing gear refurbishment	$75-80	per cycle
Wheels brakes and tyres	$100-105	per cycle
APU	$125-130	per APU hour
Component overhaul	$320-325	per flight hour

BOMBARDIER CRJ700

SEATING/RANGE		
Max seating	78	
Typical seating	70	at 31inch pitch
Maximum range	1,220	nm (2,260 km)

TECHNICAL CHARACTERISTICS		
MTOW	33	tonnes (72,750 lbs)
OEW	20.1	tonnes (44,245 lbs)
MZFW	28.3	tonnes (62,300 lbs)
Fuel capacity	10,990	litres
Engines	CF34-8C5B1	
Thrust	12,670	lbs (56 kn)

FUELS AND TIMES		
Block fuel 200 Nm	1,150	kg
Block fuel 500 Nm	1,950	kg
Block time 200 Nm	45	minutes
Block time 500 Nm	88	minutes

FLEET		
Entry into service	2001	
In service:	335	
Operators (current and planned)	26	
In storage	12	
On order	2	
Built peak year (2005)	68	
Estimated production 2017	2	
Average age	11.2	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$45-50	per flight hour
Higher checks reserve	$35-40	per flight hour
Engine overhaul	$70-75	per engine flight hour
Engine LLP	$100-105	per engine cycle
Landing gear refurbishment	$30-35	per cycle
Wheels brakes and tyres	$45-50	per cycle
APU	$55-60	per APU hour
Component overhaul	$150-160	per flight hour

BOMBARDIER CRJ900

SEATING/RANGE		
Max seating	90	
Typical seating	88	at 31inch pitch
Maximum range	1,040	nm (1,940 km)

TECHNICAL CHARACTERISTICS		
MTOW	36.5	tonnes (80,500 lbs)
OEW	21.8	tonnes (48,160 lbs)
MZFW	31.8	tonnes (70,000 lbs)
Fuel capacity	10,990	litres
Engines	CF34-8C5	
Thrust	13,360	lbs (59kn)

FUELS AND TIMES		
Block fuel 200 Nm	1,240	kg
Block fuel 500 Nm	2,100	kg
Block time 200 Nm	45	minutes
Block time 500 Nm	88	minutes

FLEET		
Entry into service	2001	
In service:	392	
Operators (current and planned)	25	
In storage	6	
On order	39	
Built peak year (2008)	59	
Estimated production 2017	12	
Average age	6.6	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$50-55	per flight hour
Higher checks reserve	$35-40	per flight hour
Engine overhaul	$70-75	per engine flight hour
Engine LLP	$100-105	per engine cycle
Landing gear refurbishment	$30-35	per cycle
Wheels brakes and tyres	$50-55	per cycle
APU	$60-65	per APU hour
Component overhaul	$160-165	per flight hour

CRJ1000

SEATING/RANGE		
Max seating	104	
Typical seating	100	at 31inch pitch
Maximum range	1,425	nm (2,640 km)
TECHNICAL CHARACTERISTICS		
MTOW	40.8	tonnes (90,000 lbs)
OEW	23.2	tonnes (51,120 lbs)
MZFW	35.2	tonnes (77,500 lbs)
Fuel capacity	10,990	litres
Engines	CF34-8C5A1	
Thrust	13,360	lbs (59kn)
FUELS AND TIMES		
Block fuel 200 Nm	1,320	kg
Block fuel 500 Nm	2,200	kg
Block time 200 Nm	45	minutes
Block time 500 Nm	88	minutes
FLEET		
Entry into service	2011	
In service:	50	
Operators (current and planned)	4	
In storage	1	
On order	21	
Built peak year (2011)	17	
Estimated production 2017	6	
Average age	3.5	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$50-55	per flight hour
Higher checks reserve	$35-40	per flight hour
Engine overhaul	$70-75	per engine flight hour
Engine LLP	$100-105	per engine cycle
Landing gear refurbishment	$30-35	per cycle
Wheels brakes and tyres	$50-55	per cycle
APU	$60-65	per APU hour
Component overhaul	$160-165	per flight hour

