January/February 2018

AIRFINANCE JOURNAL

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Aengus Kelly

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WILMINGTON TRUST

OEM consolidation makes sense, but...

Although the Airbus-CSeries tie-up has given the programme a new lease of life, both Airbus and Boeing need to be wary of the smaller narrowbody segment, writes **Jack Dutton**.

Market conditions were relatively benign for airlines in 2017 and there were few bankruptcies. The good times look set to continue in 2018, with fuel prices still low and liquidity still plentiful.

Despite the market being a favourable one in 2017, there was still plenty to report and aviation journalists had a field day. The two major Avolon and DAE deals, which closed in April and August, marked the biggest shake-up of aircraft leasing since AerCap paid $7.6 billion for ILFC in 2014. Like with the AerCap deal, Avolon's acquisition of US lessor CIT Aerospace took it to near the top of the leasing table, making it the world's third-largest lessor by number of aircraft. In acquiring Irish leasing outfit AWAS, DAE Capital added an extra $7.6 billion in assets. It climbed 21 places from being the 28th largest lessor to the seventh largest by number of aircraft, with about 400 owned, managed and committed aircraft in September 2017.

Meanwhile, 2017 brought a handful of airline insolvencies with the likes of Alitalia, Air Berlin and Monarch. The demise of Air Berlin took the form of consolidation, with Easyjet, IAG and Lufthansa all agreeing to snap up portions of the airline. In the Middle East, there were rumours that Emirates and Etihad were likely to merge because of regional economic pressure brought about by lower fuel prices as well as overcapacity. In July, Emirates announced it would join forces with Flydubai, opening a combined network of 216 unique destinations. It was a pragmatic move and it was surprising that the carriers took so long to form a partnership, considering they are both owned by the Government of Dubai.

Perhaps the biggest surprise of 2017 was Airbus's agreement to take a majority stake in the Bombardier CSeries programme. Although the deal is not expected formally to close until later this year, the move was covered across the whole spectrum of aviation publications and had seismic implications for the industry.

The deal appeared to catch Boeing off-guard in the midst of a bitter trade dispute it was having with Bombardier. The US manufacturer alleged that its Canadian rival benefited from billions of dollars of illegal government subsidies and sold CSeries aircraft at a discounted price to Delta Air Lines, which ordered 75 of the jets in April 2016. The timing was not great for Bombardier, which was halfway through a turnaround plan after coming close to bankruptcy in 2015.

Some analysts say that the deal threw a lifeline to Bombardier, because it could settle the dispute between the two North American original equipment manufacturers (OEMs). If the deal goes through, the Canadian aircraft now has a US-based production line in Mobile, Alabama, which could help Bombardier avoid a 300% tariff from the US on its aircraft being sold to US customers.

The CSeries deal also had profound implications for aviation finance. For many financiers, it restored confidence in the aircraft's future, spurring several follow-up orders from airlines such as Egyptair and one undisclosed European carrier, which ordered up to 61 of the aircraft. A lessor told *Airfinance Journal* in October that the move "definitely makes the CSeries more financeable", adding: "Airbus has a good-sized customer finance department, so it can also manipulate sales campaigns now."

However, other financiers were more dubious. One European banker hailed the move as "brilliant and strategic" but questioned Airbus's ability to turn around the programme given its ongoing concerns, including the corruption probe. "Does Airbus have the management resources to take this significant bet into a marketing success with no disruption to the current massive undertakings the EU plane maker has? The jury is out."

Airbus will undoubtedly bolster the prospects of the programme, and will likely up its sales through its increased global outreach and deliver production cost savings with its supply chain experience. But in a riposte days before Christmas, Boeing announced that it was considering a combination with Embraer. Although the two OEMs said there was no guarantee a deal will come from the talks, such a deal would be the biggest by Boeing since the purchase of McDonnell Douglas for $13 billion in 1997.

Should both the Airbus and Boeing deals go through, the big two OEMs still face an elephant in the room: is there a real home for a smaller narrowbody in the market? Historically, both Airbus and Boeing lacked a competitive aircraft in the low end of the narrowbody market. Boeing's smallest narrowbody, the 737 Max 7, so far has been the least popular model in the family, with fewer than 100 aircraft sold, according to *Airfinance Journal*'s Fleet Tracker.

The Airbus counterpart, the A319, which was launched more than two decades ago, has also not proved hugely popular compared with its larger sibling. The current engine option (Ceo) version of aircraft won 1,409 orders, versus 4,769 for the A320ceo, according to Fleet Tracker. In comparison, the A319neo has just 51 orders, versus 3,684 for the A320neo. There were six net orders for the Ceo and one net order for the Neo in 2017 – not exactly a strong year for the aircraft type.

Regardless of the market for small narrowbodies, more consolidation looks likely in 2018 and there will undoubtedly be more airline insolvencies. Food for thought, no doubt, for attendees at our 20th anniversary Annual Global Airfinance Conference in Dublin in late January.

JACK DUTTON
Editor,
Airfinance Journal

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Contents

Cover story

News analysis

Features

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Republicans block Trump's Ex-Im Bank head nominee

Two Republicans on the Senate Banking Committee have helped to block president Donald Trump's nominee to lead the Export-Import Bank of the United States (Ex-Im Bank) in a critical vote on the future of the export credit agency (ECA).

The ECA is unable to guarantee aircraft financing deals unless it has five directors on its board to make a quorum, including a president and a first vice-president. It currently has three board members, no president and no first vice-president. The acting chairman and president of Ex-Im Bank, Charles Hall, resigned in December.

In the vote, senators Mike Rounds of South Dakota and Tim Scott of South Carolina joined all Democrats on the committee to oppose Scott Garrett, the president's nominee, rejecting him by 13 votes to 10. As a result, Garrett's nomination will not advance to the full Senate, the final stage of the confirmation process.

Garrett is a controversial choice for some politicians because he has a history of criticising the export credit agency. As congressman for New Jersey between 2003 and 2017, he twice voted to eliminate it and said the agency "promotes crony capitalism".

Trump will have to nominate another senator to fill the position.

Membership of the Senate Committee includes 12 Republican senators and 11 Democrats. Republican senator Michael Crapo acts as chairman.

The president's other five nominations who were voted into the next round are (with votes): Kimberly Reed, vice-president (20-3); Spencer Bachus, board member (19-4); Judith DelZoppo Pryor, board member (20-3); Claudia Slacik, board member (20-3); and Mark Greenblatt, inspector general (23-0).

Speaking to *Airfinance Journal* in November, Tore Østby, chief financial officer of Norwegian, said the airline hopes to tap Ex-Im Bank financing in 2018 for its aircraft deliveries.

Robertson retires from **Milbank**

Hugh Robertson, an aviation finance partner based in Milbank's New York office, retired from the firm at the end of 2017.

A partner since 1987, Robertson practised at Milbank's London office from 1981 to 1984 and at Milbank's Hong Kong office from 1986 to 1989.

Speaking to *Airfinance Journal*, Robertson says: "For over two decades, I've dedicated most of my career to aviation finance at Milbank, leading our group in the early 2010s. As I approach retirement at the end of this year and reflect on our practice, we have experienced consistent and robust growth as our activities evolved from traditional bank and other private finance of legacy carriers to a broad array of public and private transactions supporting both airlines and leasing companies."

Hugh Robertson, aviation finance partner, Milbank

He adds that Milbank has helped develop "innovative and market-leading structures" responding to aviation industry needs, collaborating with the financial institutions that serve the airline business.

"It is with pride that I leave the practice in the capable hands of six experienced partners and more than 30 dedicated associates across our global network of offices who draw on the expertise of our capital markets, tax and other practice areas to service our clients on aviation matters," he adds. "It's been an exciting and fulfilling journey."

ICBC Leasing recruits former GECAS chief Liu

Former GECAS president and chief executive officer Norman Liu has joined Chinese lessor ICBC Leasing as a senior adviser. He will help the company with the expansion of its aircraft leasing business.

On 2 January ICBC Leasing had a portfolio of 579 aircraft with 70 customers. Liu worked for GECAS for 22 years before retiring in 2016.

Austrian Airlines appoints new CFO

Austrian Airlines has appointed Wolfgang Jani as its new chief financial officer (CFO).

Jani's appointment comes after an announcement in September by incumbent Heinz Lachinger that he intends to leave the company.

The 41-year-old Austrian will move from Schindler Deutschland to Austrian Airlines and assume the position of CFO on 16 April.

Jani began his professional career in 2000 as a controller for Schindler Austria. He was appointed CFO in 2007. In 2011, he became vice-president and CFO of Schindler USA, moving to Morristown, New Jersey.

In 2013, he returned to Europe and was named CFO of Schindler Germany. He also assumed responsibility as area manager for the Baltics in 2017.

Airborne Capital launches to bridge financing gap

Irish financial services company Fexco has launched a new aircraft asset manager called Airborne Capital.

Based in Dublin, the new company aims to have $5 billion of assets under management within the next five years.

As a specialist aircraft leasing and asset management business, its goal is to provide a financing alternative for aircraft deliveries over the next 20 years, which, it says, will not be covered by traditional sources of capital.

"Airborne Capital will act as a bridge between investors seeking bespoke investment solutions in the aviation space, and issuers requiring aviation financing via differentiated capital solutions," says the company in a statement.

Ramki Sundaram, previously head of aviation for French bank Natixis, will be chief executive officer (CEO) of Airborne Capital.

Its other founding partners include: Anand Ramachandran, who joins from lessor Goshawk, where he was chief financial officer; ex-Natixis executive Jocelyn Noel; Cian Dooley; and John O'Flynn and Eugene Lui, who both previously worked in corporate finance for Goshawk.

"With the financial support we can provide and the industry expertise of the team we believe this business can grow rapidly to play a major role in the market segments it is targeting," says Denis McCarthy, CEO of Fexco.

Mysoor reconnects with ex-Citi colleagues at **Doric**

Ex-Citi Anup Mysoor has joined Doric as a managing partner based in London.

He will focus on setting out the Doric aviation strategy and enlarging the aviation platform, says the German company.

Mysoor initially joined Citi's asset finance group department before moving to the airline coverage team.

He headed the Citigroup aviation business in Asia-Pacific as a managing director for many years.

Doric was formed as Doric Asset Finance in 2008 by Citi's ex-managing directors Mark Lapidus and Bernd Reber as well as Dr Peter Hein.

Following Lapidus' departure in 2013, Sibylle Pähler, who also worked at Citigroup in asset finance, was appointed managing director of Doric.

Anup Mysoor

AerCap gets new investor relations head

Irish leasing company AerCap has appointed Joseph McGinley as its new head of investor relations.

McGinley has nearly 10 years' experience in financial markets, most recently as a senior credit analyst with Davy Capital Markets in Dublin. There, he had primary responsibility for credit coverage of the aircraft leasing, airlines, utilities and renewables sectors.

In addition, he previously worked in various roles across Davy Private Clients, as well as with Danske Bank.

Cordner joins **SuperJet**

Russian aircraft manufacturer SuperJet International (SJI) has appointed Stewart Cordner as its senior vice-president commercial.

He joins SJI to take a leading role in the sales and marketing activities of the Sukhoi Superjet 100 (SSJ100) programme.

Cordner and his team, based in Venice, Italy, will have the responsibility for delivering on SSJ100 sales and expanding the aircraft's sales campaigns in the coming years. Cordner's 32 years' experience encompasses manufacturing, maintenance, repair and overhaul, customer support and, for the past 15 years, aircraft sales and asset management. He worked for BAE Systems for more than 10 years and, in 2010, he founded the Cordner Aviation Group, specialising in aircraft trading and marketing consultancy services.

During his career, he has also held various positions overseas in Latin America, USA, China and Europe.

Cordner was most recently at Ilyushin Finance Corporation, which he joined in October 2012 as sales and marketing director.

"This appointment is aimed at setting a noticeable change of direction," says the chief executive officer of SuperJet International, Stefano Marazzani.

"Stewart's experience and passion will consolidate and strengthen our relations with existing and future customers. His knowledge and hard knocks experience blended with his heart will lead the SSJ100 programme to higher results."

Airbus reshuffles top executives

Airbus chief executive officer Tom Enders will step down in 2019, as the manufacturer reshuffles its management amid corruption investigations.

German-born Enders, who has headed Airbus and EADS for 14 years, will not seek an extension once his current position expires. Airbus says it will consider internal and external candidates to replace Enders.

Enders, who last year voiced interest in staying beyond 2019, says in a statement it is time for "fresh minds for the 2020s".

Meanwhile, Fabrice Bregier, chief operating officer and head of the commercial aircraft arm, will step down in February.

Guillaume Faury, chief executive of Airbus Helicopters, will succeed Bregier as president of the main commercial aircraft division. The company also lost John Leahy, the manufacturer's chief operating officer, customers, who has led its commercial aircraft sales since 1994. He is due to retire this year.

Airbus has appointed an external candidate, Eric Schulz, to succeed Leahy. Schulz comes from Rolls-Royce, where he had been president, civil aerospace, since January 2016. His job title will be executive vice-president, chief of sales, marketing and contracts for Airbus's commercial aircraft division.

Eric Schulz

Britain and France are investigating alleged fraud and bribery related to Airbus's use of outside consultants in commercial aircraft sales.

Airbus has warned that the investigations could lead to significant penalties.

K&L Gates Singapore hires new partner

K&L Gates Singapore has hired James Bradley as a partner in the transportation finance practice area.

Bradley joins the US law firm from Norton Rose Fulbright.

In an email to *Airfinance Journal*, Bradley says he will be working on Japanese operating leases with call options, Japanese operating leases, bulk sales, leasing and financings, private jet matters and restructurings. He will be the main partner in Singapore covering aviation finance.

Bradley will work closely with K&L Gates partner Robert Melson, a leader of the firm's aircraft finance practice as well as a coordinator for its banking and finance practice group.

"James is a key addition to our global aircraft finance and leasing team who brings significant experience to the Asia region, especially in relation to airline restructurings," says Melson.

Bradley declines to provide details about the airline restructurings, saying they are confidential.

He was the fifth addition to K&L Gates' aircraft finance practice in 2017, after the arrival of London-based partners Philip Perrotta and Sidanth Rajagopal, Tokyo-based counsel Robert Snodgrass and Seattle-based counsel Misha Kovacevic.

Sowerby to join **SMTB**

Kevin Sowerby, senior vice-president, structured finance, at Veling, has left the Mauritian lessor to join Sumitomo Mitsui Trust Bank.

In an email to industry colleagues, Sowerby announced he would begin the new role in early January. He tells *Airfinance Journal* that he will join the Japanese bank as a director on its aviation team, based in its London office.

Airfinance Journal reported on 9 October that Veling closed its 11th Japanese operating lease with call option with Emirates to finance one new Boeing 777-300ER.

The aircraft, equipped with General Electric GE90-115B engines, arrived at the airline on 28 September.

TrueNoord appoints general counsel

TrueNoord, the regional aircraft lessor, has appointed Joram Lietaert Peerbolte as general counsel.

Peerbolte joined the team in November, and his primary responsibilities will be to manage the delivery of in-house legal advice and liaise with all global legal advisers. He will provide guidance and support to the company in the execution and administration of aircraft acquisitions and sales, aircraft operating leases, and associated finance transactions.

Peerbolte previously worked in the London, Paris and New York offices of Sullivan & Cromwell. He has extensive experience advising organisations throughout the business cycle on their acquisitions, dispositions and joint ventures; capital raising activities in debt and equity markets; as well as general corporate and compliance matters, according to the Dutch lessor.

GECAS appoints Kelly as chief commercial officer

Operating lessor GECAS has named Declan Kelly as chief commercial officer. In this newly-created role, Kelly will lead all origination activities for GECAS' fixed wing aircraft and is responsible for the commercial strategy, building synergies and share practices between GECAS' regions.

Kelly has 30 years' experience in the aviation industry. He will report to Alec Burger, president of GE Capital and president and chief executive officer of GECAS.

The position of GECAS' chief commercial officer will be based in Shannon Ireland. Until a replacement is named for his prior role, Kelly will also continue to serve as executive vice president, US, Latin America, Caribbean.

Spirit lines up CEO successor

US low-cost carrier Spirit Airlines is preparing Ted Christie to succeed Bob Fornaro as chief executive officer (CEO) in 2019. The airline says in a statement that current executive vice-president and chief financial officer Christie assumed the position of president and joined the company's board of directors on 1 January.

In his management role, Christie will have overall responsibility for the finance, revenue, operations, IT and human resources functions of Spirit's business. He will then become Spirit's CEO on 1 January 2019.

Christie joined Spirit in 2012 as senior vice-president and chief financial officer and, in 2017, assumed the role of executive vice-president with the additional responsibility of marketing, pricing, revenue management and scheduling.

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Narrowbody trading buoyant: Fleet Tracker

Narrowbody assets are most in demand among lessors, which traded 124 Boeing 737-family and 114 Airbus A320-family aircraft with their peers between September 2016 and September 2017.

For the first time, *Airfinance Journal* has produced data to monitor lessors' trading activity over the past year, including the largest buyers and largest sellers of aircraft. *Airfinance Journal*'s Fleet Tracker recorded 458 trades during the 12 months from September 2016 to September 2017 with an aggregate current market value of $11.8 billion. The data includes secondary market trades between lessors only; it does not include sale and leasebacks.

The figures are based on data submitted by lessors in September 2016 and September 2017. One caveat is that much of the data is based on lessor submissions for the 2016 and 2017 Leasing Top 50, so this will unlikely represent every lessor trade in the market. However, it provides a unique insight into secondary market activity that is not available elsewhere.

The Boeing 737 family pipped its rival the Airbus A320 family in the total number of trades, trading 124 times compared with 114. Despite this, the A320 was the most popular individual type, with 87 aircraft traded over the year, as well as one A320neo and 26 A321s. The 737-800 was traded the most out of the 737 family, with 77 aircraft transferred between lessors over the period.

On the widebody side, the A330 proved to be a surprisingly liquid secondary market asset among lessors, with 41 aircraft traded over the 12 months' period. Boeing 747s and 787s were less dynamic, with four 747s and two 787-8s sold between lessors. The most liquid Boeing widebody was the 777 family, with four -200ERs, four -300ERs and three -200Fs sold over the course of the year.

Of the 41 A330s, 27 were A330-200s and 14 were A330-300s. Aengus Whelan, the former head of trading at Kuwait-based lessor ALAFCO, and now the chief commercial officer of Stellwagen, believes that more -200s were sold because the -300 has longer-term appeal, so lessors are more likely to hold on to them. He adds that certain lessors "are de-risking a little bit" by disposing of -200s.

"Those that have A330 concentration are being pragmatic and reducing some of that exposure. Those buying are happy to take up that exposure because they would have a lower concentration of them," he says.

"Some lessors might pay for a widebody because they're getting the revenue they need and they're not as price sensitive as some of the narrowbodies, so overall they're taking a revenue aspect into account and the risk of the asset. They're making the judgment call that it's better to spend their dollars on an A330-200 than on an overpriced, overstretched A320 or 737-800."

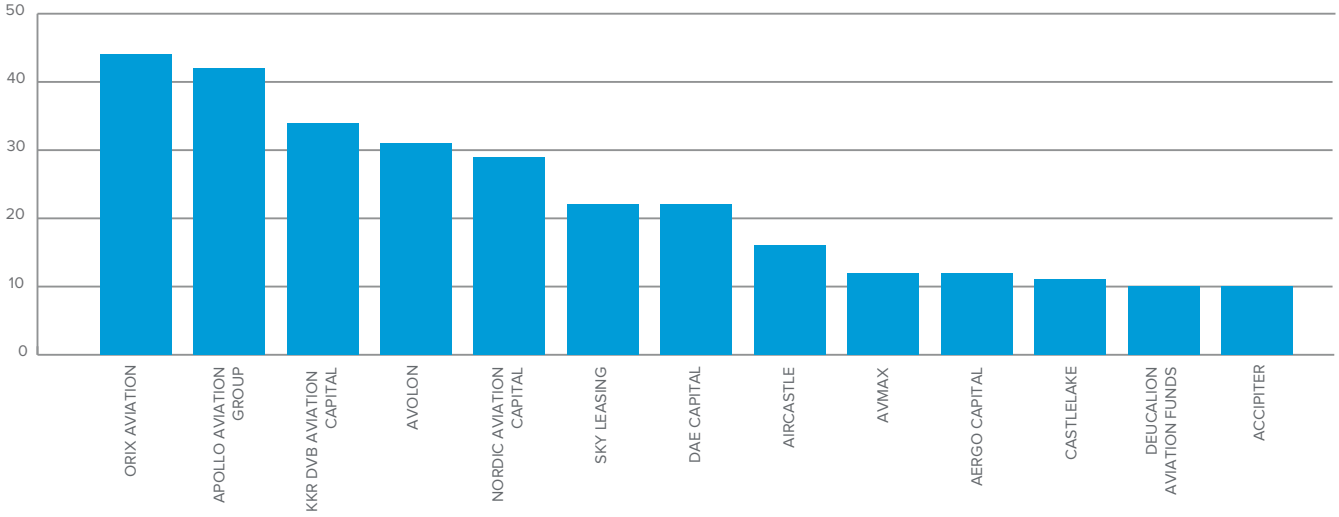
Whelan says that some buyers take widebodies unwillingly as part of a wider portfolio. For example, six narrowbodies and one widebody might be sold as an indivisible package that is both "sweet and sour" for the buyer.

ORIX Aviation was the largest buyer, acquiring 44 aircraft over the course of the year. Half of ORIX's acquisitions were for a 50/50 joint venture with Merx called Kornerstone. Apollo Aviation Group was the second-largest buyer, acquiring 42 aircraft. Another joint venture, between DVB Bank and asset manager KKR, called KKR DVB Aviation Capital, purchased 34 aircraft over the period. Avolon also scored highly, purchasing 31 aircraft from other lessors.

"Joint ventures are attractive to certain lessors and investors whose strategic objectives align," Michael Weiss, head of aircraft trading at SMBC Aviation Capital, tells *Airfinance Journal*.

"Investors are interested in these vehicles as they are able to leverage the platforms of existing lessors, with minimal investment in a platform themselves.

Most aircraft acquired



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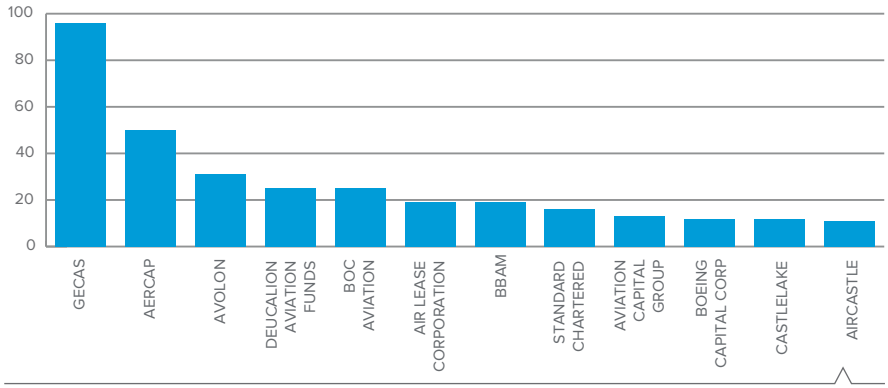
Lessors are also interested in these vehicles as they give them access to additional sources of capital to enable them to manage their portfolios, have access to larger deals, or to enable them to bid for larger numbers of aircraft in sale and leaseback transactions," he adds.

Data from Fleet Tracker indicates GECAS was the largest seller by some margin over the year, having sold nearly double the number of aircraft as AerCap in second place. The two lessors shifted a total of 96 and 50 aircraft respectively. Avolon, Deucalion Aviation Funds and BOC Aviation were also big sellers, offloading 31, 25 and 25 aircraft, respectively, over the year.

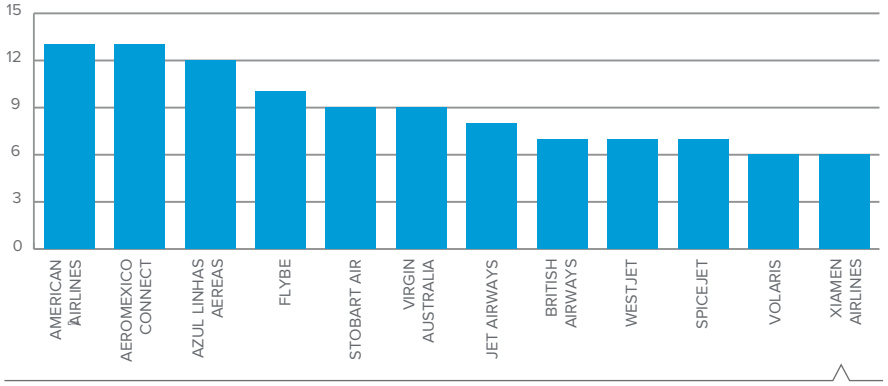
Established lessors sell aircraft for a number of reasons. These include: to keep down the average age of the portfolio; to make sure the portfolio is diversified; and to ensure the portfolio is not overly exposed to a particular lessee. Other reasons could be to generate a profit or to ensure sufficient balance sheet capacity to do new transactions with a particular lessee, where there is an existing exposure.

"I think the value of aircraft has been pretty consistent," says Whelan. "You get a lot of buyers saying it's scarce because the portfolios are coming out in packages from those few larger lessors. It's the owners or investors with high costs of capital who feel like they're outpriced or that the lessors are looking for extras. The bottom end of the market is finding it challenging staying relevant." Whelan adds that he cannot recall an instance where a portfolio that has come on the market has not been sold.

Most aircraft sold



Most traded lessees



American Airlines and Aeromexico Connect were the most traded underlying aircraft lessees, with 13 aircraft from each being traded over the course of the year. Azul Linhas Aereas and Flybe aircraft were also mobile, with 12 and 10 units being traded respectively.

Irish lessors made the most aquisitions, taking 180 aircraft over the course of the year. US lessors were the second most active, acquiring 126 aircraft over the year. The data suggests that Chinese lessors were surprisingly quiet, acquiring only nine aircraft between September 2016 and September 2017.

Some trades from Chinese lessors were made through their companies' Irish headquarters – for example, with Avolon, Accipiter and Goshawk. But there was little activity from other Chinese lessors such as CDB Leasing, Bocomm Leasing and ICBC Financial Leasing.

US-based lessors were the biggest sellers over the year, selling 217 units. Irish lessors sold 89 aircraft, while Dutch lessors, mainly consisting of AerCap, sold 52 aircraft. Chinese and Japanese lessors were not active sellers, shifting eight and two aircraft respectively. SMBC Aviation Capital's Weiss says: "The Chinese lessors have been growing their fleets and hence have not prioritised sales. I expect that will change as they seek to actively manage their portfolios in line with more established lessors. We have also seen some Chinese lessors being more active in the sale-and-leaseback market and hence they have deployed their capital in this fashion as opposed to actively buying in the secondary market.

"Chinese money is focused on long-term yields. They are looking at the encumbered value of the assets and for as long an income stream and revenue window as possible, so that's why they've got their orderbooks. They have lower expectations on returns for the new deliveries that were anticipated years back," says Whelan.

He adds: "Aside from dealing with their orderbooks in trying to place their own aircraft, they're more conservative in trying to buy secondary assets because they're focusing on longer leases. There aren't as many longer leases out there as there were before. Most don't want to do six years or eight years; they want 10 years or 12 years, so they are focusing on that. But they are buying some portfolios and they are paying the appropriate prices to win those deals."

Weiss is positive about the outlook for aircraft trading, saying the market is "still very attractive" to investors who are comfortable with the risk-adjusted return that the aviation sector offers. He adds that he is seeing appetite from most major regions, including Asia, Europe, the Middle East and the US.

"In the absence of a major external shock to the sector, I feel that the market will continue to attract investment as investors are persuaded by the sound fundamentals of the sector."

Boeing trades

Type	Model	Number
Boeing	737 800	77
	700	17
	900/900ER	8
Boeing	737 Classic	22
Boeing	777 200/300ER	11
Boeing	767 300ER	7
Boeing	747 400/400F	4
Boeing	757 200	4
Boeing	787 8	2
Grand Total		**152**

Airbus trades

Type	Model	Number
Airbus	A320/neo	88
Airbus	A319 100	36
Airbus	A321 100	26
Airbus	A330 200/300	41
Grand Total		**191**

Chinese investors warm to Hong Kong

Johnny Lau, chief executive officer of aviation consultancy Astro Aircraft Leasing, explains to **Michael Allen** that the city is a good place for Chinese clients to set up shop, but cautions that any move should be carefully thought through.

Hong Kong has become an attractive place for Chinese investors to set up shop following the introduction of lessor tax reforms, according to the chief executive officer of a local aviation consultancy.

Johnny Lau, Astro Aircraft Leasing's chief executive officer, said that many of his Chinese investor clients have been drawn to Hong Kong after the city's legislature passed a bill reducing the effective tax rate for aircraft leasing companies domiciled in Hong Kong to 1.65%.

"Being part of China, Hong Kong is a very comfortable place for my Chinese clients to base themselves; to set up something here with even a small office, maybe hiring professionals and doing some management services," says Lau, speaking at PWC's Aviation Finance and Leasing Forum at the firm's offices in Hong Kong.

"That is a better position than anywhere else from their perspective to set up their overseas investment centre."

However, any move must be carefully thought through.

"They have been experiencing some challenges from the auditors... setting up something outside China will face a risk of being considered as a tax avoidance for Chinese corporate tax," he adds.

Airfinance Journal reported in September that China's biggest aircraft lessor (excluding Chinese-owned Avolon and BOC Aviation), ICBC Financial Leasing, is planning to set up a Hong Kong subsidiary, ICBC Aviation Finance Leasing.

EETC opportunity

Lau says that Hong Kong could learn from the big ticket capital market transactions, such as enhanced equipment trust certificates (EETCs), executed outside the region. He says US and European markets have seen some "very popular papers", including EETC and asset-backed securities (ABS) schemes.

BOC Aviation closed a landmark Asian ABS transaction in 2015 but, besides that, and a recent CALC ABS, these kinds of transactions have been limited in the Asia-Pacific region.

"The human factor – i.e, the experience – is the most important thing for your investment. If you are not doing this with a proper team to manage your investment, this is dangerous."

Johnny Lau, CEO, Astro Aircraft Leasing

"Aircraft are always the most welcomed asset types as the collateral for these kinds of issuance," says Lau, who adds: "We've seen US investors putting money in different kinds of risk. The trading of these kinds of papers is actually quite active. Trillions of dollars of trading happens every year. I have to say this is something we can learn and replicate in Hong Kong."

Investor queries

Lau says the most popular questions from investors regarding aircraft investments are about the accuracy in determining an aircraft's valuation, operational profile and maintenance, insurance and safety provisions.

He says the questions about maintenance and safety should be of least concern.

"In most cases, these activities are managed by the airlines, and airlines are highly regulated domestically in their jurisdictions. The governments are following very strict quality standards, so we shouldn't be worried about that."

Lau notes, however, that values are the "core of the investment".

He says: "The human factor – i.e., the experience – is the most important thing for your investment. If you are not doing this with a proper team to manage your investment, this is dangerous.

"My advice is if you want to do the first investment, go for the experienced players. Those guys that have experience to help out investors in other markets and share information on an international basis, and have a team which can help you out to run the day-to-day operations and your exit.

"In the case of some kind of crisis – if the airlines default or there is an accident – they can help you to collect the money and pay you back. If you ask me, the most important consideration is whether you are teaming up with good people."

Berwin Leighton Paisner partner William Ho agrees, saying investors will "certainly want to know more about the major terms in the lease agreement".

He adds: "You need someone to give you good advice, so you can more properly assess the risk of investing in not just the aircraft but also the aircraft lease agreement associated."

Narrowbodies versus widebodies

Investors seeking higher returns and willing to accept higher risk and a trickier asset class should go for widebodies, says Lau, while those aiming for returns on investment of up to about 6% should look at Boeing and Airbus narrowbodies.

"If you want to get up to 10% return, you have to invest in widebodies or even some funky aircraft types like Bombardier or Embraer aircraft," he adds. "That's the market, and in terms of getting up to the 10 to 15% return area, it's not impossible, but you need to be more patient. You have to maintain a higher degree of flexibility for exits and your liquidity position should be strong. If you want to do that and have a quick return – hit and run – sorry, that is also very difficult."

2017: **ABS and unsecured markets** remain vibrant

Issuers often raise cheaper money through these markets than bank debt due to low interest rates and better investor understanding of the products. **Jack Dutton** reviews last year's capital markets activity.

Despite a slight decline in activity during 2017, due to increased bank liquidity and airlines deleveraging, capital markets remain a vital source of financing for airlines and leasing companies. Capital market deals accounted for 26% of the financing for all Boeing deliveries in 2017 to December, according to the US manufacturer's latest Current Aircraft Financing Market Outlook.

Taking advantage of record low coupons, airlines and leasing companies had raised more than $61 billion in the capital markets over 2017 at the time of writing (7 December). Lessors accounted for 70% of capital markets deals by volume as they raised unsecured debt and financed their portfolios through asset-backed securities (ABS) transactions.

> *"ABS has also become a popular product for joint ventures. There are also more protections for investors, such as excess proceeds and single waterfall provisions."*
>
> **Drew Fine**, partner, Milbank

ABS

The past year was an active one for the ABS market, with 13 deals having closed at the time of writing, compared with eight in 2016. ABS markets are attractive to aircraft lessors for several reasons. Some use the product as an equity sale of assets, where they retain the right to manage the assets as a servicer but sell the equity to new investors. Other lessors use the structure for portfolio refinancing, where the lessor retains the equity in the aircraft.

Air Lease's 2016 and 2017 Blackbird and Thunderbolt transactions are examples of when an issuer sells a portfolio of assets, but continues to act as the servicer. GECAS's 2016 Labrador Aviation Finance transaction served a similar function, being the first deal of its type with equity placed in South Korea. Asset managers, private equity funds and hedge funds continue to buy the E-notes on these transactions.

"We have seen first-time investors coming in on every new ABS transaction," says a New York-based capital markets banker. "New investors usually take time working through its credit approval process, and might not be in time for the first few deals shown to them, but eventually would invest in later deals."

Not only has the market welcomed new investors; it has also hosted new assets that ABS investors were uncomfortable with only a few years ago. "There is more flexibility for ABS of mid-life aircraft, regional and turboprop aircraft and engines," says Drew Fine, partner at Milbank. "ABS has also become a popular product for joint ventures. There are also more protections for investors, such as excess proceeds and single waterfall provisions."

Another banker tells *Airfinance Journal* that three to four years ago, the advance rates for ABS deals were in the low 70 percentages and now they are in the mid-80s, showing that banks are now more comfortable with higher loan to value ratios.

The NYC-based capital markets banker agrees, saying that ABS now allows issuers to achieve better terms through higher advance rates and lower pricing than bank transactions, particularly for older collateral.

"The investor base for ABS has broadened significantly in the past year, as investors seeking incremental yield start investing in the space," he says. "ABS financing facilitates aircraft portfolio sales better than other alternative financing, such as a bank loan."

Tony Nocera, senior managing director, ABS, at Kroll Bond Rating Agency, which has rated 35 aircraft asset-backed securities transactions since 2013, says pricing was tighter on ABS deals over the past six months.

"We're seeing repeat issuers, such as Castlelake, Apollo, even Aergen, with the HAIL transaction, which they've done as a second issuance," he says. "There's some new issuers to the market, like Sky Leasing, with the S-JETS deal, and Wing Capital Partners, with the WAVE deal, and Aergo, with the Metal deal, so that's another trend we're seeing."

He adds: "Newer companies to the ABS market are not all new companies either, some of them have been around a long time but they haven't securitised, so they've entered this market for the first time."

During 2017, ABS issues have refinanced warehouse facilities, refinanced de-levered bank facilities and facilitated portfolio sales.

However, some issuers have hinted that production line delays in new-technology aircraft, such as the Airbus A320neo, may halt future ABS deals.

John Plueger, chief executive officer of Air Lease, told *Airfinance Journal* in September that a follow-on transaction from the lessor's $344.7 million Thunderbolt ABS would come later than expected because of production line issues that have delayed new aircraft deliveries.

Conversely, the capital markets banker believes product line delays may increase ABS deals. "Delays of the new-technology aircraft actually help to extend the timing of when the current-technology aircraft expect to be replaced by new-technology aircraft, which results in a better value curve of the current-technology aircraft." In other words, there will be less depreciation on these aircraft than originally projected. With a better value curve, lessors can finance or sell current-technology aircraft at better value, hence promoting ABS issuance.

Through 2017, ABS structures became more streamlined, so more deals were done and at a quicker rate.

The banker says that the standard ABS deal now usually has a seven-year anticipated refinance date (including a full cash sweep, a pricing step up after seven-year anticipated repayment date), one single waterfall (as opposed to separate

waterfalls for i. monthly rental cash flow waterfall and ii. dispositions), a debt service coverage ratio test, a utilisation test, and end-of-lease payment pro rata repaying the debt.

The market is seeing consolidation of legal terms on these deals, meaning that lessors can access low pricing even if it is their first time tapping the market.

EETC

Among airlines, the enhanced equipment trust certificates (EETC) market is seeing an increase in non-US investors participating, as well as ongoing demand from several airlines. Five EETCs closed in 2017, the same number as 2016, according to *Airfinance Journal*'s Deal Tracker.

All the deals that closed in 2017 were for US airlines, apart from a $719.2 million EETC launched by Air Canada in December. The deal was secured against a pool of 13 aircraft, comprising nine new Boeing 737 Max 8s and four 787-9s.

"The US airlines who have traditionally issued the most EETCs have generally been extremely profitable resulting in less need to raise financing," says Milbank's Fine.

"It is in part because of the robustness of the market and the strength of the US carriers post-consolidations," adds the capital markets banker. "For example, Delta is able to fund at attractive rates in the unsecured market and American and United have less need for cash."

EETCs for airlines outside the US price much wider than US airline EETCs. Often, non-US airlines can access cheaper financing than EETCs through Japanese operating leases with call options, tax leases, sale and leasebacks and bank loans.

Although 2016 saw Norwegian price a $349 million EETC, the airline's pricing was higher than the US airlines that issued that year: the European carrier obtained a coupon of 4.87%, compared with 3.10% and 4.38% from United and American Airlines respectively. There were no European airline EETCs in 2017.

Unsecured and private placements

The majority of the top 10 lessors took advantage of the low interest rate environment and locked in low-priced unsecured funding in 2017. Deals have been used to fund aircraft acquisitions, for general corporate purposes and to help acquire other leasing companies in M&A transactions.

Some of the highlights of the year include DAE Capital issuing $2.3 billion in unsecured paper to help it acquire AWAS in August, with pricing between 4% and 5%.

Michael Halaby, head of aviation/land transport debt origination EMEA at Deutsche Bank, tells *Airfinance Journal*:

> *"Delays of the new-technology aircraft actually help extend the timing when the current-technology aircraft expect to be replaced by new-technology aircraft, which results in a better value curve of the current-technology aircraft."*
>
> **John Plueger**, chief executive officer of Air Lease,

"We've seen increasing interest from borrowers to access the unsecured bond markets given the attractive spreads available relative to secured bank margins. Indeed, we see some borrowers' margins in bank debt flat to unsecured bond issuance.

"Normally, we expect secured [paper] to trade tighter but the unsecured debt investor universe is substantially larger than the secured loan market. I expect more aviation companies – in particular lessors – to access the unsecured markets given the ease of using the proceeds to acquire equipment."

There has also been some activity in the European unsecured markets. Ryanair returned to the eurobond market for the third time in February via a six-year offering, which priced at 1.125% – one of the major deals of the year. Lessors also tapped the eurobond markets in 2017. For example, Russian-owned but Dublin-based lessor GTLK Europe priced a $500 million eurobond on the Irish stock exchange in June at 5.125% a year.

On the unsecured side, aviation companies are increasingly interested in the Schuldschein (SSD), a privately placed and unlisted bilateral loan instrument usually governed by German law. After issuing its debut Schuldschein in 2016 and becoming the first aircraft lessor to tap this market, raising $95 million, Goshawk dived in again in October. Nordic Aviation Capital also raised its first Schuldschein in late 2017, with Investec acting as the lead arranger.

Halaby adds: "I expect SSD to be a serious contender for airlines and lessors provided the market continues to perform. No direct secured SSD has been completed to our knowledge but we expect those trades will come.

"The issue is getting issuers comfortable on execution risk as they are used to fully underwritten secured bank deals. SSD is popular for borrowers seeking euros – as well as US dollar and sterling – given the larger investor base. It is crucial to recognise that the SSD market is not a purely German product; we see a number of deals for international borrowers attracting global investor demand."

Despite the recent flurry of activity in European capital markets, one capital markets banker is dubious about them opening further anytime soon.

"An aircraft is still primarily a US dollar asset. Rating agencies penalise non-USD currency issuance due to asset recovery analysis. We expect aircraft to trade more in euro (and renminbi for that matter) at some point – but it will take time."

Over 2017, the private placement market saw deals from issuers including Goshawk, Jackson Square Aviation and SAS.

"US private placements – both secured and unsecured – offer issuers who previously depended on secured bank loans and the like to diversify their borrowing base and maturity profile," says Halaby. "The limiter to the number of private placements is more due to issuers who are not yet entirely comfortable with the best efforts nature of deals, which typify capital markets transactions versus underwritten bank trades."

He adds: "Many investors now have portfolio managers and analysts as well as the infrastructure necessary to invest in any number of airlines and aviation lessors. The more credits they see, the more they can amortise that cost over a wider range. The private nature of the market allows borrowers to access capital under the radar."

As aviation becomes a more recognised, better understood and relatively stable asset class, yield-hungry investors continue to invest selectively across a variety of debt products. Along with this, a favourable interest rate and long-term financing environment has made the capital markets attractive for leasing companies, as well as airlines that have high credit ratings.

It looks likely that capital markets will remain buoyant in 2018 as a source of capital for airlines and lessors. However, this assumes that several variables remain favourable, including oil prices, GDP growth, air travel demand and the financial outlook of lessors and airlines.