Q400

SEATING/RANGE		
Max seating	80	
Typical seating	74	at 31inch pitch
Maximum range	1,010	nm (1,870 km)
TECHNICAL CHARACTERISTICS		
MTOW	29.5	tonnes (65,200 lbs)
OEW	17.8	tonnes (30,290 lbs)
MZFW	26.3	tonnes (58,000 lbs)
Fuel capacity	6,700	litres
Engines	PW150A	
Thrust	5,070	shp
FUELS AND TIMES		
Block fuel 100Nm	525	kg
Block fuel 200 Nm	855	kg
Block fuel 500 Nm	1,860	kg
Block time 100 Nm	35	minutes
Block time 200 Nm	55	minutes
Block time 500 Nm	108	minutes
FLEET		
Entry into service	1999	
In service:	484	
Operators (current and planned)	62	
In storage	37	
On order	71	
Built peak year (2007)	42	
Estimated production 2017	22	
Average age	6.5	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$45-50	per flight hour
Higher checks reserve	$34-35	per flight hour
Engine overhaul	$145-150	per engine flight hour
Engine LLP	$40-45	per engine cycle
Landing gear refurbishment	$30-35	per cycle
Wheels brakes and tyres	$45-50	per cycle
APU	$55-60	per APU hour
Propeller	$15-20	per propeller hour
Component overhaul	$145-150	per flight hour

CS100

SEATING/RANGE	
Max seating	133
Typical seating	108 at 32 inch pitch
Maximum range	3,100 nautical miles (5,740km)
TECHNICAL CHARACTERISTICS	
MTOW	54.9 tonnes (option 60.8)
OEW	33.3 tonnes
MZFW	50.3 tonnes
Fuel capacity	22,040 litres
Engines	PW1521G/1524G/1525G
Thrust	21,000lbs to 23,300lbs
FUELS AND TIMES	
Block fuel 1,000 nautical miles (nm)	1,340kg
Block fuel 2,000nm	2,510kg
Block fuel 4,000nm	4,500kg
Block time 1,00nm	54 minutes
Block time 2,000nm	94 minutes
Block time 4,000nm	160 minutes
FLEET	
Entry into service	2016
In service	10
Operators (current and planned)	11
In storage	0
On order	158
Built peak year	-
Planned 2017	8
Average age	less than 1 year old

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES

Insufficient data available

CS300

SEATING/RANGE	
Max seating	160
Typical seating	140 at 32 inch pitch
Maximum range	3,300 nautical miles (6,110km)
TECHNICAL CHARACTERISTICS	
MTOW	59.9 tonnes (option 67.6)
OEW	34.3 tonnes
MZFW	50.3 tonnes
Fuel capacity	22,040 litres
Engines	PW1521G/1524G/1525G
Thrust	21,000lbs to 23,300lbs
FUELS AND TIMES	
Block fuel 1,000 nautical miles (nm)	1,390kg
Block fuel 2,000nm	2,5610kg
Block fuel 4,000nm	4,700kg
Block time 1,00nm	54 minutes
Block time 2,000nm	94 minutes
Block time 4,000nm	160 minutes
FLEET	
Entry into service	2016
In service	3
Operators (current and planned)	11
In storage	0
On order	216
Built peak year	-
Planned 2016	11
Average age	-

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES

Insufficient data available

E170

SEATING/RANGE		
Max seating	80	at 30/29 inch pitch
Typical seating	70	at 32inch pitch
Maximum range (AR version)	2,100	nm (3,890 km)
TECHNICAL CHARACTERISTICS		
MTOW	35.99	tonnes (79,340 lbs)
OEW	21	tonnes (46,385 lbs)
MZFW	30.14	tonnes (66,447 lbs)
Fuel capacity	11,670	litres
Engines	CF34-8E	
Thrust	13,800	lbs
FUELS AND TIMES		
Block fuel 200 Nm	1,120	kg
Block fuel 500 Nm	2,260	kg
Block time 200 Nm	44	minutes
Block time 500 Nm	79	minutes
FLEET		
Entry into service	2004	
In service	195	
Operators (current and planned)	27	
In storage	8	
On order	2	
Built peak year (2004)	46	
Estimated production 2017	2	
Average age	9.9	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$45-50	per flight hour
Higher checks reserve	$35-40	per flight hour
Engine overhaul	$70-75	per engine flight hour
Engine LLP	$100-105	per engine cycle
Landing gear refurbishment	$30-35	per cycle
Wheels brakes and tyres	$50-55	per cycle
APU	$55-60	per APU hour
Component overhaul	$150-160	per flight hour

E175

SEATING/RANGE		
Max seating	88	at 30inch pitch
Typical seating	78	at 32inch pitch
Maximum range (AR version)	2,000	nm (3,706 km)
TECHNICAL CHARACTERISTICS		
MTOW	37.5	tonnes (79,340 lbs)
OEW	21.62	tonnes (47,664 lbs)
MZFW	31.7	tonnes (69,887 lbs)
Fuel capacity	11,670	litres
Engines	CF34-8E	
Thrust	13,800	lbs
FUELS AND TIMES		
Block fuel 200 Nm	1,180	kg
Block fuel 500 Nm	2,390	kg
Block time 200 Nm	45	minutes
Block time 500 Nm	81	minutes
FLEET		
Entry into service	2005	
In service	397	
Operators (current and planned)	20	
In storage	15	
On order	154	Excluding E2 version
Built peak year (2008)	56	
Estimated production 2017	30	
Average age	5.1	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$45-50	per flight hour
Higher checks reserve	$35-40	per flight hour
Engine overhaul	$70-75	per engine flight hour
Engine LLP	$100-105	per engine cycle
Landing gear refurbishment	$30-35	per cycle
Wheels brakes and tyres	$50-55	per cycle
APU	$55-60	per APU hour
Component overhaul	$150-160	per flight hour

E190

SEATING/RANGE		
Max seating	114	at 30inch pitch
Typical seating	98	at 32 inch pitch
Maximum range (AR version)	2,400	nm (4,448 km)
TECHNICAL CHARACTERISTICS		
MTOW	47.8	tonnes (105,359 lbs)
OEW	27.72	tonnes (47,664 lbs)
MZFW	40.8	tonnes (89,949 lbs)
Fuel capacity	16,210	litres
Engines	CF34-10E	
Thrust	18,500	lbs
FUELS AND TIMES		
Block fuel 200 Nm	1,340	kg
Block fuel 500 Nm	2,710	kg
Block time 200 Nm	46	minutes
Block time 500 Nm	83	minutes
FLEET		
Entry into service	2005	
In service	517	
Operators (current and planned)	76	
In storage	27	
On order	59	Excludes E2 models
Built peak year (2011)	81	
Estimated production 2017	16	
Average age	6.5	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$45-50	per flight hour
Higher checks reserve	$35-40	per flight hour
Engine overhaul	$70-75	per engine flight hour
Engine LLP	$90-95	per engine cycle
Landing gear refurbishment	$35-40	per cycle
Wheels brakes and tyres	$55-60	per cycle
APU	$70-75	per APU hour
Component overhaul	$180-185	per flight hour