Germania turns to Asia for fleet financing

Karsten Balke, the Berlin-based leisure carrier's chief executive officer, tells **Michael Allen** how the airline wants to transition its fleet by 2022.

Berlin-based leisure carrier Germania is exploring the Asia-Pacific finance market to fund the delivery of at least 25 aircraft for its fleet renewal.

The carrier's chief executive officer, Karsten Balke, tells *Airfinance Journal* at the Asia-Pacific Airfinance conference in Hong Kong that Germania wants to reduce its reliance on German and other European lenders and explore less "old-fashioned" financing structures.

A lawyer, Balke began working for Germania in 2005, advising the widow of the carrier's founder Hinrich Bischoff after his death that year. Balke moved to the board as a general attorney in 2012, before stepping up as chief executive officer in 2014.

Over the past seven years, Balke has seen Germania double its fleet size. Now, the carrier has 29 aircraft, including 14 150-seat Airbus A319s, five 215-seat A321s and 10 148-seat Boeing 737-700s.

At the 2016 Farnborough airshow, Germania placed an order for 25 A320neos and 15 options. The carrier has delivery slots arranged for 2020, 2021 and 2022 for the firm orders, with options deliverable in 2023 and 2024.

"This is designed to be a replacement for our ageing fleet. We have older Boeing 737-700s, for which we were the launch customer with Boeing in 1998. We have to do something about it because those aircraft are 19 years old now," says Balke.

Now, Germania's goal is to achieve 100% fleet commonality.

"When you have a mixed fleet in such a small airline, it means you have crews for Boeing, crews for Airbus, and it is not that efficient," he says.

"We are replacing our fleet. We want to have commonality and that means we want to have one aircraft type. We want to have the most modern aircraft – very young age. This is our target in order to be more efficient."

Balke acknowledges that the transition from Boeing to Airbus will not be easy, having been a "loyal customer" to Boeing for more than 30 years, but he is attracted by the economics of the PW1100G engine from Pratt & Whitney and is unfazed by the issues customers such as Indigo and HK Express have suffered.

"We believe even though it is having difficulties now, when the first deliveries come in 2020 it should be fixed," Balke says, adding that Germania has discussed this issue with Pratt & Whitney.

Financing strategy

Germania's preference is to own its aircraft. Until 2010, it owned its entire fleet and performed fleet renewal every 10 years, taking deliveries in 1988 and 1998. However, since the death of founder Bischoff, there was "a little confusion of whether or not this would go on and who would be the boss of the company and the shareholder", and it became tougher to secure internal approval to renew the fleet on schedule.

Therefore, since 2010, Germania has leased in aircraft, but the carrier plans to return to an all-owned fleet by 2022.

The new financing will be more exotic than previous financings, both in terms of geographical source and structure.

"We have been financing our aircraft in a quite old-fashioned way in the past," says Balke.

"We have paid up PDPs [predelivery payments] out of our cash flow and even a little bit more, and the rest been paying straight down. As the markets are changing, as we cannot foresee how the market will be in 2020-2022, of course we have to be flexible. For us, 25 aircraft is quite a big order."

Balke adds that he is considering mortgages on Germania's existing Airbus fleet because those aircraft are younger than its Boeings.

Germania's managing director, Johannes Klinsmann, said during a company presentation at *Airfinance Journal*'s Airline Briefing & Networking Day that the carrier is in discussions with lessors to add up to 10 aircraft next summer under short-term lease.

Klinsmann added that the leases would be for two or three years to bridge the gap to the first A320neo deliveries, which start in January 2020.

"We expect that next year [2018] we will be in Hong Kong, and we will see if what we have started now has come to fruition," says Balke.

Air Berlin

The insolvency of Air Berlin, a carrier with which Germania has worked closely, providing wet-leased aircraft, has presented an opportunity for Germania.

"There are a few gaps where we can actually profit from that, or take advantage of this bankruptcy," says Balke.

He believes that Air Berlin's takeover of two airlines, DBA and LTU International, may have contributed to its demise.

"There were different cultures within Air Berlin Group and it was hard to settle and absorb that and make it one airline," says Balke. "They were coming from the same background as we are – a leisure carrier – starting business, domestic and long-haul at one time, and that was maybe too much."

CDB's Chang building **'global lessor with Chinese heritage'**

Peter Chang, chief executive officer of CDB Leasing, tells **Michael Allen** about his lessor's expansion into the international market to pursue higher yields.

CDB Aviation Lease Finance (CDB Aviation) plans to develop as a "global leasing company with Chinese heritage" under chief executive officer Peter Chang. The Taiwanese-American, who has been doing leasing deals in China since 1990 and came out of semi-retirement to head up the CDB Aviation following the departure of predecessor Donal Boylan, admires lessors like Avolon and AerCap, deeming them "beautiful platforms".

"They are mature and fully functional and I admire them very much, but do I want to adapt to their system? The answer is 'no'. We have a different set of advantages and disadvantages," he says.

Chang says the support of CDB Aviation's parent, China Development Bank (CDB), is "unprecedented in terms of size, reliability and perpetuity". CDB is one of China's three policy banks, along with Agricultural Bank of China (ABC) and The Export-Import Bank of China (CEXIM).

Peter Chang, chief executive officer, CDB Aviation Lease Finance (CDB Aviation)

Chang's relationship with CDB Leasing chairman Wang Xue Dong, for whom he was previously working on a "semi-advisory basis", helped land him the top job at CDB Aviation.

"I was helping him search for a new CEO. It was very, very difficult because people didn't have the confidence," he says.

"The ones who knew China were very apprehensive about jumping in because they didn't know it could be done. They think you'll be bogged down by regulations and so on. The 'Chinese-y' part scared them off. They finally said: 'Peter, why don't you do it?'"

Chang describes two key changes to CDB Leasing's aircraft leasing business

CDB Aviation timeline

2006: The first Chinese lessor to set up an SPV in Cayman for operating lease.

2007: Leases five aircraft to China Southern Airlines, establishing a "close relationship".

2008: First joint lease of two 737-800s to China United Airlines; first cargo project leasing an MD-11F.

2009: Acquired 15 aircraft from GECAS, winning *Airfinance Journal*'s Aircraft Trade of the Year award; did first overseas sale and leaseback for two A320s with Russia's S7 Airlines.

2010: Ordered 20 Embraer E190s from the manufacturer – the first Chinese lessor to do so; executed China's first operating lease using a free trade zone structure.

2011: Won *Airfinance Journal*'s Asia-Pacific Deal of the Year 2011 for its purchase of a 32-aircraft portfolio from GECAS.

2013: Fleet grows to over 150 aircraft.

2014: Places orders for Boeing and Airbus aircraft.

2016: Lists on the Hong Kong stock exchange in an $800 million initial public offering.

December 2016: Then-CEO Donal Boylan leaves CDB Aviation just six months into the job.

January 2017: Peter Chang confirmed as the company's new CEO.

2017: Office relocates from Shenzhen to Hong Kong.

(Sources: CDB Aviation factsheet; Airfinance Journal research)

since 2014. First, in order to "take [the company] out of the Chinese jurisdiction", CDB Leasing won permission from the China Banking Regulatory Commission (CBRC) to register a branch wholly-owned subsidiary of Shenzhen-based CDB Leasing in Dublin.

"In the meantime, they operated an office in Hong Kong and recruited Western people to turn it around and make it into an international platform," he says.

CDB Leasing set up CDB Aviation in Ireland for several reasons. First, to attract aircraft leasing talent, which Chang says is difficult to do in China. Second, the company wanted an environment conducive to becoming "more global" and not "under the auspices of Chinese law, including [for] something as mundane as getting visas for travel", Chang says.

Chang says the Dublin office can accommodate 100 people. While the Hong Kong office now has more staff than Dublin, Chang expects the Dublin office to outgrow Hong Kong. CDB Aviation's global headcount now stands at 62.

Asked whether CDB Aviation intends to take advantage of a bill to reduce tax for aircraft lessors in Hong Kong that was passed this summer, Chang says CDB Aviation is "looking at it very closely".

Chang says it would be "easy" for CDB Aviation to comply with the bill, as it already has a significant amount of staff in Hong Kong. The bill requires lessors to have a "substantial presence" there.

However, Chang says that lower income tax is not the main consideration.

"At the end of the day, it's not so much that you pay lower income tax; it's really about the benefit and flexibility to your customers. I hope Hong Kong becomes successful. It's easy to say we can lower corporate tax, but that's only one side of the story – the other side is you need to develop the double tax treaties," he says.

One obstacle Hong Kong faces in developing as an aircraft leasing hub is its relative lack of double tax treaties.

> *"You could be a Martian – the key word is talent. It's a question about competency...It's the entire name of the game. If you can't satisfy servicing your customer, the rest is quite academic. We are not traders. We are operating lessors in an old-school way."*
>
> **Peter Chang**, chief executive officer, CDB Aviation Lease Finance (CDB Aviation)

> *"My mission is to create, pure and simple, an international platform that is equal to the rest of the first-tier lessors like GECAS, AerCap and Avolon."*
>
> **Peter Chang**, chief executive officer, CDB Aviation Lease Finance (CDB Aviation)

Airfinance Journal reported in March that Ireland has 72 tax treaties, whereas Hong Kong has only 36.

In his last interview with *Airfinance Journal* in February 2017, Chang outlined plans to lease more aircraft to non-domestic lessees to pursue higher yields. Since that interview, Chang says CDB Aviation has added six more non-Chinese customers – a gain he attributes to growing the company's origination team from two to 16 people, 14 of whom are non-Chinese.

CDB Aviation now has a fleet of 210 aircraft, comprising 174 on operating lease and 36 on finance lease, according to a company factsheet. It leases these aircraft to 45 customers in 25 countries.

"Finding the good talent we have is a miracle and it has almost religious dimensions for me personally," Chang says.

Although CDB Aviation is tapping into the Western talent pool and increasing the number of foreign faces in its business, Chang makes it clear that talent is the main criteria for his personnel selection.

"You could be a Martian – the key word is talent. It's a question about competency... It's the entire name of the game. If you can't satisfy servicing your customer, the rest is quite academic. We are not traders. We are operating lessors in an old-school way," he says. Asked whether, as a policy bank, the Chinese government's One Belt One Road (OBOR) has any influence over CDB Aviation's business decisions, Chang quickly says: "Zero".

"My mission is to create, pure and simple, an international platform that is equal to the rest of the first-tier lessors like GECAS, AerCap and Avolon," he says.

"When [OBOR] becomes a real material element, then we'll look at it professionally and with a certain amount of scrutiny and then evaluate where our comparative advantages are and when we can apply it. Until then, we've got other things to do; we're quite busy.

"We are a Chinese lessor with a global platform. People don't go around calling GECAS an American lessor all the time – it's a lessor. It's a highly competent lessor."

AerCap plots steady course for new year

Aengus Kelly, AerCap's chief executive officer, tells **Laura Mueller** he is confident the lessor can withstand increased competition in the market as it enters 2018 in a "very strong position".

By and large, it was business as usual for AerCap in 2017.

Despite aircraft delivery delays and two customer insolvencies, the lessor still managed to offload several portfolios, raise funding and sidestep most of the merger rumours that circled its closest competitors in the second half of last year.

Its chief executive expects 2018 to deliver more of the same.

"We don't see anything in the environment today that we haven't been faced with before," says Aengus Kelly in an interview with *Airfinance Journal*.

"The industry is in a pretty good place today, driven by the key fundamentals of strong passenger growth, a relatively benign airline credit environment and consistent secondary market demand for aircraft."

The global economy also supports this optimism as the USA heads into 2018 with strong growth momentum. At its 12 December meeting, the US Federal Reserve raised the benchmark fed funds rate by 0.25%. The move completed the Fed's 2017 agenda of three rate hikes under its mandate to promote economic health and stability.

It also improved its view of the strength of the American economy. The annual rate of projected economic growth in 2018 was increased to 2.5% from 2.1%.

In Europe, Germany showed strong GDP growth of 3.3% in the third quarter and, while UK growth was not as high as other countries, it still grew 1.6% during the period.

However, potential shocks to the Chinese economy will remain among the key risks to global growth in 2018. For now, though, economic activity is holding up.

Kelly maintains that AerCap is in a "very strong position" after its third-quarter results, with revenues for the first three quarters of $3.8 billion and net income of $810 million.

He remains confident about AerCap's ability to secure deals despite increased competition from new entrants to the market.

> *"The industry is in a pretty good place today, driven by the key fundamentals of strong passenger growth, a relatively benign airline credit environment and consistent secondary market demand for aircraft."*
>
> **Aengus Kelly**, chief executive officer, AerCap

"The competitive environment ebbs and flows as you'd expect in any industry, and there has been plenty of press about the new entrants to the sale-and-leaseback markets, but we believe we are best placed to take advantage of the current environment as our scale, attractive orderbook and experienced management team gives us access to profitable avenues to deploy our capital," he says.

He notes the industry has witnessed "lots of activity in the last number of years", as returns have appeared more attractive in the low-rate environment.

"That said, the returns are only possible if the assets are managed correctly, and the risk is priced accordingly. We have always been careful to strike the right balance between returns and risk, and clearly at very low lease-rate factors you leave too little room for surprises so we'd expect the market to become more rational in time."

Portfolio expansion

AerCap remained busy through the last weeks of 2017. In late November, the lessor priced $800 million of senior notes at 3.5%, due 2025. It will use the proceeds from the offering for general corporate purposes. This came after an announcement in July of a 10-year unsecured issuance of $1 billion-worth of notes at 3.65%, due 2027.

The lessor also announced an extension to its share repurchase programme, authorising purchases of $200 million of ordinary shares through March 2018.

That follows on from announced repurchases of up to $250 million of shares through the end of 2017.

The programme will be funded using the lessor's cash on hand and cash generated from operations.

In the final week of December, AerCap exercised options to purchase 50 more Airbus A320neo-family aircraft and sold a portfolio of mixed assets to a new customer.

Deliveries of these narrowbodies will begin in 2022, bringing its firm A320neo orders to 270, including those already delivered to the lessor. AerCap notes that it had already placed three-quarters of its forward orderbook for the aircraft before placing this order.

According to *Airfinance Journal*'s Fleet Tracker, the lessor has 41 in-service

A320neos, with 21 units equipped with Pratt & Whitney PW1100G engines and 20 with CFM International Leap-1A powerplants.

However, the introduction of the new narrowbody has not been plain sailing.

The lessor announced on a third-quarter earnings call that it was lowering its capital expenditure outlook for 2017 because of the deferral of nearly two dozen A320neos to 2018.

AerCap's chief financial officer, Peter Juhas, noted the updated deliveries were delayed by "two months from the previous schedule provided... primarily due to engine production delays... as well as some certification delays".

The effect of the delays reduced AerCap's 2017 capital expenditure to about $5 billion. It expects its 2018 spend to be around $6 billion.

"With every new programme there can be delivery delays as early issues are ironed out," says Kelly, adding: "We don't expect to see outright cancellations as the OEMs [original equipment manufacturers] and their supply chains are now coming to grips with the issues that beset those initial engines. The focus for them will be to catch up on production to ensure no further slippages on timelines so that our airline customers can continue to enjoy the benefits of the new-technology aircraft."

On the trading front, AerCap sold a 21-aircraft portfolio to Peregrine Aviation for $800 million, after a series of sales throughout 2017.

The portfolio, which included a mix of widebody and narrowbody aircraft, marked the first transaction between the parties.

Peregrine Aviation is an investment entity established by NCB Capital, the brokerage arm of the National Commercial Bank, the largest bank in Saudi Arabia, and has $37 billion of assets under management.

As part of the sale, AerCap will provide lease management services to Peregrine and will retain an equity interest in the entity.

"The transaction is further evidence of the reach of the AerCap platform and our disciplined approach to portfolio management," says Kelly.

The deal meant AerCap sold or was contracted to sell about $2.4 billion of mid-life assets in 2017. This compares with $3.1 billion of disposals in 2016 and $1.7 billion in 2015.

AerCap disposed of 27 aircraft averaging 16 years old in the third quarter. The net gain on sales for the quarter was $63.7 million, compared with $22.4 million a year ago.

Kelly credits the aircraft sales as part of the increase in AerCap's third-quarter net profit to $265.8 million, which was up 18% from the year-ago quarter.

"We continue to see very strong demand for our widebody aircraft, seen most vividly in the execution of agreements for 10 A330s out of Air Berlin into a number of airlines around the world in the space of a few weeks."

Aengus Kelly, chief executive officer, AerCap

During the second quarter, AerCap achieved a net gain on the sale of assets of $69.5 million, relating to 24 aircraft sold and six aircraft reclassified to finance leases.

This compares with a net gain of asset sales of $38.4 million for the same period in 2016, relating to 32 aircraft sold and three aircraft reclassified to finance leases. In the first quarter of 2017, AerCap sold 21 aircraft at an 11% gain on sale.

Bankruptcies

AerCap had to step up its aircraft re-leasing during the year, after the insolvencies of Monarch Airlines and Air Berlin.

According to *Airfinance Journal*'s Fleet Tracker, Monarch's 35-aircraft all-narrowbody fleet included one Boeing 737-800, 25 Airbus A321s and nine A320s.

AerCap is the most exposed lessor to the UK carrier, with one A320 and eight A321s. Two units are owned by its AERLS 2007-1 securitisation.

The lessor also was due to complete sale and leasebacks with the UK carrier for five on-order Boeing 737 Max 8s, the first of which was scheduled for delivery in March 2018.

AerCap also faced the early return of 10 Airbus A330s from Air Berlin, but managed quickly to turnaround the aircraft with new lessees.

"We continue to see very strong demand for our widebody aircraft, seen most vividly in the execution of agreements for 10 A330s out of Air Berlin into a number of airlines around the world in the space of a few weeks," says Kelly.

In September, Malaysia Airlines signed a letter of intent with AerCap to lease six former Air Berlin A330-200s.

The six aircraft are equipped with PW4000 engines, which are the same powerplants that are on MAS's A330-300 fleet, according to Fleet Tracker.

The A330-200s will be leased for six years to 2023.

In addition, during the first week of January, International Airlines Group (IAG) confirmed plans to purchase the assets of former Air Berlin subsidiary Niki.

IAG's purchase of the Austrian leisure carrier for €20 million ($24 million) will include a fleet of up to 15 A320-family aircraft. Niki has a fleet of 38 units of which one mid-life A321 is on lease from AerCap. It was unclear at press time whether AerCap's A321 will be part of the IAG purchase.

The airline filed for insolvency on 13 December after Lufthansa dropped its plan to acquire the carrier.

New aircraft and mergers

The recent memorandum of understanding between Airbus and Bombardier has not changed AerCap's view of the CSeries.

"For our view on the CSeries to change, we would need to see a material pick up in interest from our airline customers, who are at the heart of our approach to ordering, but that is likely to take time to develop," says Kelly.

"Fundamentally, we are very focused on the 463 new-technology aircraft we have ordered, across the A320neo family and A350s, the Embraer E2s, the 737 Maxs and our recently topped-up 787s and A320s, as these are the models which are most in-demand from our customers."

Kelly remains dismissive about any immediate M&A activity despite being linked to talks with HNA and Avolon at *Airfinance Journal*'s Hong Kong Airfinance event in November, a matter the lessor declined to comment on at the time.

"We don't expect to be involved in any pending M&A deals, but we have shown that if the right asset at the right price was made available, then we have the capacity to analyse it quickly and the ability to execute successfully."

History has shown that this industry can be incredibly fast-moving, such as in the case of AerCap's takeover of ILFC in 2014, and Kelly says the lessor is "planning accordingly".

But he insists this is nothing new.

"There will always be M&A activity in the sector," he says. "So, we will continue to monitor the market to choose the best avenue to deploy our investors' capital."

KDB seeks higher margins

KJ Yang, head of project finance department 1/transportation team two (aviation finance) at Korea Development Bank, tells *Michael Allen* about the latest trends in the Korean aircraft finance market.

With an office in Yeouido less than two hours' drive from the North and South Korean border, one might expect KJ Yang to be nervous.

But the 23-year veteran of Korea Development Bank (KDB), where he is head of project finance department 1/ transportation team 2 (aviation finance), is more concerned with "crazy" pricing in the aircraft finance lending market than a 33-year-old dictator next door.

"It's a very, very low margin... Pricing is at a crazy level. It's very, very difficult," he says, bemoaning the squeezed margins on recent transactions he has observed in the market.

Middle Eastern deals

North Korea presents "no threat" and the mood in Seoul is "quite peaceful", he says, adding that he expects the tensions to calm down this year. If anything, diplomatic relations in the Middle East are a greater cause for concern. Qatar Airways, whose home country is now isolated from its neighbours, was previously a favourite of Korean investors, as was Abu Dhabi-based Etihad Airways.

Yang says it is tougher now to do deals with Qatar because of the country's geopolitical risk. He adds that Etihad is also difficult because of concerns about the airline's balance sheet. Instead, he is considering deals with Flydubai for deliveries this year.

KDB tried several Japanese operating lease (Jol) and Japanese operating lease with call option (Jolco) transactions with Qatar and Etihad in the first half and third quarter of 2017.

Airfinance Journal understands that Etihad's interest coverage ratio for a third consecutive year was below one, which is one of KDB's "filtering factors". This gave Etihad a B level for the company's internal rating. However, Etihad is rated A- by Fitch.

"We appealed and adjusted our internal rating to BBB-," says Yang, adding: "In the case of below A rating internally, it's somewhat difficult to take $50 million or over per aircraft because we must submit this to the highest credit committee.

"And, due to the increased credit premium, the pricing of a BBB-grade client would be higher than an A-grade client. The market pricing of Etihad is based on Fitch rating A. So we can't meet the financing requirements of the client. The opportunities of Etihad were widebody transactions, so we must do the minimum ticket size of at least $50 million.

"But Flydubai is different from Etihad," he says. "We don't have any concerns with Flydubai."

Emirates also poses a problem for KDB, because it already has about $320 million-worth of exposure to the carrier via three Airbus A380s and four Boeing 777-300ERs. This includes $65 million of Jolco exposure. Yang says the maximum exposure KDB would want to have to Emirates is $500 million to $560 million.

"Our largest exposure client is Korean Air, and the amount is roughly $570 million for aircraft financing only," he says.

But Yang has not given up hope on getting Qatar, Emirates and Etihad transactions done in future.

"We will try Qatar next year – firstly, with some lessor financing to Qatar. We will try again for Emirates with A350s, A380s or 777s," he says, adding that it is important for KDB to expand quickly.

"For Korean institutional investors, the requirement of the yield is extremely high, so it's not efficient to finance airlines in North America and Canada."

KJ Yang, head of project finance department I/transportation team 2, Korea Development Bank

KDB is also exploring airline transactions in greater China, including with China Airlines and Eva Air in Taiwan and Sichuan Airlines in the People's Republic of China (PRC).

"I'm pursuing the acceptable credits of FSCs [full-service carriers] in the Asia-Pacific region, but the competition is very tight, especially with China Airlines and Eva: these two airlines' transactions don't come into the market often because they are very popular with international banks, and even junior loans from Taiwanese local banks usually provide them with the competitive pricing. Second-tier PRC airlines are the same," says Yang.

"So KDB's preference is direct financing to these FSCs, but we can't overwhelm them with the aggressive pricing. That's the reason why we did lessor financings quite often so far. Generally, these kinds of lessor financings are eight- to 10-year loans with balloons and sometimes full recourse to the lessor. In addition, the pricing would be mid-range 100 basis points pricing or over."

KDB's transactions with leasing companies include some with Chinese lessors. The bank is helping Ping An Leasing by acting as one of the arrangers of a delivery financing for one of its A350s on lease to Vietnam Airlines.

In addition, KDB is working with Haitong UniTrust and Minsheng Financial Leasing on transactions.

"In addition, we are doing the AWAS, DAE Capital and ALAFCO portfolio acquisition financings. I think we feel more comfortable with financing lessors than airlines," he says.

But not all markets are conducive to financing from South Korea; North America is a "different story".

"For Korean institutional investors, the requirement of the yield is extremely high, so it's not efficient to finance airlines in North America and Canada. I would not consider this for the Korean market because of the inefficiency and the execution risk," he says, adding that carriers such as Air Canada might struggle to access the Korean market because of the lingering memory of its 2003 bankruptcy.

Growth of the Korean market

While Yang says South Korea lacks a centralised body that records the country's lenders' total exposure to the aircraft financing market, he believes the total exposure was likely to hit $3 billion by the end of 2017.

He calculates that, from 2014 to 2016, Korean investors invested $2.2 billion into aircraft. In 2017, four transactions have closed already with an invested amount of about $400 million. Adding those sums to the "three or four" widebody transactions that should finalise in the fourth quarter gives about $3 billion of exposure.

Yang says another $800 million to $1 billion could be added in 2018, growing the industry to $4 billion.

This growth is fine in absolute terms, says Yang, but the problem is that it has not been "stable" growth. He would like to introduce semi-blind or blind pool funds – in which investors would not necessarily know what airlines they were investing in – in order to stabilise market growth.

"All the fund structures in Korea up till now have been the separate deal base fund schemes, not the semi-blind, but some institutions like KDB ourselves and Korea Investment & Securities will try to launch semi-blind funds to invest in narrowbody portfolios," he says.

He admits, however, that it is not easy to attract Korean investors to this type of fund. That is because they tend to prefer loan schemes over investment schemes and prefer to know the specific airlines and asset types involved so they can report to their credit committees for approval.

Another interesting structure that could stabilise market growth is offered by Crianza Aviation, a company formed in mid-2016 with the backing of South Korean private equity and venture capital manager IMM Investment, German financier East Merchant and Youjee Partners.

"Crianza is the first case of its kind in Korea. I think the company would like to expand its fleet numbers next year. They have added three or four aircraft to their fleet already and I think they have some liquidity," he says.

At *Airfinance Journal*'s Inaugural Korea Airfinance Conference in Seoul in March, Crianza's managing partner, Baldur Vander, said it was looking for a level of equity investment that would give the company $500 million to $800 million in total assets each year.

"Crianza is a fund to invest in the equity portion or junior portion of deals. Similarly, Mirae Asset is targeting a similar scheme where they would like to invest in the equity and junior, and they will appoint some asset management company as the servicer," says Yang.

Portfolio transactions

In November 2016, GECAS returned to the asset-backed securitisation market with a $709 million dual-tranche offering called Labrador Aviation Finance. The deal involved Korean institutional investors.

Yang describes the impact of that deal in the Korean market as "severe". He says that while the overall effect was positive, Labrador was "quite a big size" and thus limited the opportunities to find investors for other deals in the first quarter of 2017.

"It's a very impressive transaction because they tried the portfolio financing concept based on the transaction. The most important thing is the asset type is narrowbody and they succeeded to introduce the new names to the Korean market," says Yang.

Qatar, Egyptair and Garuda Indonesia represent the three largest lessee concentrations in the offering, making up 37.1% of the portfolio, accounting for 15.3%, 12.4% and 9.4% respectively, according to *Airfinance Journal*'s November 2016 report on the deal.

Sources previously said that Korean investors would tend to avoid a single transaction with Egyptair because of the heightened risk. However, because of the involvement of GECAS – which is the number one lessor in the world by number of aircraft (according to *Airfinance Journal*'s The Leasing Top 50) – investors were sufficiently reassured that the risk could be managed.

Continued interest in South Korea

Yang sees continued interest in the Korean market from international airlines.

"Finnair came to Korea in December and met with KDB, in April 2017, Air France visited," he says, adding that this is a "quite good signal to the market".

Yang adds: "Finnair's image is quite good to the lenders because they actually were the first Korean institutional investor transaction in Korea. I think before next February's *Airfinance Journal* conference in Seoul some airlines will visit Korea."

Yang also says he met with executives of British budget airline Jet2.com, which expressed its intention to visit South Korea.

"Also, as you know, Avolon and AerCap know this market well and they can wisely utilise a reasonable amount of financing from the local banks, Korean security companies and Korean asset management companies," says Yang.

"I think next year there will be a direct approach from the airlines and some repeated access from the top-tier leasing companies. It's a good image for the Korean market and it's a good promoting factor to all the financial institutions in Korea."

Celebrate diversity to boost women in air finance: **Transportation Partners CFO**

Airfinance Journal commences a regular section focusing on women in the aviation finance sector.

More women than men begin their careers in financial services, but as they progress the majority fall out, especially at middle-management level, a survey by the UK Treasury concludes. This leaves almost all the top jobs in the hands of men.

Airfinance Journal will speak to those women who have stayed the course, to discover what is hindering the advancement of women in aviation finance, and share the insights of those who continue to break down barriers in gender diversity.

To kick off the discussion, *Airfinance Journal* sits down with Valerie Tay, who has acted as chief financial officer of Transportation Partners for the past five years.

Since joining the lessor, Tay has arranged financing for 226 aircraft, of which 201 have been delivered to-date. Those aircraft have been financed through a myriad of financing sources such as sale and leasebacks, export credit agency support, bonds, commercial financings and Japanese operating leases. She is also responsible for diversifying the banking panel for Transportation Partners and also expanding the bank and lessor sources for the Lion Group of airlines.

Tay began her career at Pricewaterhousecoopers as a senior audit assistant in 1994 and then moved onto various roles at Bank of Nova Scotia, Citibank and Daimler Chrysler, which became Daimler following its sale to Cerberus Capital Management in 2007. However, she did not enter aviation finance until 2005, when she joined German financier HSH Nordbank.

During that time, Tay says the biggest change in the aviation finance market has been its expansion.

"There are a lot more players now, including those from alternative funding sources in the market, especially. Also, there is a renewed focus on investments in aircraft from investors in Asia."

Along with the expansion of the industry, Tay believes time has brought better treatment of women in the aviation finance workforce.

"With the push from Women's International Day and various aviation societies like ISTAT hosting events catering to females in aviation, there is a better platform for women to support other women and also to challenge unconscious bias."

Valerie Tay, chief financial officer, Transportation Partners

"With the push from Women's International Day and various aviation societies like ISTAT hosting events catering to females in aviation, there is a better platform for women to support other women and also to challenge unconscious bias," she says.

"Also, with more women sharing their experiences, there is a certain comradery. This is the case in all industries, from banking to sports, and it's good that the aviation industry is also proactive in being in the forefront to support talent regardless of gender."

When asked what advice she would offer women looking to enter the air finance market, Tay points to American aviation pioneer and author Amelia Earhart.

"Amelia Earhart succeeded in fulfilling her ambition to fly across the Atlantic Ocean through hard work and by being good at what she did with a 'do it' attitude," says Tay.

Using her as a role model, women interested in aviation finance should focus on "being good at their capabilities and not on the gender mix", she says, adding: "Also, it is important to be authentic to our feminine personality traits and instincts as diversity brings strength and merit to a team."

To encourage more women to enter aviation finance, Tay stresses the need for proper policies to support women's needs, such as maternity leave and flexible hours.

"From a practical standpoint, women in the workforce have different personal requirements, and as long as human resources policies reflect flexibility to accommodate this, then this will help to ensure their tenures are long-term sustainable ones," she says.

Tay believes also that ongoing praise for diversity from the air finance industry will encourage more women to enter the workforce.

"The aviation industry has traditionally been a male-dominated industry, so women will bring diversity and, fundamentally, if the industry celebrates this and gives recognition to success from diversity – that will be a big draw."

IFRS 16 likely to change lease contracts

Brian O'Callaghan, lead audit and assurance partner for the Deloitte Ireland aircraft leasing and finance advisory team, believes the new accounting regulation could reduce lease times as airlines seek to reduce liabilities and minimise its impact on leverage ratios.

As the dawn breaks on 2018 the aviation finance industry remains optimistic. Lessors have experienced strong demand for narrowbody jets by both airlines and investors, and new-order delivery lags suggest there is no sign of such demand abating in the near term.

The positive macro fundamentals underpinning airline industry growth have benefited the aviation finance industry. Bottom line airline growth is being fuelled by robust demand, reduced finance costs and operational efficiencies, and will translate to the fourth consecutive year of sustainable profits for the airline industry.

The strong airline industry fundamentals extolled by many have been validated further by recent published projections by the International Air Transport Association (Iata). Iata's bullish projections predict the global airline industry net profit will rise from the $34.5 billion expected in 2017 to a forecast figure of $38.4 billion in 2018.

The aviation finance industry should be encouraged by these factors, and lessor optimism emanating from the forecast profit projections and strong macro demographics is well founded. However, some dark clouds remain on the horizon, and the optimism is tempered by the challenges the industry faces.

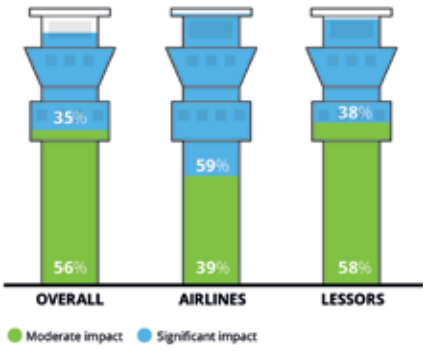
Many industry participants have long memories and often highlight airline industry fragilities which have been previously exposed. Even those with short memories cannot ignore the recent airline struggles of Air Berlin, Alitalia, Monarch Airlines, and VIM Airlines. Recent examples of labour pressures have been well publicised, and such pressures, when coupled with infrastructure, increased competition and a potential rise in fuel price, provide headaches for many.

International and US tax reform remains topical and the ultimate impact of reforms such as those promulgated by the OECD under the base erosion and profit shifting initiatives remain to the forefront of minds.

Finally, the profitability outlined above has improved the airline industry's credit profile, which, together with increased liquidity and investor appetite, has contributed to lease rate compression in recent periods, impacting lessor margins.

Against this backdrop, the implementation date for IFRS 16 Leases is inching closer and moving firmly into the industry's focus. This new financial reporting standard promises to exercise the minds of not just those responsible for financial reporting, with the industry consensus suggesting it will have a notable impact from an operational, reporting, and implementation perspective.

What level of impact will the adoption of IFRS 16 have on your business?



IFRS 16 is effective for annual periods beginning on or after 1 January 2019, and is the culmination of the International Accounting Standard Board's programme of work which began in July 2006. The path to issuance of IFRS 16 has certainly been long and winding, and throughout this journey the aviation industry has been firmly in the IASB's thoughts, most notably highlighted through quotes attributed to the IASB chairman, Sir David Tweedie.

In terms of what we can expect on implementation of IFRS 16, many aspects are pretty clear and widely accepted. The impact on airlines will be more pronounced than their financing partners. Substantial new assets and liabilities will appear on airline balance sheets, while reported profit and performance measures will be impacted. Perhaps most significantly, the impact on individual airlines will depend on their particular financing and leasing structures, and may be very different from the impact on their peers.

Other aspects of what IFRS 16 Leases holds in store for the aviation finance industry are less clear. How the market will approach the key judgment areas in the standard such as the discount rate assumption, which may have the largest quantitative impact on the lease asset and liability valuations, and how potential currency volatility will be managed or hedged, remains to be seen. The jury is also out on how the market will perceive, and respond to, the anticipated impacts.

To gauge market perception on the impact of IFRS 16 on the aviation industry, Deloitte and Euromoney Institutional Investor Thought Leadership teamed up to produce the *Balancing the Books* report. The report contains perspectives gleaned from 381 senior executives surveyed from the aviation finance industry as well as in-depth interviews conducted with senior industry executives and independent experts. It provides fascinating insight on the operational, financial and implementation challenges which the standard presents and also pays particular attention to the often contrasting views of airlines and lessors.

The principal headline from the report is the acknowledgement from airlines that IFRS 16 will have an impact on their business, with 59% of respondents suggesting this impact will be significant. Given that Iata data estimates that about 40% of the current global fleet of nearly 20,000 passenger aircraft is leased, this is not surprising.

What is more telling is where this impact will be felt, and the fact that it extends far beyond the anticipated financial reporting sphere. Areas of concern include transitional arrangements, the review of existing lease and finance data, and the

To minimise the impact of IFRS 16 existing leases will be renegotiated and standard terms for new leases will change

potential renegotiation of lease contracts. The impact projected for lessors, while still noteworthy, is less prominent. The considerable balance sheet impacts felt by airlines on the recognition of leased aircraft as right-of-use assets and rental payments as liabilities, will not be a concern for the majority of lessors, and is reflected in the market feedback. The more pronounced effects for airlines have resulted in 82% of respondents expecting IFRS 16 to be more negative for airlines than for lessors, investors or financial institutions.

Interestingly, market consensus considers that lease contracts will change in the wake of IFRS 16. Lease durations, which have been contracting over time, could become even shorter as airlines seek to reduce liabilities and minimise IFRS 16's impact on leverage ratios. The impact of the standard on leverage ratios is of particular concern, and outweighs the fears regarding the many other financial statement impacts, such as accelerated income statement charges and increased earnings before interest, taxes, depreciation and amortisation.

Changes to which of the following metrics will be most problematic to your organisation?

Two answers per respondent

Some 63% of respondents are most concerned by changes to leverage ratios, with airlines particularly anxious about breaching debt covenants, and/or increasing borrowing costs.

While financiers interviewed for our research contend that most covenants already account for the impact of operating leases on debt, they do concede it will be time-consuming to ensure this is the case.

Other than lease durations, currency denomination is among the lease terms most susceptible to change because of IFRS 16, according to those carriers which rely more heavily on leasing, and managing this extra volatility is touted as the most significant challenge of IFRS 16 by one-fifth of airlines. Most leases are paid in dollars, but these payments, which are recognised as liabilities under the new standard, must be converted to the local currency of an airline, pushing additional foreign exchange volatility through its income statement.

The industry-held view is also that changes to lease contracts, including those outlined above relating to lease duration and currency, will be difficult to renegotiate, with one-third of airlines and 23% of lessors suggesting that the complexity of renegotiating finance and lease contracts will be very challenging. The fact that lessors are expected to resist such changes could result in IFRS 16 being a potential source of tension with airlines.

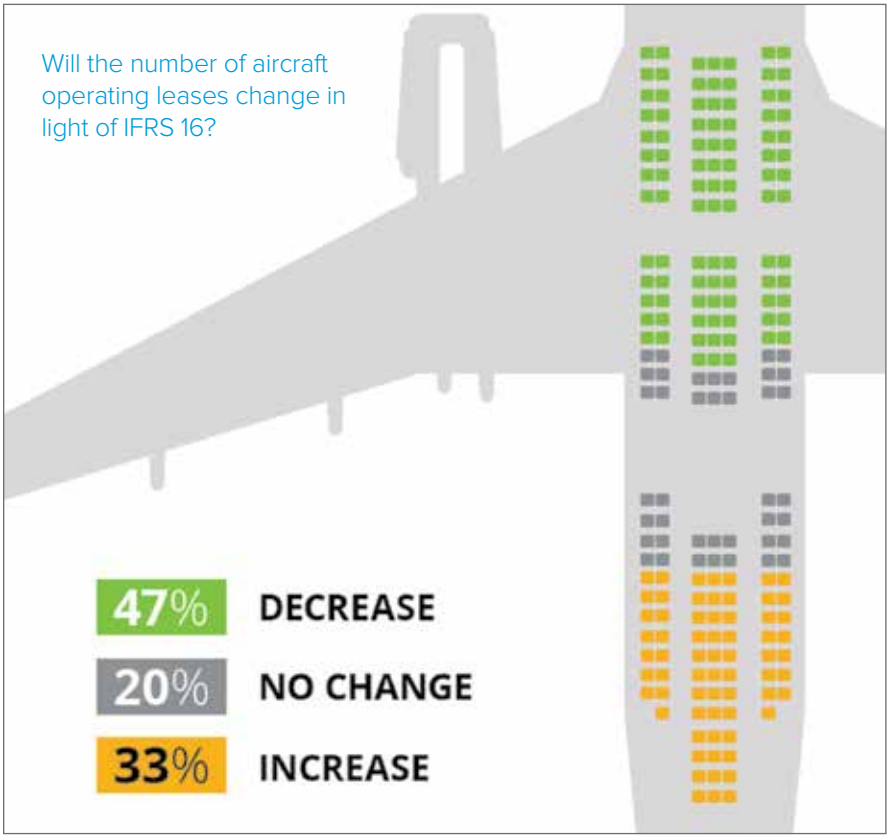
What remains uncertain is what impact, if any, IFRS 16 will have on leasing volumes. The report reflects very different views among the market, with some predicting that operating lease and sale-leaseback volumes will fall in light of the new accounting standard, while many expect no change or even an increase in leasing activity.

We will certainly observe developments in this regard with interest, but one cannot but expect that some of the macro factors alluded to earlier in this article are likely to be far more impactful on leasing volumes than IFRS 16.

In summary though, most industry participants feel well prepared for the advent of IFRS 16, with 90% telling our survey they have sufficient or comprehensive understanding of the standard, confidence that is matched by the wider industry, only 9% of which admit little or no comprehension of the new accounting standard.

Whether this confidence is borne out in reality, as the industry is charting its course through the adoption of this new reporting framework, remains to be seen.

Will the number of aircraft operating leases change in light of IFRS 16?



A **rapid rise**

Michael Allen examines the rise of JoI/JoIco arranger JP Lease Products & Services, comparing its growth to that of FPG in the JoIco market.

Low-profile Japanese equity arranger JP Lease Products & Services has won quiet admiration from industry peers for the growth of its tax leasing business.

In August, JP Lease's parent company, Japan Investment Advisor (JIA), finalised an order for 10 737 Max 8 aircraft.

Speaking to *Airfinance Journal*, JP Lease board director Teiji Ishikawa says that with deliveries not coming until 2021 and 2022, JP Lease still has time to decide what to do with the aircraft it has ordered.

"We thought it better to have an order position of this new type of aircraft," he says, adding that other lessors have positions on new engine option aircraft.

"We were focusing on mid-life aircraft and older ones, but now we are spreading the coverage to younger ones also. Having our own orderbook will give us more opportunity to have a closer relationship with airlines. Introducing new aircraft (especially new types of aircraft) is a core decision for airlines and we would like to construct a tight relationship with airlines in our target list."

Ishikawa will not disclose how many aircraft JP Lease has in total, but says 60 is "not so far off".