E195

SEATING/RANGE		
Max seating	122	at 30inch pitch
Typical seating	108	at 32inch pitch
Maximum range (AR version)	2,200	nm (4,077 km)
TECHNICAL CHARACTERISTICS		
MTOW	48.79	tonnes (105,359 lbs)
OEW	28.85	tonnes (63,603 lbs)
MZFW	42.5	tonnes (93,696 lbs)
Fuel capacity	16,210	litres
Engines	CF34-10E	
Thrust	18,500	lbs
FUELS AND TIMES		
Block fuel 200 Nm	1,420	kg
Block fuel 500 Nm	2,870	kg
Block time 200 Nm	47	minutes
Block time 500 Nm	85	minutes
FLEET		
Entry into service	2006	
In service	150	
Operators (current and planned)	17	
In storage	3	
On order	15	Excludes E2 models
Built peak year (2011)	24	
Estimated production 2015	7	
Average age	4.9	years

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES		
C-check reserve	$45-50	per flight hour
Higher checks reserve	$35-40	per flight hour
Engine overhaul	$70-75	per engine flight hour
Engine LLP	$90-95	per engine cycle
Landing gear refurbishment	$35-40	per cycle
Wheels brakes and tyres	$55-60	per cycle
APU	$70-75	per APU hour
Component overhaul	$180-185	per flight hour

NEW AIRCRAFT MARKET VALUES ($ MILLIONS)

Model	Avitas view	CV view	IBA view	ICF view	MBA view	Oriel view	Average
Airbus							
A319	37.5	36.0	37.5	35.3	33.9	33.2	35.6
A320	44.8	43.0	44.5	44.3	42.7	42.9	43.7
A320neo	48.0	49.5	48.8	48.1	45.9	44.7	47.5
A321	52.5	50.0	52.5	53.1	50.7	51.0	51.6
A330-200	92.0	85.0	95.0	95.1	88.2	87.2	90.4
A330-300	105.0	100.0	106.0	104.7	99.9	96.7	102.1
A350-900	140.1	150.0	146.0	140.7	141.2	143.1	143.5
A380	214.4	245.0	226.0	214.8	212.4	209.3	220.3
ATR							
ATR42-600	15.7	17.5	15.2	15.0	14.9	18.3	16.1
ATR72-600	20.3	20.0	20.8	20.3	20.4	20.3	20.4
Boeing							
737-700	38.5	36.0	37.7	37.0	34.4	32.7	36.1
737-800	48.5	45.5	47.9	46.9	45.7	46.2	46.8
737-900ER	50.8	47.0	50.0	49.8	49.0	47.2	49.0
747-8 (passenger)	176.2	150.0	165.0	176.9	159.9	147.5	162.6
777-300ER	162.0	155.0	164.0	163.7	157.7	138.8	156.9
787-8	119.8	118.0	120.3	117.8	115.3	112.6	117.3
787-9	140.0	145.0	136.5	135.1	132.2	133.9	137.1
Bombardier							
CRJ700	25.1	24.5	24.0	22.7	23.8	21.6	23.6
CRJ900	27.5	25.5	24.8	27.1	26.1	25.2	26.0
CRJ1000	29.9	26.0	28.1	28.9	26.5	27.9	27.9
CS100	33.5	28.0	33.5	33.5	31.4	34.6	32.4
CS300	38.5	34.0	38.0	36.5	35.5	40.5	37.2
Q400	23.2	21.0	21.5	21.4	20.3	21.2	21.4
Embraer							
E170	28.4	27.0	25.7	23.9	25.2	24.5	25.8
E175	29.4	29.5	28.3	28.2	28.8	26.7	28.5
E190 (AR)	33.8	35.0	32.7	30.1	32.0	31.3	32.5
E195 (AR)	36.1	36.5	34.4	34.2	33.9	31.8	34.5

LEASE RATES ($000S)