Airfinance Journal's Fleet Tracker shows data for 34 of these aircraft. JP Lease's lessees include Aer Lingus, Atlantic Airlines, British Airways, Brussels Airlines, Cathay Dragon, Cathay Pacific Airways, Jet2.com, KLM, Peach Aviation, Solaseed Air, Transavia and Vueling Airlines.

Taking 60 as a ballpark figure, about half of JP Lease's aircraft are managed by Arena Aviation Capital, an Amsterdam-based company it has been working with since 2015 and formed a joint venture (JV) with in September 2017.

Arena's portfolio, including that of the JV, is about 42 aircraft, of which 30 are with JP Lease, with a market value of about $1.5 billion, Arena's managing director and founding partner Patrick den Elzen tells *Airfinance Journal*.

"The plan is to grow the JoI [Japanese operating lease] business with JP Lease to 50 to 60 aircraft by the end of next year," he says.

However, JP Lease likes to maintain relationships with "many parties", says Ishikawa. He names Japanese trading house Sojitz and Asset Brok'Air as two companies JP Lease has also collaborated with on projects, adding that Sojitz helped with the JIA's 737 Max order.

> *"The plan is to grow the Japanese operating lease business with JP Lease to 50 to 60 aircraft by the end of next year."*
>
> **Teiji Ishikawa**, board director, JP Lease

Thierry Pierson, managing director at Asset Brok'Air, says his company has been working with JP Lease since the end of 2012. The companies' first deal together was an Airbus A319 Japanese operating lease with call option (JoIco) transaction for Air France. Pierson says Asset Brok'Air has now arranged about 30 JoIcos for JP Lease, including three for Hong Kong lessor China Aircraft Leasing.

"JoI is really focused on metal risk transfer, which... technically it's more linked to assessment of the return value and remarketing of the aircraft at lease end, which is not where we are more active. We are clearly active on the credit side of the transaction and not asset risk. On that matter, we focused with JP Lease only on JoIco," adds Pierson.

Pierson describes Ishikawa as someone who is "opening the market".

"He is not one who [simply] follows the market. If you follow the market, all you have to do is be the cheapest one against the others, but when you are opening the market, you need to be bright enough to understand the airline... and to explain this to your investors."

FPG similarities

Several industry sources liken JP Lease's rapid growth in the JoI market to the rise of JoIco heavyweight Financial Products Group (FPG).

"JP Lease are growing quite aggressively. FPG have taken over the JoIco market and the guys in JP Lease seem to be doing a similar thing with the JoI market," says a Europe-based banker who has done business with the company.

A Tokyo-based banker says: "if you look at the other JoI arrangers, they have been quite silent recently. JP Lease is quite active if you look at their track record over the past three to five years."

The "big difference" between FPG and JP Lease, says the European banker, is that FPG is more JoIco-focused while JP Lease has typically favoured JoIs.

To an outsider, the difference between a

Jolco and a Jol may be difficult to discern. Both rely on Japan's tax system to provide advantages to investors and customers, but each structure has its own specific advantage.

"In a Jolco, the airline is supposed to buy the aircraft so the equity investors don't face metal risk, which is the risk of price fluctuation of the aircraft at lease end [residual value]," Bob Melson, a partner at K&L Gates Tokyo, a law firm that advises on Jol/Jolco transactions for parties including JP Lease, told *Airfinance Journal* in April 2017 for an article about the Jol market.

"Jol equity investors are taking aircraft residual value risk as they get the aircraft back at the end of the lease. Jolco investors don't get the aircraft back, as it is bought by the airline, or it is supposed to be at least, so they don't have the metal risk," added Melson.

An in-house source at FPG says: "I'm sure they [JP Lease] would love to do the Jolco deals if they could. I think the big difference is JP has to go out and get their investors for the deal. FPG can underwrite at the beginning, then we do the deal."

FPG was founded in 2001 by Hisanaga Tanimura, who now serves as the company's chief executive officer. The company started out doing Jolcos for ships and container boxes, and its first aircraft deal did not come until a decade later when it closed an Air France Boeing 777-300ER Jolco. FPG picked up the transaction after three other companies walked away in a period of economic uncertainty that followed the March 2011 Tohoku earthquake and tsunami.

In 2012, the company closed a Jolco for CDB Leasing, tapping both the Chinese market and the lessor market – two markets that Tanimura said in a July 2016 interview other equity arrangers were too cautious to explore.

FPG has continued this trend, more recently closing lessor Jolcos for Chinese lessors CCB Leasing and CMB Leasing. Previously, it also did Jolcos for ICBC Financial Leasing.

Ishikawa indicates that JP Lease has done four Jols for Chinese leasing companies (which he will not name), but says the market is not growing that much. Also, JP Lease needs to exercise caution in doing Jols for lessors, because those lessors may be competing with JP Lease for deals with airlines.

He says: "Lessor Jolcos are one of the options for leasing companies to introduce financing with reasonable cost. However, the needs of a leasing company is not only to take the cheaper finance. Most lessors would prefer to have flexibility in the adjustment of their portfolio. Lessor Jolcos normally have a fixed financing period, which might make lessors hesitate to take this type of finance. We are trying to put more flexibility by introducing new devices in our Jolco and hoping it might give more chance for us."

> *"Jol equity investors are taking aircraft residual value risk as they get the aircraft back at the end of the lease. Jolco investors don't get the aircraft back, as it is bought by the airline, or it is supposed to be at least, so they don't have the metal risk."*
>
> **Bob Melson**, partner, K&L Gates Tokyo

One of JP Lease's "principles" is to consider the credit of an airline first, rather than the name.

"We introduced new names to the Jol market in 2017 and we already we have some new names for 2018," says Ishikawa.

This is similar to what FPG is doing in the Jolco market.

"If you want to close $3 billion in transactions, a popular name like BA or Lufthansa is not enough. We need a new name, otherwise we cannot meet our investors' big demand," Tanimura told *Airfinance Journal* in July 2016.

Discussing JP Lease and Arena's joint venture, den Elzen says: "I think there is clearly a difference between what FPG is doing with Amentum and what we are doing with JP Lease. FPG and Amentum are looking at new aircraft and longer leases and we are looking at mid-life and older aircraft, with shorter leases. But we do look at the same quality names."

Enter Arena

JP Lease and Arena first met at the 2015 Istat conference in Prague, den Elzen tells *Airfinance Journal*. The pair began working together and closed their first deal in April 2016, later deciding to form a joint venture. JP Lease wanted a "higher degree of control" over the management of its aircraft, while Arena wished to retain its independence.

Arena was also looking to diversify its investor customer base, mostly working with European trading houses and US private equity.

"We were finding out like everybody else that yields were being compressed and aircraft prices are going up, and so if you want to be competitive in this market you need to have access to a competitive cost of capital," says den Elzen.

He says the joint venture (JV) focuses on Jol deals for JP Lease, but JP Lease has also made capital available so the JV can develop business with third-party investors outside Japan.

He adds: "In our case, because we are an independent leasing platform and we do not have our own balance sheet, we need to find outside investors to have that competitive edge. Japanese tax equity, of course, is very competitively priced.

"For us, it was a very welcome addition to our investor base. For them, we represented a very welcome addition to their origination channels and a skilled asset manager to support the execution of their mid-life and older Jol aircraft strategy."

Mid-life focus

JP Lease was originally active primarily in Jol and Jolco transactions for new aircraft, but with contracting margins and compressed yields, "even with tax equity economics they saw that their returns were being eroded by the aggressive new capital coming out of China, for example", says den Elzen.

So JP Lease "pushed the envelope" to develop a market for tax equity investors to invest in mid-life and older aircraft.

Ishikawa says: "The main aviation lessors focused on the new aircraft and the price was expensive in my opinion, so some middle-aged vintage aircraft were not so expensive." However, den Elzen says that older aircraft require "more creativity" to optimise investment returns.

"You need to have a really pro-active, hands-on technical and contract management team and that's what we specialised in," den Elzen says, adding: "I see a healthy future with JP Lease. The Japanese economy is doing very well. Of course, this industry is cyclical, but I don't see the Japanese economy going into recession any time soon, which means there are a lot of profits that need to be sheltered, meaning the interest in the tax product will remain there."

> *"You need to have a really pro-active, hands-on technical and contract management team and that's what we specialised in."*
>
> **Patrick den Elzen**, managing director and founding partner, Arena

New opportunities post-Transasia

After the bankruptcy of one of Taiwan's largest airlines in November 2016, local rivals seized on international routes and took advantage of cheap domestic financing. **Michael Allen** reports.

Since moving to Taiwan in the early 1980s, Thomas McGowan has witnessed big changes in the country's aviation industry.

The American lawyer, who works for law firm Russin & Vecchi's Taipei office, recalls how high-speed rail rendered frequent flights from the northern capital Taipei to the southern metropolis Kaohsiung obsolete. After that, flying became more of an international affair, as reliance on domestic air transport decreased.

In an interview with *Airfinance Journal*, China Airlines president, Su-Chien Hsieh, said that Taiwan's limited population and rail network combine to constrain domestic demand, so his carrier focuses on its international network. China Airlines' main rival, Eva Air, declined an interview for this article.

Taiwan's airline market is small. The two main carriers, China Airlines and Eva Air, both have regional subsidiaries: Mandarin Airlines and Uni Air, respectively. China Airlines also recently took full control of Tigerair Taiwan, giving itself a wholly owned low-cost subsidiary. In addition, there is Far Eastern Air Transport (FAT), but Transasia Airways (TNA) and its subsidiary, V Air, are no longer in operation.

A new carrier, Starlux, is being set up by a disgruntled former president of Evergreen Group, who resigned over a dispute concerning his father's will. The airline's founder, Chang Kuo-wei, has dubbed his project the "Emirates of Taiwan".

The *Nikkei Asian Review* reported in October that Starlux has begun preliminary preparations to start services from Taiwan's Taoyuan airport by the end of 2019.

The country's airline industry was thrown into the international spotlight last year in the run-up to Transasia Airways' collapse. Harrowing dashcam footage caught an ATR plunging into a bridge shortly after takeoff from Songshan airport, killing 43 people and introducing the Transasia brand to a global audience in the worst possible way.

That disaster followed one the previous year, when another Transasia ATR crashed, killing 48. Opinions are divided on whether the crashes caused the airline's demise, or

whether other factors were to blame.

BOC Aviation's chief executive officer, Robert Martin, whose company had three Airbus A320s with Transasia when the airline shut up shop, is convinced it was down to one thing: a put option the airline had on a bond of $75 million due in November 2016.

"We talked to them about it around six months before and said: 'You need to get it refinanced'."

Martin says Transasia insisted Taiwanese banks would refinance the bond, but this never happened.

"We watched the bond, and almost until the day they defaulted it was trading at par. It was incredible. So whoever bought it was totally oblivious to the fact that this problem was coming," he says.

Airfinance Journal reported on 22 December 2016 that BOC Aviation's three aircraft had left Taiwan. The lessor later placed those aircraft – as well as one pipeline Transasia aircraft – with other airline customers, including Air Guilin.

"There was nobody fighting the airplanes from leaving," says McGowan, referring to all the leased aircraft and not just BOC Aviation's.

"If you look at it in retrospect and from a macro perspective, it was fairly smooth. At least for the clients we represent it was fairly smooth, though it probably cost some of them more time and money than they would have preferred to get the job done."

As *Airfinance Journal* documented in detail at the end of 2016 and start of 2017, all the lessors with exposure to Transasia Airways received their aircraft back. Post-repossession briefings given to *Airfinance Journal* by sources at some of these leasing companies confirm that the process was relatively unproblematic, and many lessors have found new homes for their former Transasia aircraft.

Now, Transasia is in the process of selling off its aircraft – as well as other assets – to pay off its creditors. *Airfinance Journal* understands the carrier has a skeleton staff in place at its Taipei office to deal with this.

Although the majority of Transasia's fleet was leased, the carrier still has two Airbus A330s, two A321s and seven ATR72s for sale, says a source close to the airline. A local media report states Transasia has now sold the two A330s to an unnamed buyer. (*Airfinance Journal* spied several of the jets sitting on the tarmac of Taoyuan airport on 30 October).

The source says a potential buyer, which the person declined to name, is in the process of reviewing the Airbus aircraft, while the ATRs are still awaiting a buyer.

Russin & Vecchi's McGowan says: "What we are watching now is, what are the banks and the administrator going to do with the aircraft? Will it be a public auction or a private sale? If the court sells the aircraft at auction, the secured creditors get the money first, then other creditors. From a legal perspective, there is a clear distribution order and a transparent price.

"But selling through auction might not be the way to achieve the best price. Any kind of public auction is going to be 'as is, where is'; with a private sale, you probably get more effective inspection of the aircraft, etc."

Airfinance Journal understands that Transasia submitted its application for bankruptcy at about the end of October.

"I just think they are going to grind into bankruptcy. The yield for creditors is going to be X cents on the dollar at the end of the day," says McGowan.

"Asked about the time frame for repossession and deregistration of aircraft, McGowan says that those not used to the "Taiwan bureaucratic system" may find it slow.

"If you are not used to that pace, you have to be educated to the fact that you are not going to jump the queue. You are

not going to get the government to skip steps.

"Once you are educated to the fact that you have to play within the system rather than beat up the system it works reasonably well. All you can do is if the government asks for a piece of paper you give it to them to keep the process moving rather than arguing about whether or not you really have to."

McGowan says that having the "full cooperation of the operator" helped speed up the Transasia repossessions.

"This time we had the full cooperation of the operator. They were going to all the meetings. If you ask TNA to give you something, they give it to you," he says.

"Where the Taiwan system is less than perfect is if you had a situation where you didn't have operator cooperation. If you had no airline cooperation you could have an aircraft sitting here for up to two years," adds McGowan.

Cheap local financing

Compared with Asian financial centres such as Singapore and Hong Kong, Taiwan's bank financing market for aircraft is small, and a large part of its business is domestic. Taiwanese airlines tend to do much of their financing at home.

Russin & Vecchi's McGowan says it is very difficult for international financiers looking for opportunities in Taiwan to compete with airlines' ability to "just go down to their local banker and borrow money".

He adds: "The opportunities for leasing have to be balance-sheet driven or not wanting to deal with residual value."

A senior executive at a Taiwanese airline says that "financing in the local currency in Taiwan is so cheap", adding that interest rates of just 1.05% for an A350 financing are possible.

"I think the Central Bank of the Republic of China wants to increase the economic growth, so they don't want to increase the rate of interest. Another reason is there is so much money in Taiwan, and the last reason is there are not too many investment opportunities in Taiwan, so I think the banks have lots of funds that cannot be released."

Two of the more active players in the domestic banking market are Cathay United Bank and CTBC Bank.

Airfinance Journal understands that Cathay United made its first forays into aircraft financing during the 2007-08 financial crisis, when European and American banks were withdrawing from investing in aircraft. The bank now has about half a dozen people in its aircraft financing team and a loan book of $1.2 billion.

"Traditionally, most of our distribution channel will be the Taiwanese banks, and now we are seeing if we can distribute to overseas countries like Japan and Korea.

> *"Where the Taiwan system is less than perfect is if you had a situation where you didn't have operator cooperation."*
>
> **Thomas McGowan** lawyer, Russin & Vecchi

Taiwanese banks can be a bit harder because even though we are under the largest group in Taiwan, once we get outside of Taiwan we are not so big," a source at the bank tells *Airfinance Journal*.

The bank is more focused on lessor financing and is exposed to many lessors in the leasing top 50.

While mainland Chinese lessors present a great opportunity for lenders, it is difficult for Taiwanese banks such as Cathay to participate in that market because mainland lessors prefer to use mainland banks for financing.

CTBC has a smaller loan book than Cathay United, with an estimated exposure of $500 million to $600 million. In 2010, Ting Chen, from the bank's Taiwan corporate banking division, set up a small product business within CTBC and started looking at aviation deals. The bank's first transactions were with Eva Air and China Airlines.

Airfinance Journal understands that over the past seven years, CTBC has been trying to grow and expand its loan book into different markets. A few years ago, the bank started doing portfolio deals, which increased its exposure to different jurisdictions because the portfolios contained airlines from various different countries.

The bank prefers not to take a big share on each deal, rather doing club deals and syndicating the pieces out to other Taiwanese banks.

CTBC also owns Tokyo Star Bank in Japan, and Taiwan generally has more amiable relations with Japan than the People's Republic of China (PRC).

Tokyo Star, whose aviation department has its own management team and a degree of autonomy on deal approval, was recently involved in a ¥14.9 billion ($136 million) financing for Financial Products Group (FPG). Last year, it was also a lender – along with CTBC – on a $650 million credit facility for AerCap.

Although Taiwan has about 30 regional banks, not all of them have the heft of Cathay United and CTBC to originate deals in overseas markets.

"I don't think every bank has the resource to reach out to every country alone. Some of them prefer to follow the lead bank," says a Taiwanese banking source.

BOC Aviation's Martin says some Taiwanese banks are "flush with funds and tend to play in the mid-tier risk market in the aircraft finance market".

He adds that a "fairly deep" market of Taiwanese insurance companies – such as Cathay Life Insurance – are also investing in bonds for aircraft lessors.

"Whenever we do a bond issue, we will come and talk to those companies," he says.

Absorbing TNA's capacity

When Transasia Airways folded, about 300,000 seats on routes to Japan became available to Taiwan's other airlines.

Budget airline Tigerair Taiwan was quick to seize this opportunity, and its swift action was one of the reasons the carrier made a profit this year, the carrier's chief financial officer, Erin Shih, tells *Airfinance Journal* at the airline's Songshan airport offices in Taipei.

Tigerair Taiwan now has a fleet of 11 aircraft after a new A320 was received from BOC Aviation last month.

That is likely to be the last aircraft the airline adds for some time as it focuses on maintaining profitability without growing its fleet, says Shih.

"I think we will not expand our fleet currently – 11 is enough. We don't want to be bigger right now. We think we can be small and profitable," she says.

Tigerair Taiwan also leases aircraft from Jackson Square Aviation and Pembroke. Shih says that leasing its aircraft means the carrier does not have to worry about residual value risk, which is "a big problem" for airlines.

However, despite Tigerair Taiwan being the only Taiwanese low-cost carrier (LCC), there are 22 LCCs operating in the Taiwanese market, so competition is fierce. As a result, the carrier is trying out new business models such as becoming a hybrid carrier.

"We can try to find a new business model that is stable in Taiwan," says Shih. She believes one of the reasons Transasia failed is because it expanded too fast.

Cross-strait traffic between Taiwan and mainland China has declined recently, partly because of Taiwan's election of pro-independence president Tsai Ing-wen in 2014.

Shih says that flights from Taiwan to mainland China are still strong, but "not the other way round". To compensate, Tigerair is launching routes to south-east Asia and Bangkok instead.

"After a few years maybe the political issue will go away," she says. "At that time, I think we may have a new market from Taiwan to mainland China. That will be the time to expand our fleet."

AIRFINANCE JOURNAL EVENTS

2018 Event Calendar

Conference	Date	Location
20th Anniversary Global Airfinance Conference	23-25 January 2018	Dublin
2nd Annual Korean Airfinance Conference	27-28 February 2018	Seoul
New York School of Aviation Finance	10-13 April 2018	New York
7th Annual Japan Airfinance Conference	19-20 April 2018	Tokyo
38th Annual North America Airfinance Conference	15-16 May 2018	Miami
16th Annual China Airfinance Conference	14-15 June 2018	Shanghai
New: Inaugural Southeast Aerospace & Defence Conference	25-27 June 2018	Mobile
Summer School of Aviation Finance	02-04 July 2018	Cambridge
New: Latin America School of Aviation Finance	11-12 September 2018	Mexico City
14th Annual Latin America Airfinance Conference	13-14 September 2018	Mexico City

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Lau heads off for new challenges

The Hong Konger, who has just retired from Baker McKenzie, tells **Michael Allen** how the Chinese aviation finance landscape has changed since he became a lawyer in 1991, and how he rose from a nervous articled clerk in Hong Kong to a senior partner in Shanghai.

After 27 years as an aviation finance lawyer, Harvey Lau's best advice for a junior aviation lawyer is to gain experience acting for all parties on a deal – airlines, banks and lessors – to gain a balanced perspective.

The Hong Kong native made his career at law firm Baker McKenzie, having joined back in January 1991. Having grown up in Kowloon, Lau felt great to be working across the harbour in the hustle and bustle of Central as a young man in his mid-20s.

Now, with a 27-year law career in Hong Kong and Shanghai behind him, Lau, a Canadian permanent resident, is looking forward to relocating to Vancouver with his partner. He plans to take up landscape gardening, as well as travel to Italy to learn Italian cooking.

"I don't plan to do anything to make money because that would be stressful," he tells *Airfinance Journal* in Baker McKenzie's office in Hong Kong.

His final trip for the firm was to the Shanghai office Christmas party, and to treat his client China Eastern Airlines to a farewell dinner.

Under his and fellow senior partner Andrew Lockhart's leadership, Baker McKenzie's Asia-Pacific aircraft finance practice has ranked consistently high in *Airfinance Journal*'s Guide to Aviation Lawyers. In 2017, the firm was the second-most active in the region (beaten only by Clifford Chance) with 46 deals. The previous year, it ranked third (behind Clifford Chance and Norton Rose) with 32 deals. In 2015, it was placed second with 50 deals.