Model	Avitas view	CV view	IBA view	ICF view	MBA view	Oriel view	Overall range
Airbus							
A319	270-310	260	240-310	230-280	249-267	235	230-310
A320	310-370	335	285-360	290-345	313-336	335	285-370
A320neo	300-390	370	310-400	330-385	337-361	355	300-400
A321	370-420	395	340-420	350-410	372-400	410	340-420
A330-200	680-760	725	650-830	400-750	679-729	720	650-830
A330-300	770-870	875	700-900	500-800	769-826	775	700-900
A350-900	1,020-1,150	1,100	980-1,200	900-1,100	1,087-1,167	1,150	980-1,167
A380	1,600-1,740	1,900	1,750-2,000	1,500-1,800	1,635-1,755	1,750	1,500-2,000
ATR							
ATR42-600	110-140	155	135-150	115-135	118-127	150	110-155
ATR72-600	150 - 170	175	175-200	155-175	162-174	155	150-200
Boeing							
737-700	270-310	255	240-305	240-290	247-265	240	240-310
737-800	340-400	350	295-380	310-375	328-352	335	295-400
737-900ER	360-400	365	320-400	330-380	351-377	360	320-400
747-8 (passenger)	1,300-1,440	1,150	1,100-1,250	1,050-1,200	1,186-1,273	1,225	1,050-1,440
777-300ER	1,200-1,330	1,200	1,200-1,450	1,150-1,350	1,169-1,255	1,100	1,100-1,450
787-8	860-980	900	890-1,050	850-950	855-918	925	850-1,050
787-9	1,020-1,150	1,100	960-1,150	950-1,100	980-1,053	1,050	950-1,150
Bombardier							
CRJ700	180-200	228	160-195	150-185	189-202	200	150-228
CRJ900	190-220	233	185-220	180-215	207-222	225	180-233
CRJ1000	210-240	233	190-240	190-230	210-225	255	190-255
CS100	220-260	215	230-300	230-280	249-267	260	215-300
CS300	260-300	255	260-330	280-310	282-302	280	255-330
Q400	170-190	195	175-200	170-200	161-173	190	161-200
Embraer							
E170	200-230	235	180-215	170-200	200-215	230	170-230
E175	220-240	240	197-230	190-220	228-245	240	190-245
E190 (AR)	240-270	280	230-270	230-250	254-272	285	230-285
E195 (AR)	250-290	280	240-280	240-270	269-289	290	240-290

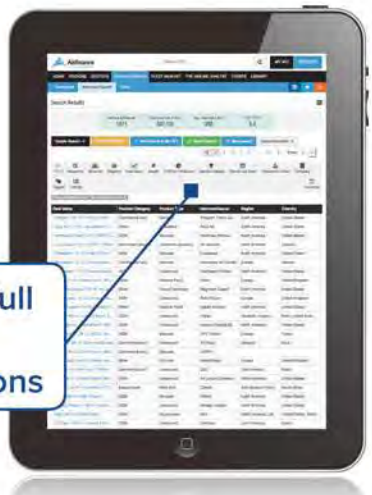
AIRFINANCE JOURNAL

AIRFINANCE JOURNAL & DEALS

Your essential intelligence resource for aviation finance

FREE TRIAL

More than 400 market interviews each month



Conduct full market comparisons

Why take a free trial to **Airfinance Journal** and **Deals**?