Lau has acted on deals for Chinese banking, leasing and airline heavyweights such as ICBC, ICBC Financial Leasing, Minsheng Financial Leasing, Air China, China Eastern Airlines and China Southern Airlines. He has also advised foreign clients on doing deals in China.

In addition, he has been involved in landmark transactions in the Chinese market, including the transfer of 34 aircraft leases to Air China from China Southwest Airlines and CNAC-Zhejiang Airlines when the carriers merged in 2002.

> *"Of course, working for a big firm like this was also exciting, but at the same time challenging because we were sometimes asked to do something we'd never done before. Naturally, we would make mistakes and get really nervous about it."*
>
> **Harvey Lau**, aviation finance lawyer, Baker McKenzie

Unlike some industry colleagues who, despite officially retiring, have taken up part-time advisory posts and freelance gigs, Lau is adamant he is going into "full retirement" and there will be "no more lawyering".

"I should have told the firm I was joining a competitor so I could get six months of gardening leave!" he jokes.

Although Lau is 10 years younger than the firm's retirement age of 62, he is already keen to escape the stress of a lawyer's life.

"I'm done – but never say never," he says.

Besides a few odd jobs during his student years as a tour guide in south-east Asia and a fitting model for Macy's department store in Hong Kong, Lau's whole career has been at Baker McKenzie. His first two years, after completing the firm's foreign studies scholarship at New York University, were spent as what was then called an articled clerk, but is now usually known as a trainee solicitor.

"Of course, working for a big firm like this was also exciting, but at the same time challenging because we were sometimes asked to do something we'd never done before. Naturally, we would make mistakes and get really nervous about it."

Lau spent six months on rotation between the real estate, commercial, dispute resolution, immigration, tax and finance departments, but quickly ended up specialising in aviation. One of the big attractions about the industry was the travel required.

"A couple of times we were asked to attend physical delivery for the clients, so I had the chance to travel to, for example, Seattle, to take delivery of an aircraft. We also had to travel to different places in China for client visits," he says.

One of his first business trips to China was to visit Xiamen Airlines, for which Baker McKenzie acted on the operating lease of the first five aircraft from a Norwegian airline – the first deal Lau handled from start to finish in his career as an aircraft finance lawyer.

Lau was quick to establish himself at

Baker McKenzie as an aircraft finance specialist, being known throughout the firm as the go-to guy for aircraft transactions. He was fortunate to find a mentor in David Martin, whose name, despite having retired, would still be received warmly by many senior players in the Chinese market, says Lau. Lau and Martin travelled often together to China to meet Chinese clients.

Lau says that at that time, a lot of the Chinese airline clients did not speak English, so as a proficient Mandarin speaker he was able to front the clients and attend negotiation meetings.

"That is something that maybe some of the other younger lawyers didn't get the chance to," says Lau.

Back in the 1980s and 1990s, the Chinese aviation market looked very different to how it does today.

"I remember in those days for one operating lease we were able to charge about $53,000, and now we would be lucky if we were able to charge $30,000," he says.

"At that time, definitely, for example, the Hong Kong dollar was more expensive than the renminbi, but now even if you take away the currency exchange the pricing is still much lower than way back."

At that time, rather than the huge diversity of local lenders and lessors now present, there were only Chinese airlines, foreign lessors and foreign banks, says Lau. Bank of China and China Construction Bank were the only Chinese lenders involved in aircraft finance, providing guarantees on deals.

"In the 1980s, there was only one airline in China, called CAAC, but then they decided to have a divesture, so they called the airlines depending on the location of them, so, for example, China Eastern is on the east side and China Southern is on the south side.

"After a few years, they decided to open the market to the non-government investors, so they now have Juneyao and Hainan, for example."

Now, in the words of one market participant, it seems like "every man and his dog" is doing aircraft leasing in China. The market has seen ambitious new entrants such as CMIG Leasing, Ping An Leasing and Xiamen Aircraft Leasing rapidly expanding their portfolios.

"I think the trend will continue on for quite a few years because there are quite a few markets the Chinese leasing companies haven't tapped yet. I don't think there will be mergers of these leasing companies because a lot of them are bank owned, so unless the banks merge there would be no reason to," says Lau.

Shanghai

The second stage of Lau's aviation finance law career started in 2002 when he was asked to start the firm's banking practice in Shanghai.

"If a senior partner asked you to do it, then you could only say yes," he says.

Lau explains that in the early 1990s Baker McKenzie had two offices, one in Beijing and one in Shanghai. However, because of some political disputes between China and the US, the firm was later limited to one office. It chose Beijing, because of its proximity to the Chinese government.

After China acceded to the World Trade Organisation in 2001, the firm was able to reopen its Shanghai office – and this is where Lau went.

"At first it was quite hard because it was just me in the group in Shanghai. Quite a few times, I received inquiries that I had never dealt with, so it was a bit challenging in the first couple of years until I was able to build and grow the team. At that time, I remember we had only 30 people and now we have 170," he says.

Future challenges

One challenge for the Chinese market will be coming up with "interesting structures" to reduce costs for airlines and, at the same time, increase the profit margin of the leasing companies or banks, says Lau.

He notes how, whereas a couple of years ago there were a lot of deals such as French tax leases in the market for Chinese airlines, these seem to have dropped out.

"I don't know for sure but I wonder whether that has to do with the lack of equity in the European countries," he says.

"It looks like now everybody is focused on having the lessor company set up in one of the free-trade zones in China so the airlines could benefit from the VAT offset."

Lau believes the free-trade zones will continue to provide opportunities in China for airlines and lessors.

"Probably it will continue for at least a few more years, until the tax authorities decide there is too much of a tax income leakage and they may change the rules. We also see, for example, some of the lease novations that were originated by the lessors – one of the features would be to replace, say, an Irish lessor with those free-trade zone SPV [special purpose vehicle] lessors."

While Lau is optimistic about China's continued aviation growth over the coming decades, he believes market conditions will get tougher for law firms as more of them contest the market.

"China will require a lot more aircraft in the next 15 to 20 years, but I think it will be harder and harder for law firms because, over time, there will be more firms wanting to do aircraft financing and then, naturally, it will have pressure on the fees," he says.

"We saw that happening in the past 10 to 20 years and... to put it nicely, the Chinese companies are more price sensitive. Among all the aircraft financing clients we have, I have only one client that would allow us to bill on an hourly rate. Otherwise it is just fixed fees."

Competition between domestic Chinese firms and international firms is also becoming fiercer.

"I think it's totally competitive between domestic and international firms. Some clients consider us as a foreign firm and that we don't have the expertise to do PRC [People's Republic of China] work, but we do because we have PRC-trained lawyers. The Chinese laws firms claim – and they do – to know how to do Chinese deals, but they also claim that they can do foreign law transactions."

Lau adds that whereas people might view a global firm such as Allen & Overy as Baker McKenzie's natural competitor, in the Chinese market competition will be just as strong from a local firm such as Han Kun.

Baker's realignment

Lau is confident Baker McKenzie will continue to be a strong player in Asia-Pacific aircraft finance.

Andrew Lockhart, with whom Lau used to co-lead, will continue to head the department. Allen Ng has moved to Shanghai. The firm has one aircraft associate in Hong Kong and four in Shanghai.

"The team have worked quite closely together for many years," says Lau, "so there are only a couple of clients that Allen did not know well and I had to introduce. Otherwise – put it this way – they are clients of the firm."

Why vertically integrating gives **engine lessors the edge**

Airfinance Journal speaks to Bobby Janagan, vice-president and general manager at Rolls-Royce & Partners Finance, about the prospects of two key engine types and why it is worth cutting out the middle man.

Bobby Janagan, vice-president and general manager at Rolls-Royce & Partners Finance (RRPF), the engine leasing joint-venture business, says that more engine lessors are looking to vertically integrate as competition in this market increases.

"It's to optimise the profit rather than sharing it with a third party. But, a much more important point is by vertically integrating parts supply you can align much more with customers.

"You can have multiple customer touch points from initial fleet financing to supporting asset transitions and eventually retirements," he adds.

There were several instances of engine lessors vertically integrating during 2017. Engine Lease Finance acquired a majority shareholding in Chicago-based parts company Inventory Navigators in June. Bankrupt TES Aviation was acquired by Willis Asset Management, a subsidiary of Willis Lease Finance, in October. TES Aviation had about 500 aircraft engines under management.

Janagan says that acquiring a parts business makes sense, because a parts company needs a regular feed of engines for part out to generate spare parts stock. Without a feeder, sustaining a parts business is a challenge.

RRPF has been integrated within the wider Rolls-Royce Group, including its used parts division, since its establishment in 1989. However, more recently, it has been more directly managing a used material business.

Rolls-Royce Group sold its shareholding in International Aero Engines (the manufacturer of V2500-A5 engines) in 2012 and since then has been slowly divesting from V2500-related businesses. The first step in doing that was to sell the V2500 used parts business to RRPF in 2014.

"It made a lot of strategic sense for the parts business to be integrated into RRPF, because we are the largest owner of V2500 spare engines. We are able to feed material to that parts business," says Janagan.

The engine leasing market gets more interesting from the mid-life space onwards, he adds, because airlines and aircraft lessors both need engines to transition, creating opportunities for engine exchanges and green time leasing, as well as used material for shop visits.

"As a lessor who started investing in V2500s and Trent 700s in the early '90s, we have a lot of engines that could support these kind of opportunities, so we work very closely with aircraft lessors and airlines on all kinds of transactions."

The two "core programmes" for the lessor are the V2500 (Airbus A320) and the Trent 700 (A330), which should provide profitable trading opportunities in the near term. Both of these programmes went into service in the mid-1990s but the average fleet age is only about eight years because of long production runs.

"In these programmes, although on average they are still quite young, there are an increasing number of mid-life and older aircraft where we can help asset owners to extend the economic life of aircraft with solutions such as lease engines and engine exchanges. And then, when we part out the unserviceable engines, we can support customers, lessors and overhaul shops with serviceable used material to achieve lower time and material [T&M] shop visit cost."

In the past, engine lessors would sell their engines in the market and a parts trader would buy them. Now, there is more focus from the engine lessors on how best to extract value from engine material.

"We previously sold whole engines externally or internally and occasionally parted out V2500 engines and sold the material to the Rolls-Royce shop. Now we are parting them out and putting material into our old engines to extract better value for the shareholders," he says.

"We are also actively working with all of the Trent 700 overhaul shops to overhaul engines on T&M basis using serviceable used material."

V2500 and Trent 700

RRPF is bullish about the prospects of V2500 and Trent 700s, being the largest lessor of these two asset types. The company bought eight V2500s in 2017, mainly from older A319s, an aircraft that is quickly coming to the market for part-out.

"I think the V2500 is going to fly for a very long time because the overall operating cost advantage between the Ceo and Neo is limited in the current fuel price environment," says Janagan. "There are roughly 3,000 aircraft in service or on order with about 184 V2500 operators."

He adds: "Not all of them are going to switch over to Neo and even if they all want to switch, Airbus can only produce so many aircraft a year, which means a lot of Ceo aircraft will continue to fly for a long time. A good example is Southwest. Southwest only phased out the [Boeing] 737 Classics in September after 20-plus years of service, even though the 737NG entered service in 1998."

Although there are many widebody used aircraft coming available, the A330 has seen a strong secondary market demand. After Air Berlin's collapse in August, the largest lessor was quickly able to place most of their A330s with Malaysia Airlines. Janagan says the 15 to 20 expected A330s transitioning a year is "a manageable number" provided the global economic environment is balanced.

Janagan views the transition from the A330 current generation to the A330neo in a similar way to the A320 – he thinks that the current generation aircraft will continue to fly for many years. "Some older aircraft that delivered in the mid-'90s may get parted out, but my view is that many will transition successfully. There are a lot of airlines flying A330s today. It's a small aircraft, so the second-tier operators can fill the plane and a lot of lessors are in that space so the market will be vibrant."

Boeing 737-800 – hard act to follow

By any measure Boeing's best-selling single-aisle aircraft is a huge success, but appraisers suggest that values will be hit by the arrival of its successor and stiff competition from Airbus's current- and next-generation models.

The Boeing 737-800 is the biggest-selling member of the successful next-generation (NG) 737 family, which overall has totalled more than 6,300 orders. Along with the -800, the other members of the family are the 737-600, -700 and -900ER models.

The 737-700 was the first model to be developed, with its first delivery in December 1997. The 737-800 followed, entering service in spring 1998. The aircraft has been continuously developed, notably with the addition of a blended winglets option.

In 2009, Boeing and CFM introduced the CFM56-7BE engine enhancement programme to coincide with airframe improvements. Boeing says the combination reduces 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.

Successor

The direct replacement of the 737-800 is the 737 Max 8, which entered service in May 2017. Models in the Max series are powered by CFM International Leap-1B engines. According to the manufacturer, Max models will reduce fuel burn by about 13% compared with current-generation aircraft.

Despite the entry into service of the 737 Max 8, the 737-800 continues to be built and a definitive date for the end of production is yet to be announced.

Istat appraisers' views

Avitas

Martin O'Hanrahan, senior consultant

A hugely successful aircraft programme, the 737-800 has become a staple of the world's narrowbody market. Availability and

storage rates are consistently low and few units have been permanently retired. The 737-800 is by far the best-selling variant within the entire 737 range, though its direct successor, the 737 Max 8, is already in second place in terms of commitments.

The 737 Max 8 was launched in 2011 as part of the Max family and the first delivery, an aircraft placed on lease by Avolon to Malindo Air, occurred in May 2017. The type has secured sales from a diverse range of operators and lessors, and benefits from being part of a family of aircraft and having a single engine type, the CFM56-7B series. The CFM56-7B26 variant is by far the most common choice of powerplant, equipping about 78% of the in-service fleet. The current standard is the -7B26E.

Capitalising on the success of its first- and second-generation predecessors, the 737-800 sold easily to customers eager to take advantage of its increased mission capability and technological enhancements, which delivered attractive operating economics. The model also benefited from the tendency for some operators to migrate from aircraft in the 737-700-size category to larger aircraft. Both legacy and low-cost carriers have been able to deploy the 737-800 successfully across a wide range of missions, while lessors have endorsed it with regular and substantial orders.

The 737-800 has always warranted a premium over the competing Airbus A320, though the market is beginning to see some impact as deliveries of the 737 Max 8 gather momentum. The type has been sought-after by lessors and its presence in the marketplace has been unassailable for many years. The fleet also benefits from having a younger profile than its most direct rival, having entered service in 1997.

While there is some inevitable pressure from an end-of-the-line effect, its desirability as a popular and versatile asset will continue for many years to come.

With values of early vintage units now at levels that make cargo conversions viable, several freighter configuration programmes have been launched. With a typical revenue payload of about 23 tonnes and a design range of 2,570 nautical miles (nm), the cargo conversion is likely to prove a popular platform, offering full commonality within the 737NG family.

MBA

Alex Cosaro, senior analyst, asset valuations

The 737-800 is one of the best-selling commercial aircraft of all time and the market continues to be strong, nearly 20 years after the first aircraft was delivered. The 737-800 is well positioned in terms of seating capacity, as shown by its commercial success compared with the smaller 737-700 and larger 737-900ER.

Even with Boeing's launch of the new 737 Max 8, values have remained steady because the low price of fuel has kept the 737-800 competitive compared with the latest generation of aircraft. In some cases, lessors have seen higher yields for the 737-800 than for the 737 Max 8 because of the -800's lower acquisition costs and corresponding lease rates.

The first large wave of 737-800s are due to come off their initial lease in the early 2020s, but these aircraft will likely be able to find homes should Brent Crude oil prices continue to hover around $60 a barrel.

AIRCRAFT CHARACTERISTICS

Seating/range

Max seating	189 at 30-inch pitch
Typical seating	162 at 32/34-inch pitch
Maximum range (winglets)	3,115 nautical miles (5,760km)

Technical characteristics

MTOW	79 tonnes
OEW	41.1 tonnes
MZFW	61.7 tonnes
Fuel capacity	26,020 litres
Engines	CFM56-7B
Thrust	27,300lbs

Fuels and times

Block fuel 200nm	2,000kg
Block fuel 500nm	3,530kg
Block time 200nm	54 minutes
Block time 500nm	94 minutes

Fleet data

Entry into service	1998
In service	4,554
Operators (current and planned)	208
In storage	46
On order	439
Built peak year (2016)	408
Estimated production 2018	210
Average age	7.2 years

Source: *Airfinance Journal*'s Fleet Tracker

Indicative maintenance reserves

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

Source: *Airfinance Journal*'s research

Production of the 737-800 is winding down, but the current backlog of nearly 400 aircraft mixed in with concurrent Max deliveries should keep production going for a couple more years.

Freighter conversion programmes from Aeronautical Engineers (AEI) and Boeing will also extend the life of the 737-800. The conversion is an ideal replacement for the ageing 737-300F and 737-400F aircraft currently in service. If fuel prices increase, the 737 Max 8 will undoubtedly start replacing the 737-800 at a much faster rate, because the aircraft offers 15% fuel burn improvement over the 737-800 and longer airframe maintenance intervals.

For now, however, the market for the 737-800 remains strong and the aircraft continues to be the value leader in the current-generation narrowbody passenger market.

Oriel

Olga Razzhivina, senior Istat appraiser

By far the most successful member of the 737NG family, the -800 has achieved more than 5,000 sales – nearly 75% of the 737NG total. Although the 737 Max 8 is set to supersede the 737-800, there are still more than 380 orders in the backlog for the NG model.

The aircraft is to be found in all airline business models: flag carriers, low-cost airlines and charter operators. The largest fleet (about 400 aircraft) is with Ryanair. About 50% of the fleet is in the hands of lessors, which cherish the liquidity and strong residual value performance of the variant.

The 737-800 values and lease rates have mostly outperformed those of its main competitor, the A320 model. It is difficult to point to a single cause for this, but there are a number of factors that have probably contributed to the stronger performance.

First, for a long time the 737-800 allowed six more passengers in its maximum density configuration than the A320. The Boeing model also had winglets introduced earlier in the life of the programme than the competing Airbus models. Second, the single engine choice on 737NGs has led to a larger remarketing base than the two-source A320. Third, with the A320 being the European manufacturer's first single-aisle product, Airbus had to build up market share with the A320. This partly entailed taking on less-established customers which had a higher rate of failure than 737 operators. Last, the leased 737-800 fleet is concentrated with fewer lessors, leading to less competition.

Given that values for the older vintages are still firm, the freighter conversion programme could appear premature. However, the 737NG is under pressure from import age restrictions in various jurisdictions and demand for narrowbody freighters is supported by the booming e-commerce industry. Conversion slots with all three providers – Boeing (including a partnership with STAECO in China), Bedek and AEI – are sold out to a variety of customers, including airlines and lessors.

After years of better than expected performance, market values and lease rates have declined to more normal levels. Relatively low fuel prices, as well as engine reliability problems with the early examples of the 737 Max- and A320neo-generation aircraft, are helping lease rates of 737NGs and A320ceos. While these forces are likely to persist for a while, the increase in production rates and a switch to new-generation models will put 737-800 values and lease rates under pressure.

Values

Current market value ($m)

Build year	2001	2005	2009	2013	2017
Avitas view	16.5	21.9	28.7	37.1	47.1
MBA view	15.6	20.6	27.1	35.2	44.9
Oriel view	12.3	15.7	21.2	29.2	46.1

Assuming standard Istat criteria.

Indicative lease rates ($000s/month)

Build year	2001	2005	2009	2013	2017
Avitas view	176-196	202-222	236-256	278-298	320-340
MBA view	170-183	202-217	240-257	280-301	322-345
Oriel view	170	190	230	270	335

Compact **competitors**

Embraer's E195-E2 and Bombardier's CS100 appear to be closely matched. **Geoff Hearn** investigates which model offers the best option for airlines and financiers.

Bombardier and Embraer have a history of acrimonious rivalry in the regional aircraft market and the competition looks set to continue as the manufacturers strive for market share in the 100-seat segment.

The CSeries and E2 families are not completely aligned in terms of model size but there is little doubt that they will compete in a wide variety of campaigns. The most direct competition is between the CS100 and the E195-E2. Both aircraft are in a size category below the main Airbus and Boeing single-aisle aircraft.

Embraer's E195-E2

Bombardier's CS100

Bombardier CS100

The CS100 is part of Bombardier's single-aisle family, which also includes the larger CS300. Unlike Airbus's Neo family and Boeing's Max models, the CSeries aircraft are all-new designs. The aircraft have had their share of setbacks during development but both the CS100 and its larger sibling have now entered service.

The order situation has been improving, and the recent announcement that Airbus is to take a majority share in the programme may transform the CSeries' fortunes. The involvement of Airbus is, however, unlikely to ease Bombardier's dispute with Boeing over subsidies, which has led US authorities to impose punitive import taxes, jeopardising the major order placed by Delta airlines. The reports of discussions between Boeing and Embraer about a potential tie-up suggest that two rival camps may be forming.

Bombardier says a clean-sheet design allows the CSeries models to offer a fuel saving of 20% and a similar advantage in cash operating-cost compared with current-generation competitors. These figures have been eroded by the latest re-engined versions of the Airbus A320 and Boeing 737 families and Embraer's E2 models, but the CSeries retains an advantage.