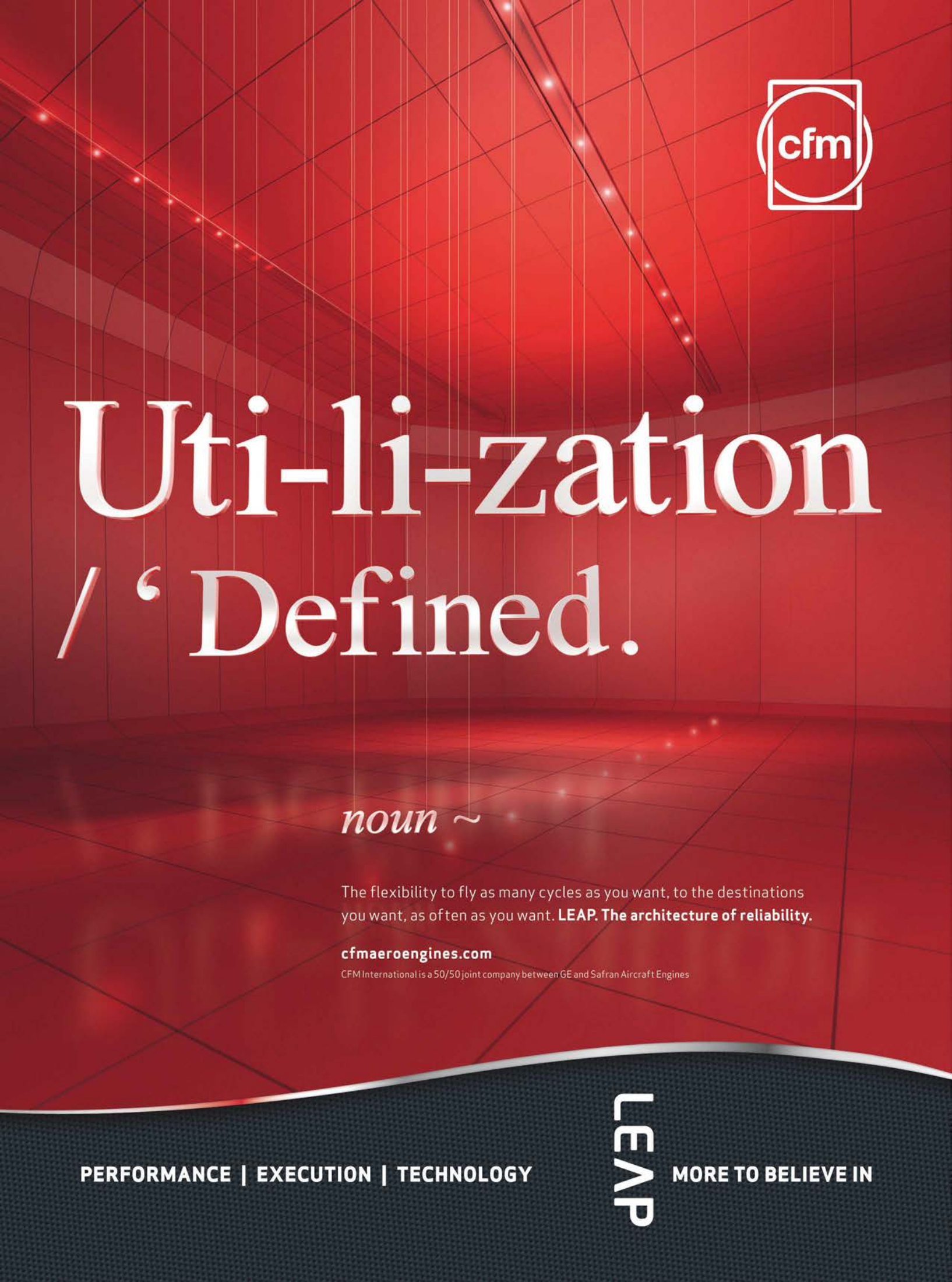
- Benchmark your competition
- Find new business through our RFP alerts
- Receive news and insight from the industry's key players straight to your inbox
- Understand the strategies of your rivals and partners through more than 400 market interviews each month
- Assess the latest developments in product structures with our deal analysis
- View 10 years of historic aircraft financing transactions for the loan and capital markets both public and private
- Access market status reports covering: deals, regions, borrowers, banks and more
- Unrestricted access to Airfinance Journal and Deals Database available across all devices

Start your FREE TRIAL today.

www.airfinancejournal.com

chris.welding@euromoneyplc.com

+44 (0) 207 779 8015


cfm
Uti-li-zation
/ ‘ Defined.
noun ~
The flexibility to fly as many cycles as you want, to the destinations you want, as often as you want. LEAP. The architecture of reliability.
cfmaeroengines.com
CFM International is a 50/50 joint company between GE and Safran Aircraft Engines
PERFORMANCE | EXECUTION | TECHNOLOGY
LEAP
MORE TO BELIEVE IN