E195-E2

The E195-E2 is the largest member of Embraer's E2 family. E-Jet models are often referred to as regional jets, reflecting Embraer's history of producing smaller models, but the manufacturer does not favour the terminology. Embraer sees the aircraft as more akin to the smaller single-aisle aircraft of Airbus and Boeing. The other two members of the family are the E175-E2 and the E190-E2. The E2 models are updated and re-engined versions of the current generation of E-Jets.

The E195-E2, which is certified as the EMB190-400, will be the second model to enter service, after the E190-E2. Brazilian carrier Azul is planned to be the launch operator for the variant and entry into service is targeted for the first half of 2019.

The E195-E2 is extended by three seat rows compared with its predecessor, which places it between the CS100 and CS300 in terms of passenger capacity.

Key data of Embraer E2 and Bombardier CSeries models

Model	E175-E2	E190-E2	E195-E2	CS100	CS300
Typical seats single class	80	97	118	108	130
Typical range (nm)	2,060	2,800	2,600	3,100	3,300
(Target) entry into service	(2020)	(2018)	(2019)	2016	2016
Delivered	None	None	None	14	14
Orders backlog	150	83	98	164	224
List price ($m)	51.6	59.1	66.6	79.5	89.5

Source: *Airfinance Journal's research December 2017*

Orders

Looking at the respective families, the combined sales of the Bombardiers exceed those of the Embraer E-Jet models. The difference is relatively small (388 versus 331) and is perhaps unsurprising given the Bombardier aircraft are already in service. The CS100 has a clear lead in terms of orders over the directly competing E195-E2, but neither aircraft is the most popular in its respective family.

Embraer seems to be achieving more success at the lower end of its size category, whereas Bombardier's CS300 model is so far proving more successful than its smaller stablemate. It is too early to see these as definitive trends, but it may be that the manufacturers will gravitate to different size categories.

The smaller size category looks likely to be less competitive, with rival aircraft coming from unestablished manufacturers and an absence of suitable aircraft from Boeing and Airbus. There are, however, some doubts over the size of this market, not least because of constraints in the US.

The larger Bombardier aircraft face competition from Boeing and Airbus models, albeit ones that are not optimally sized for the sub-130-seat market. However, even a relatively small share of the booming single-aisle market could provide healthy sales figures.

Market perception

Gueric Dechavanne, vice-president, commercial aviation services, Collateral Verifications, says the E195-E2's order and customer base suggest it is likely to be used for niche markets, as has been the case for its predecessor. Dechavanne adds, however, that the additional capacity the aircraft will offer may be attractive to operators looking for cabin flexibility, especially in the US, where dual-class configurations have become more popular.

He points out that, although current operators of E-Jets may find the new-generation models attractive if fuel prices increase, the existing fleet of E-Jets is relatively young. This means that it is likely to take a few more years for the replacement cycle to begin. Once the cycle starts, orders for the largest of the E2 models should pick up, but Dechavanne does not believe that sales of the largest variant will be much higher than for the current E195 model.

Dechavanne has some similar views on the CS100, which he believes may become another niche aircraft over the long term.

"Unfortunately," he says, "for the type, delays, relatively low fuel prices and aggressive campaigns from competing manufacturers have made it difficult for the aircraft to gain traction."

He adds: "Although the aircraft appears well suited to replace ageing 100- to 150-seat aircraft such as 737-300s, 737-700s, A319s, Fokker 100s and MD80s, the current low fuel price environment makes it tough for operators to justify taking the risk of introducing a new aircraft type when they can extend leases or purchase used aircraft at much lower costs."

Dechavanne does see some potential and believes the acquisition of the programme by Airbus will help. He concludes: "Should oil continue its upward trend, this should also help to justify the increased capital costs to acquire the aircraft. Overall, this programme has some potential for success, but the verdict is still out."

Indicative relative cash operating costs (COC)

	E190-E2	E195-E2	CS100	CS300
Relative trip cost	92%	Base	97%	103%
Relative seat cost	116%	Base	107%	94%

Indicative relative total direct operating costs (DOC)

Relative trip cost	91%	Base	107%	117%
Relative seat cost	116%	Base	117%	107%

Assumptions: 500 nautical sector; fuel price $1.75 per US gallon.
Figures are based on Airfinance Journal's interpretation of manufacturer claims and published data.
Fuel consumption, speed, maintenance costs and typical seating layouts are as per Air Investor 2018.

Operating costs

Airfinance Journal has looked at the relative operating costs of the E195-E2 and the CS100. Although these models are the most direct competitors in the range, they are not directly aligned in terms of seating. The stretching of the E2 version of the E195 has placed its seating capacity between that of the CS100 and the CS300. The relative operating costs of the CS300 have, therefore, also been included in the analysis and for completeness the E190-E2 has been analysed.

The third member of the Embraer family, the E175-E2, does not compete directly and is, therefore, excluded from the operating cost analysis, although the model's success or otherwise is likely to play a significant role in determining the fortunes of the E2 family.

The results of the analysis are as would be expected when comparing aircraft of different sizes and similar technology in that the larger E195-E2 has a higher cash operating cost (COC) per trip than the CS100, but the situation is reversed when comparing the seat cost. This pattern is repeated when the larger CS300 is compared with the E195-E2. This suggests that, although the CS100's all-new design means it retains a significant advantage over the re-engined E190-E2 in terms of fuel consumption, it does not appear to offer a sufficient advantage to enable the smaller aircraft to have lower seat-mile costs than its larger competitor. Embraer maintains that this is in part because the E2 family is more than just a re-engining, with significant advances being made in airframe technology.

There are a number of caveats to this analysis. The Bombardier models offer significantly more range than the competing Embraer aircraft and should an airline not require the additional capability, it is possible to select lower maximum take-off weight options, which will reduce operating costs (particularly in a European environment). In some cases, the additional range may be a critical factor in an airline's selection process.

The competitiveness of the Bombardier aircraft will also be increased in the event of a rise in fuel prices from the current level used in the analysis ($1.75 per US gallon).

Although the cash operating comparison appears to be in line with expectations, the inclusion of capital costs to obtain total direct operating costs (DOC) appears to give the Embraer aircraft a distinct advantage in both trip cost and cost per seat. This would suggest that the pricing of the Bombardier models is ambitious.

The average of current market values for the CS100, supplied by appraisal firms to *Airfinance Journal*, is $32.5 million compared with Bombardier's 2017 list price bfor the model of $79.5 million. Current market value for the E195-E2 is difficult to gauge because the aircraft has not entered service and there has been little to no trading of the type. However, a source suggests to *Airfinance Journal* that the pricing of deals concluded [by Embraer] on the E195-E2 "is in the high $30[million]s".

The source adds that as and when the CS100 becomes established, its pricing should recover to a level that reflects its advantage in cash operating cost.


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Airlines

Airline	Fitch	Moody's	S&P
Aeroflot	B+(stable)	-	-
Air Canada	BB-(stable)	Ba3(stable)	BB-(pos)
Air New Zealand	-	Baa2(stable)	-
Alaska Air Group	BBB-(stable)	-	BB+(stable)
Allegiant Travel Company	-	Ba3(stable)	BB-(stable)
American Airlines Group	BB-(stable)	Ba3(stable)	BB-(stable)
Avianca Holdings - IFRS	B(neg)	-	B(stable)
British Airways	BBB-(stable)	Baa3(stable)	BB+(stable)
Delta Air Lines	BBB-(stable)	Baa3(stable)	BBB-(stable)
easyJet	-	Baa1(stable)	BBB+(stable)
Etihad Airways	A(stable)	-	-
GOL	B(stable)	B2(stable)	B-(pos)
Hawaiian Airlines	B+(pos)	B1(stable)	BB-(stable)
jetBlue	BB-(pos)	Ba1(stable)	BB(stable)
LATAM Airlines Group	B+(stable)	B1(stable)	BB-(stable)
Lufthansa Group	-	Baa3(stable)	BBB-(stable)
Qantas Airways	-	Baa2(stable)	BBB-(stable)
Ryanair	BBB+(stable)	-	BBB+(stable)
SAS	-	B1(stable)	B+(stable)
Southwest Airlines	BBB+(stable)	A3(stable)	BBB+(stable)
Spirit Airlines	BB+(stable)	-	BB-(stable)
Turkish Airlines	-	Ba3(stable)	BB-(neg)
United Continental Holdings	BB(stable)	Ba2(stable)	BB-(pos)
US Airways Group	-	B1	-
Virgin Australia	-	B2(neg)	B+(stable)
WestJet	-	Baa2(neg)	BBB-(stable)

Source: Ratings Agencies - 9th January 2018

Lessors

	Fitch	Moody's	S&P	Kroll Bond Ratings
AerCap	BBB-(stable)	-	BBB-(stable)	-
Air Lease Corp	BBB(stable)	-	BBB(stable)	A-(stable)
Aircastle	-	Ba1(stable)	BB+(pos)	-
Avation PLC	B+(stable)	-	B+(stable)	-
Aviation Capital Group	BBB(stable)	-	A-(stable)	-
Avolon Holdings Limited	BB(stable)	Ba2(stable)	BB+(stable)	BBB(stable)
AWAS Aviation Capital Limited	-	Ba3(stable)	BB(pos)	-
BOC Aviation	A-(stable)	-	A-(stable)	-
Dubai Aerospace Enterprise	-	Ba2(stable)	BB(pos)	-
Fly Leasing	-	Ba3(stable)	BB-(stable)	BBB(stable)
ILFC (Part of AerCap)	-	Baa3(stable)	-	-
Park Aerospace Holdings	BB(stable)	Ba3(stable)	-	-
SMBC Aviation Capital	A-(stable)	-	BBB+(stable)	-

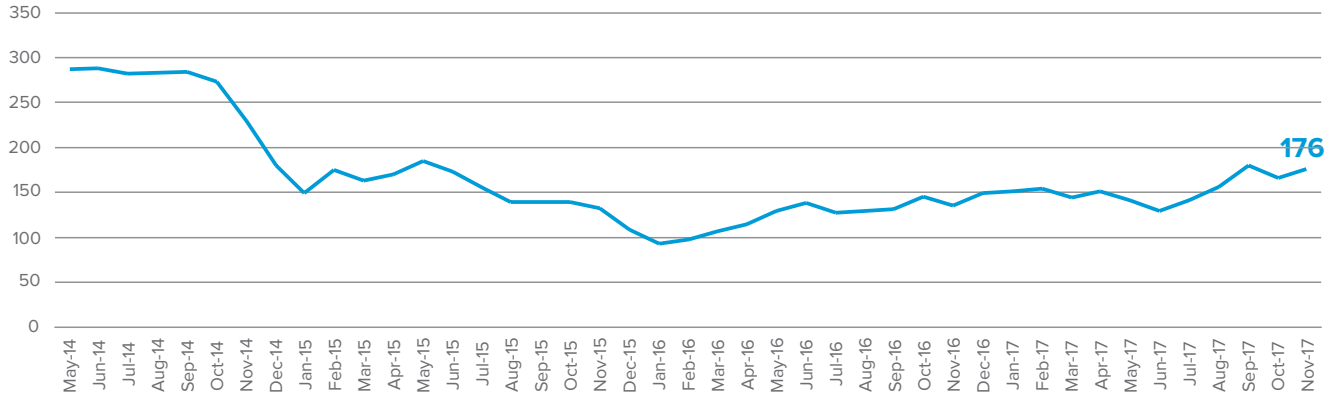
Source: Ratings Agencies - 9th January 2018

Manufacturers

	Fitch	Moody's	S&P
Airbus Group	A-(stable)	A2(stable)	A+(stable)
Boeing	A(stable)	A2(stable)	A(stable)
Bombardier	B(neg)	B3(neg)	B-(stable)
Embraer	BBB-(stable)	Ba1(neg)	BBB(neg)
Rolls-Royce	A-(stable)	A3(neg)	BBB+(stable)
United Technologies	A-(neg)	A3(stable)	A-(neg)

Source: Ratings Agencies - 9th January 2018

US Gulf Coast kerosene-type jet fuel (cents per US gallon)



Source: US Energy Infromation Administration

Recent commercial aircraft orders (Nov 2017 - Jan 2018)

Customer	Country	Quantity/Type
Egyptair	Egypt	12xCS300
Turkish Airlines	Turkey	3x777F
Vietjet	Vietnam	11xA321; 73xA321neo*
Royal Air Maroc	Morocco	4x787-9
AerCap	Ireland	50xA320neo
Indigo Partners	USA	274xA320neo; 156xA321neo
CALC	China	50xA320neo
Viva Air	Panama	35xA320neo; 15xA320ceo
Undisclosed customer	Undisclosed	6xCRJ900
Flydubai	UAE	175x737 Max
Pegasus Airlines	Turkey	25xA321neo ACF
Delta Air Lines	USA	100xA321neo
Qazaq Air	Kazahkstan	2xQ400
ICBC Financial Leasing	China	55xC919
Qatar Airways	Qatar	50xA321neo ACF**
Belavia	Belarus	1xE195
Cemair	South Africa	2xQ400
Nordic Aviation Capital	Denmark	2xQ400
Okay Airways	China	5x787-9
Avolon	Ireland	55x737 Max8; 20x737 Max 10
Scat	Kazahkstan	6x 737 Max 8
CDB Aviation Lease Finance	China	58xA320neo; 32xA321neo
Ethiopian Airlines	Ethiopia	4x777Fs
ALAFCO	Kuwait	20x737 Max 8
Azerbaijan Airlines	Azerbaijan	5x787-8
CDB Aviation Lease Finance	China	42x 737 Max8; 10x737 Max 10; 8x787-9

*Converted from 73xA320neo **Converted from 50xA320neo. Based on *Airfinance Journal* research up to 10/01/2018

Commercial aircraft orders by manufacturer

	Gross orders 2017	Cancellations 2017	Net orders 2017	Net orders 2016
Airbus	1229	120	1,109	731
Boeing	1053	141	912	668
Bombardier	72	0	72	237
Embraer	95	0	95	55
ATR	125	0	125	45

Based on *Airfinance Journal* research and manufacturer announcements for 2017.

The underappreciated value of experience and its relevance today

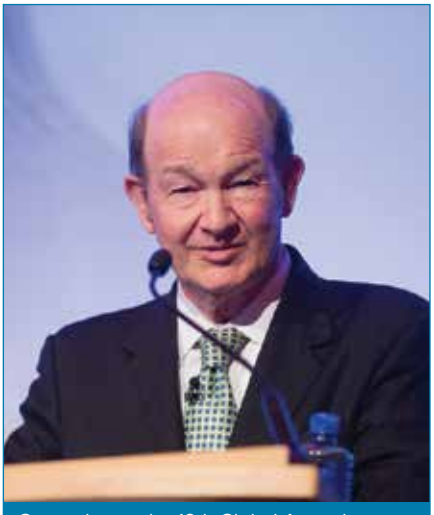
With a downturn on the horizon, a surfeit of new market players that have not been through one before is disconcerting, writes **Adam Pilarski**, senior vice-president at Avitas.

December 26 was the anniversary of Chairman Mao's birth. The Chinese government is pursuing a campaign of dismissing foreign influences on its population and going back to its own roots. People, especially Communist Party members, were urged not to observe Christmas but celebrate the "day after", in memory of the "Great Leader".

It is interesting that many people support such sentiment in China, some old and some quite young. Chairman Mao died more than 40 years ago and many people celebrating his birthday were not alive when he was born. They did not live through the "Great Leap Forward" and "Cultural Revolution" periods where, according to most estimates, between 18 million and 55 million people perished because of Mao's policies. Their nostalgic reverence for the long-gone leader is not based on actual experiences but on some perception of what reality was back then – and a profound lack of historical knowledge.

Similarly, the Soviet Union's longest-ruling leader, Joseph Stalin, has been dead for almost 65 years and is generally blamed for at least 20 million to 25 million casualties because of his disastrous policies, including the famous "Great Purge" period. Again, a number of years ago, the population saw Stalin as an evil dictator but a sizeable number of Russians today long for "the good old days" of his reign. For people who lived through those tumultuous times, it is hard to fathom how anybody would want to return to such disastrous days.

Experience is one of the most under-appreciated qualities. I remember a few decades ago lecturing in China on forecasting. The Chinese were just discovering the western business world and their analysts wanted to learn the secrets of accurate forecasting. That was how they phrased it: please give us your secret formulas for accurate forecasting. The obvious answer is that, in addition to the standard attributes (good data, quantitative skills, reasonable models, solid theoretical knowledge of how the world operates, and so on), a most important qualification is experience. Looking at developments, it is useful to learn from history and from one's mistakes in trying to predict the future.



Our author at the 19th Global Annual Airfinance Conference in Dublin.

> *"Knowing how to handle the sudden plethora of returned aircraft contributing to an almost instantaneous drop in values is critical for survival."*
>
> **Adam Pilarski**, senior vice-president, Avitas

The unfortunate fact of life is that there are very few truly secret formulas. Experience can only come from years of doing something (read: from experience), and no shortcuts exist. Experience cannot be obtained by osmosis; it has to be learned by doing something for years and continuously improving.

The reality of life is that businesses in general do not value experience. Most big firms abolished in-house libraries and often do not collect historical data ("we are an engineering department, not a museum" is often heard). This goes along with an almost mythical belief that, with the vast proliferation of data sources and research methods on the internet, anybody can become an instant expert. Instead of utilising experience, a convenient approach is to rely on data available on the internet without realising all the pitfalls of such data.

How is this relevant to today's world of aviation? The present situation is seen by most analysts and practitioners as very positive. The world economy is humming, the stock market is buzzing, airlines are enjoying record profits, backlogs of aircraft are at sky-high levels. What could possibly go wrong?

I have been quite outspoken for some time now about the possibility of us being in a bubble environment. I can even identify possible events that can cause the bubble to burst. What keeps me up at night, though, is the lack of experience of many of the important players in handling a possible downturn and avoiding the panic and costly mistakes that happened in the past. In the same way as the up cycle has its irrational elements, the down cycle will have potentially devastating consequences for the industry. Knowing how to handle the sudden plethora of returned aircraft contributing to an almost instantaneous drop in values is critical for survival.

There are two basic elements why this downturn may cause a lot of pain. One is the emergence of new players who have not had to face a downturn. The plethora of Chinese lessors is one example where their entire experience is only with the up cycle. The second is demographic: because we have not had a downturn for some time, the number of people still employed who are familiar with such a reality is getting smaller. Even more, there is a stubborn refusal by many players to learn from the past about what could go wrong. Not being prepared for events occurring during a downturn is a natural consequence of not accepting lessons that should have been gained from experience.

Hopefully, we will learn new lessons from the inevitable downturn which, eventually, we will be able to incorporate in the future to help the industry continue growing and prospering.

AIRFINANCE JOURNAL

An ***Airfinance Journal***

special supplement

Air Investor 2018

Views on **values**

Air Investor looks at a selection of key aircraft reviewed during 2017 by a panel of appraisers. The values and lease rates are taken from aircraft profiles published in *Airfinance Journal* during the past 12 months. The aircraft types considered are: Boeing 777-300ER, ATR72-600, Embraer E195 and Sukhoi Superjet SSJ100.

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 variety of consultancy companies:

AVITAS
Martin O'Hanrahan, director, asset valuation

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

IBA
Mike Yeomans, head analyst, commercial aircraft and leasing

ICF International
Angus Mackay, principal

MBA
Alex Cosaro, senior analyst, asset valuations

Lindsey Webster, director asset valuations

Oriel
Olga Razzhivina, senior Istat appraiser

The assumptions
Current market value (CMV) is as per the Istat definition: "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.

Also 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 777-300ER

The 777-300ER is the most successful model in Boeing's popular 777 range. The formal go-ahead for the 777 family was announced in October 1990. Original 777-200 models were available with a choice of powerplant from General Electric (GE), Pratt & Whitney or Rolls-Royce.

The stretched 777-300 first flew in 1997 and was sold primarily to Asian airlines, the large majority of which selected Rolls-Royce's Trent engines.

No GE-powered standard 777-300 aircraft were delivered, but the manufacturer was awarded sole supplier status on the extended-range 777-300ER version, which was launched in 2002 and entered service in 2003.

Appraiser views
Collateral Verifications' Dechavanne sees the Airbus A350-1000 as a significant threat to the current 777 model. "With its improved economics, the A350 may slow future orders for the 777-300ER, which could have an additional impact on residual values and lease rates. Once the replacement for the 777, the 777X, starts to deliver in larger numbers, this will also affect the future of the current model, but it is too early to tell when this will take place and to what extent."

Dechavanne also thinks a freighter-conversion programme, complementing the factory-built 777F, will probably be developed.

ICF's Mackay is sceptical about the prospects for a freighter-conversion programme and believes redeployment of 777-300ERs to second-tier carriers may be challenging. ICF believes the 777-300ER market will continue to soften with further deterioration in values and lease rates in the medium term.

Oriel's Razzhivina says that the improvements by Boeing and GE are timely and will offer some respite from the last-off-the-line effect. But she adds that the improvements may not be entirely welcomed by the owners of earlier 777-300ERs, which are already facing a challenge in placing aircraft that are coming off lease in the next couple of years.

Values 777-300ER

Current market value ($m)

Build year	2007	2009	2011	2013	2015	2017
CV view	75.1	85.2	97.5	111.6	130.4	154.7
ICF view	81.3	93.6	107.8	124.1	142.8	164.3
Oriel view	63.0	67.5	74.5	85.5	100.5	138.3

Indicative lease rates ($m/month)

Build year	2007	2009	2011	2013	2015	2017
CV view	0.65	0.75	0.85	0.95	1.05	1.20
ICF view	0.75-0.85	0.85-0.95	0.95-1.05	1.05-1.15	1.15-1.25	1.25-1.35
Oriel view	0.63	0.68	0.73	0.83	0.93	1.10

All values and lease rates as published in Airfinance Journal February/March 2017.

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KLM

5 E175

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JULY TILL NOVEMBER 2017

norwegian

4 B787-9

UKEF Financing

Mandated Lead Arranger, Facility Agent & Security Trustee

JULY TILL DECEMBER 2017

AirAsia

4 A320 NEO

Term Loan Financing

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ATR72-600

The ATR72 is a twin-engined turboprop developed from the ATR42 to provide capacity for 70-plus passengers, by stretching the fuselage, increasing the wingspan and upgrading to more powerful engines. The original ATR72-100 variant entered service in October 1989, but was soon superseded by the -200 model. The aircraft was developed with a series of upgrades to maximum take-off weight and engine power, culminating in the ATR72-212.

The ATR72-500 (certificated as the ATR72-212A) is a major development of the aircraft, which incorporates six-bladed propellers in place of the original four-bladed configuration.

The ATR72-600 model replaces the -500 and is the current production standard. It offers further performance improvements and includes a redesigned cabin.

The latest development of the ATR72-600 is a high-density seating configuration, which can accommodate 78 passengers.

Appraiser views

O'Hanrahan of Avitas says the ATR72-600 is clearly beating its main rival, Bombardier's Q400, but he believes the Q400's higher speed and newly-developed 90-seat interior help to keep the Bombardier competitive.

Yeomans of IBA says the market for the ATR72-600 has been soft over the past two years because of several factors. In the pre-2014 high fuel cost environment, the ATR72 family flourished and values and lease rates were very buoyant, but as fuel prices fell and demand for ATR72 aircraft weakened, lessors were forced to discount lease rates to secure placements for their aircraft.

However, IBA sees the long-term outlook for the aircraft as positive and the current environment could represent an opportunity for forward-thinking investors to acquire very capable aircraft. A rise in the cost of fuel would be likely to increase demand for the ATR72-600.

MBA's Cosaro believes values for the ATR72-600 will remain relatively stable for the medium term, despite lower fuel prices eroding the aircraft's advantage over competing 70-seaters. He adds that a geographically diverse operator base helps to support aircraft values.

Values ATR72-600

Current market value ($m)

Build year	2011	2012	2013	2014	2015	2016	2017
Avitas view	11.8	12.8	13.9	15.3	16.9	18.8	20.4
IBA view	12.6	13.4	14.3	15.3	16.7	18.5	20.6
MBA view	–	15.4	16.5	17.6	18.8	20.0	21.4

Indicative lease rates ($000s/month)

Build year	2011	2012	2013	2014	2015	2016	2017
Avitas view	105-117	115-125	125-133	131-141	139-149	147-157	155-165
IBA view	141	145	149	154	162	172	180
MBA view	–	130-150	140-160	140-170	150-170	150-180	160-190

All values and lease rates as published in Airfinance Journal April/May 2017.

Embraer E195

The Embraer 195 is the largest member of the E-Jet family from Brazilian manufacturer Embraer. The E-Jet family consists of four principal variants, grouped in two size categories. The original E170 model and the slightly larger E175 offer about 70 to 80 seats and the stretched E190/E195 variants typically accommodate between 90 and 110 passengers. The E195's capacity is about 10 seats more than that of the E190.

The stretched E190 and E195 versions are equipped with higher thrust engines, larger wings and upgraded landing gear. There is about 95% parts commonality between the E190 and the E195 and these two models have nearly 90% commonality with the E170/175.

The E195 is available in four versions but the vast majority of aircraft are either advanced-range (AR) or long-range (LR) models.

Appraiser views

O'Hanrahan of Avitas points out that the slightly smaller E190 variants have enjoyed much more success in terms of orders than the E195, which he believes is caught between two market segments. On the one hand, operators in North America are limited in terms of how they can deploy the aircraft by pilot scope clauses, which restrict the number of E195-sized aircraft that can be flown by regional carriers. On the other hand, the E195 does not offer the accommodation or range of more capable aircraft in the 120- to 150-seat class.

MBA's Lindsey Webster voices some concerns over the type's customer distribution, with the top three operators accounting for two-thirds of the overall fleet. However, she adds that a demonstrated ability to place the E195 with new operators augurs well for the variant's long-term potential.

Oriel's Razzhivina agrees with O'Hanrahan about the E195 straddling markets. She adds that because of its small fleet, the E195 has gained little popularity with lessors, thus limiting competition and potentially supporting healthier lease rates than those of the more popular E190.

Values E195LR, GE CF34-10E engines

Current market value ($m)

Build year	2008	2010	2012	2014	2016
Avitas view	17.4	20.7	24.6	28.7	33.5
MBA view	17.5	20.2	23.4	27.0	31.3
Oriel view	14.0	15.5	17.4	20.2	26.5

Indicative lease rates ($000s/month)

Build year	2008	2010	2012	2014	2016
Avitas view	148–158	174-184	200-210	226-236	252-262
MBA view	170-190	190-210	210-230	230-250	250-270
Oriel view	165	175	195	215	250

All values and lease rates as published in Airfinance Journal August/September 2017.

Sukhoi Superjet 100

Launched in 2000, the Sukhoi Superjet 100 (SSJ100) aircraft is a product of a joint venture between the Russian aircraft manufacturer Sukhoi and the Italian aerospace company Leonardo. It is a new-technology, fly-by-wire regional aircraft powered by two PowerJet SaM146 engines, jointly designed and produced by Snecma Moteurs and NPO Saturn. The aircraft has the highest-ever proportion of western components in a Russian aircraft.

Seating up to 98 passengers in a five-abreast configuration, the SSJ100 is available in basic (95B) and long-range (95LR) variants, serving short- to medium-range routes between 1,645 and 2,470 nautical miles.

Appraiser views

Collateral Verifications' Dechavanne thinks the SSJ100 is struggling to maintain its early momentum. He suggests that the competitiveness of the 70- to 100-seat market puts pressure on the type, which will be increased with the advent of Embraer's second-generation variants of its E-Jet family. The Mitsubishi MRJ has also been viewed as a competitor, but the delays in the aircraft's development make it less of a threat, at least in the short term.

ICF's Mackay agrees the SSJ100 has entered a crowded 70- to 100-seat regional market, but he adds that, despite this challenging market, the SSJ100 has had some success in both western and domestic markets. However, he believes that early sales were helped by large discounts that priced the aircraft well below the competing Embraer and Bombardier models.

Oriel's Razzhivina says that the SSJ's destiny is to some extent beyond Sukhoi's control. "Whatever the operating characteristics of the SSJ100, its acceptance in the West will always be subject to Russia's position on the world stage."

Oriel's values for the SSJ100 range from $7.5 million for the oldest vintage to about $18.5 million for the new extended-range example. The monthly lease rates vary between $80,000 and $165,000, depending on aircraft age.

Values Sukhoi Superjet 100

Current market value ($m)

Build year	2011	2013	2015	2017
CV view	12.8	14.3	16.3	25.4
ICF view	15	17.7	20.7	24.2

Indicative lease rates ($000s/month)

Build year	2011	2013	2015	2017
CV view	130	150	170	190
ICF view	120-140	135-160	155-190	175-210

All values and lease rates as published in Airfinance Journal October/November 2017.

Narrowbodies still top charts

Assets with a strong secondary market outlook continue to be viewed favourably by investors.

Manufacturers have long been criticised by investors on the multiple aircraft products but once again the results of *Airfinance Journal*'s 2018 Investor Poll shows an endorsement of their development programmes.

This year's top 10 aircraft includes three current-generation aircraft (Boeing 737-800, Airbus A320 and A321) and six new-generation models, including A320neo-family, 737 Max-family as well as the A350 and 787 models.

Narrowbodies

When it comes to investing, it is clear that investors' appetite remains in "mainstream" aircraft. Few have ventured outside the most popular types of narrowbody and widebody.

The highest overall ranking aircraft is the Boeing 737-800 model, closely followed by the Airbus A321neo and A320 models.

The 737-800 remains an "excellent aircraft", says one investor. A trader highlights the popularity of the aircraft in the secondary market, but attention is also starting to shift to the freighter conversion market.

The highest overall ranking aircraft is the Boeing 737-800

As 1 January 2018, *Airfinance Journal*'s Fleet Tracker recorded more than 4,600 aircraft in operation with 35 units in storage or in transition. Availability is low with less than 16 aircraft believed to be offered for sale.

But while the 737-800 model continues to dominate *Airfinance Journal*'s Investor Poll, its successor, the 737 Max 8, scores the best residual value retention. Again, the A321neo comes second in terms of residual values, highlighting investors' faith for new-generation models.

Given the large orderbooks of the Max 8 and A320neo types, investor support for these aircraft is unsurprising, and there is no doubt the A320neo and the Max 8 will eclipse the current-generation models.

For the time being – and probably for another three to five years – the A320 and 737-800 models are the best and most liquid narrowbody assets around.

The poll also shows the 737-800 model as the best aircraft regarding value for money, scoring 4.36 out of five.

Single-aisles

Aircraft Type	Residual value	Value for Money	Operational success	Remarketing Potential	Overall score	Last year's score	Difference
737-800	4.33	4.36	4.95	4.67	4.58	**4.61**	-0.03
A321neo	4.55	4.30	n/a	4.62	4.49	**4.45**	0.04
A320	4.00	4.22	4.86	4.36	4.36	**4.25**	0.11
A320neo	4.42	4.09	4.00	4.69	4.30	**4.39**	-0.09
737 Max 8	4.64	4.22	n/a	4.00	4.29	**4.10**	0.19
A321	3.88	4.00	4.50	4.13	4.13	**4.13**	0.00
737 Max 10	3.67	3.88	n/a	4.00	3.85	**n/a**	n/a
CS300	3.56	3.75	3.50	3.40	3.55	**3.42**	0.13
737-900ER	3.31	3.43	3.42	3.00	3.29	**3.06**	0.23
A319	3.09	3.29	3.80	2.92	3.27	**3.04**	0.23
737-700	2.95	3.22	3.80	2.89	3.22	**3.29**	-0.07
737 Max 9	3.18	3.33	n/a	3.00	3.17	**3.22**	-0.05
737 Max 7	2.80	3.00	n/a	2.64	2.81	**3.04**	-0.23
A319neo	2.90	2.89	n/a	2.00	2.60	**2.64**	-0.04
C919	1.80	2.56	n/a	2.27	2.21	**n/a**	n/a
737-600	2.00	2.36	2.09	1.47	1.98	**1.59**	0.39
A318	1.81	2.20	2.04	1.35	1.85	**1.22**	0.63
MC-21	1.70	2.11	n/a	1.64	1.82	**1.67**	0.15

Size matters in the narrowbody market. The poll shows that the size of the narrowbody aircraft is linked to their popularity. The bottom half of the single-aisle table typically includes the likes of the 120- and 130-seat aircraft, meaning they are seen as less attractive to investors.

The A319 model is the most improved narrowbody overall along with the 737-600 and the A318 models. While few transactions have happened involving the latter models, the A319 still sees lease placements as well as aircraft sales and acquisitions with leases attached.

Airfinance Journal's Fleet Tracker recorded more than 45 transactions in this market over the past two years, mainly under operating leases.

Demand has emerged from every part of the world but Allegiant Air in the US and Volotea in Europe have been the most proactive in this market. Eurowings has taken many A319s from Germanwings as it completed its transformation from a regional into a low-cost subsidiary of Lufthansa.

Some sources argue there is life in this aircraft, yet others expect more A319s heading for the part-out market.

The market is less buoyant for the 737-700, although Southwest Airlines has been the main carrier adding units over the past two years.

One investor argues that the 737-700 and the A319 models are cheaper alternatives to the Embraer 195 model.

Investor appetite for the A321 improves and the A321neo is the second highest ranked aircraft for the second consecutive year as the market moves to larger models. This increased investor appetite is evidenced in the poll as the A321 continues comfortably to beat any aircraft in this market.

Regional aircraft

In 2018, Embraer will deliver its first E2 model to Norwegian customer Wideroe, which signed a contract for up to 15 aircraft consisting of three firm orders for the E190-E2 and purchase rights for 12 further E2s.

The first E190-E2 is scheduled for April and will be configured with 114 seats in a single class.

According to the Investor Poll, the E190-E2 topped the regional aircraft category, with the ATR72-600 and Bombardier Q400 turboprops making up the three most appealing regional aircraft investments.

The Q400 overall rating has declined over the past 12 months, but less than its ATR72-600 competitor. During the past year, oil prices dropped to $44 a barrel (June 2017) from $56 a barrel (January 2017), but reached $61 a barrel in early January 2018.

Both turboprop manufacturers have had a good year in terms of new aircraft sales with landmark deals in India (Q400s for Spicejet), Iran (ATR72-600s for Iran Air) and even in the freighter market (ATR72 freighters for Fedex).

Still the Q400 lags behind the ATR72-600. One investor says the Q400 fights "an uphill battle" with the ATR72, but is a useful aircraft in its niche. Availability of Q400s is starting to rise again.

The ATR72-600's operational score of 3.67 still shows the variant is considered best in its class, but concerns about oversupply in this market over the past few years may have impacted its popularity. "The ATR72-600 market is soft due to large lessor participation," says one respondent.

One of the most noticeable progressions in this year's poll is the CRJ900 model. Bombardier still sees life in the 86-seat variant, especially in the US where competing aircraft are barred by US scope clauses.

Outside the US, Bombardier sold a total of 15 CRJ900s to Ireland's Cityjet in 2017 and recorded an order for up to 12 aircraft from an undisclosed customer.

Embraer's E175 and E190 continue to attract interest from investors but some argue that the E175, a very attractive jet

Regionals

Aircraft Type	Residual value	Value for Money	Operational success	Remarketing Potential	Overall score	Last year's score	Difference
E190-E2	3.63	3.14	n/a	3.44	3.40	**3.49**	-0.09
ATR72-600	3.25	3.27	3.67	3.29	3.37	**3.77**	-0.40
Q400	3.31	3.33	3.58	3.13	3.34	**3.49**	-0.15
E175	3.07	3.15	3.67	3.07	3.24	**3.23**	0.01
E190	3.28	3.24	3.43	3.00	3.24	**3.33**	-0.09
CRJ900	3.00	3.33	3.58	3.00	3.23	**2.89**	0.34
ATR72-500	2.94	3.31	3.58	2.94	3.19	**3.53**	-0.34
E195-E2	3.25	2.86	n/a	3.22	3.11	**3.26**	-0.15
E175-E2	3.13	2.86	n/a	3.33	3.11	**3.68**	-0.57
E195	3.20	3.00	3.17	2.93	3.08	**2.96**	0.12
ATR42-500	2.93	3.08	3.00	2.57	2.89	**3.40**	-0.51
ATR42-600	2.85	3.00	3.09	2.64	2.89	**3.24**	-0.35
CS100	2.75	3.14	2.83	2.56	2.82	**2.75**	0.07
CRJ700	2.64	2.85	3.00	2.57	2.77	**2.45**	0.32
CRJ705	2.62	2.75	2.80	2.69	2.71	**2.52**	0.19
E170	2.67	2.71	2.85	2.31	2.63	**2.84**	-0.21
CRJ200	1.86	2.69	3.60	2.07	2.56	**2.15**	0.41
CRJ1000	2.45	3.00	2.38	2.33	2.54	**2.14**	0.40
SSJ-100	2.50	3.00	2.00	2.27	2.44	**1.89**	0.55
MRJ90	2.44	2.38	n/a	2.00	2.27	**2.44**	-0.17
ERJ-145	1.73	2.43	3.00	1.81	2.24	**2.16**	0.08
ERJ-140	1.60	2.22	1.70	1.67	1.80	**1.68**	0.12
ARJ21	1.40	1.78	n/a	1.45	1.54	**1.52**	0.02

for the US market, is at its peak in terms of popularity with the introduction of the E2 family.

Widebodies

Remarketability is crucial for widebody aircraft, because of the initial investment and transition costs incurred by investors.

The 787-9 model topped this category for the second year in a row, reflecting its acceptability by financiers. It also came first in terms of remarketing potential with a score of 4.29. In the previous year's poll, the 787-9 remarketing potential scored 3.87. Likewise, respondents say the remarketing potential of an A350-900 model is 4.00, up from 3.54 in 2017.

Both aircraft topped the table, beating the competition by a sizeable margin.

There have been concerns over the past few years about remarketing difficulties for A330s and 777s. Aircraft are being placed, as shown by the surplus of former Air Berlin aircraft now heading to different operators. However, lease rates for those old vintage units are at the lower end of the spectrum.

Airbus's mid-range widebody, the A330-200, is still regarded as a good investment but as one investor points out: its market is split by three engine types. "This doesn't help remarketing but the A330-200 model enjoys a good used market albeit at low lease rates," says the investor.

The Boeing 787-9 model topped the widebody category for the second year in a row

Another source says the values outlook remains challenging but still the A330-200 model has applications in markets. Its overall score is slightly up from last year's poll.

The larger A330-300 is considered as still a "good performer" but the values outlook is weakening, according to one respondent.

The 777-300ER's overall score has remained flat, at 3.38 this year compared with 3.32 in the previous poll. Its remarketing potential is similar to the A330-300 but respondents say residual value potential is higher than its Airbus counterpart. One respondent says the 777-300ER is likely to follow the 777-200ER market downwards as availability increases.

The 767-300ER did surprisingly well in the poll. The aircraft is viewed as a "cheap interim lift", and may be on its last run on the passenger side. It has found more popularity on the freighter market with companies such as retail giant Amazon, which has 32 of the aircraft.

One respondent says: "Operationally, the 767-300ER is still viable, but it becomes tough to remarket and finance."

Twin-aisles

Aircraft Type	Residual value	Value for Money	Operational success	Remarketing Potential	Overall score	Last year's score	Difference
787-9	4.31	4.09	4.67	4.29	4.34	**4.18**	0.16
A350-900	4.25	3.82	4.60	4.00	4.17	**3.88**	0.29
767-300ER	3.29	3.54	4.55	3.36	3.68	**3.42**	0.26
787-10	3.64	3.70	n/a	3.67	3.67	**3.41**	0.26
787-8	3.71	3.50	3.80	3.60	3.65	**3.59**	0.06
A350-1000	3.44	3.38	n/a	3.40	3.41	**3.40**	0.01
777-300ER	2.75	3.36	4.54	2.89	3.38	**3.32**	0.06
777-9	3.38	3.29	n/a	3.33	3.33	**3.48**	-0.15
A330-300	2.85	3.28	4.00	2.90	3.26	**3.39**	-0.13
777-200ER	2.13	2.93	3.45	3.94	3.11	**2.56**	0.55
A330-900neo	3.13	3.14	n/a	3.00	3.09	**3.14**	-0.05
777-8	2.88	3.14	n/a	3.11	3.04	**3.43**	-0.39
A330-200	2.38	3.00	3.67	2.52	2.89	**2.79**	0.10
A350-800	2.86	3.00	n/a	2.56	2.80	**2.22**	0.58
777-200LR	2.36	3.00	2.50	2.54	2.60	**2.38**	0.22
747-400	1.93	2.64	3.91	1.93	2.60	**2.46**	0.14
A330-800neo	2.44	2.63	n/a	2.20	2.42	**2.64**	-0.22
767-400ER	1.75	2.29	2.29	2.18	2.13	**2.04**	0.09
767-200ER	1.70	2.33	2.71	1.60	2.09	**2.08**	0.01
A380	1.54	2.33	2.92	1.53	2.08	**2.27**	-0.19
747-8 pax	1.89	2.13	2.00	1.80	1.95	**1.80**	0.15
A340-600	1.50	1.77	1.36	1.21	1.46	**1.55**	-0.09
A340-500	1.38	1.67	1.30	1.15	1.38	**1.40**	-0.02

The **numbers**

The following pages include key data for current production commercial aircraft and for models due to enter service in 2018. The information provided is based on a number of key assumptions as detailed in the following.

Technical characteristics
Where applicable, the maximum take-off weight (MTOW) shows the minimum and maximum options available for the type in question. There may be intermediate weights available. The operating empty weight (OEW) is based on the manufacturers' figures. Airline 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 reserves
The maintenance reserve 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 *Airfinance Journal*'s understanding of typical check costs and intervals. No allowance is made for cabin refurbishment. The cost quoted for component overhaul excludes inventory support.

Engine maintenance cost estimates are based on figures quoted in the *Airfinance Journal Guide to Financing and Investing in Engines 2017*. Unless stated, the engine costs refer to the most common engine type for the aircraft model in question.

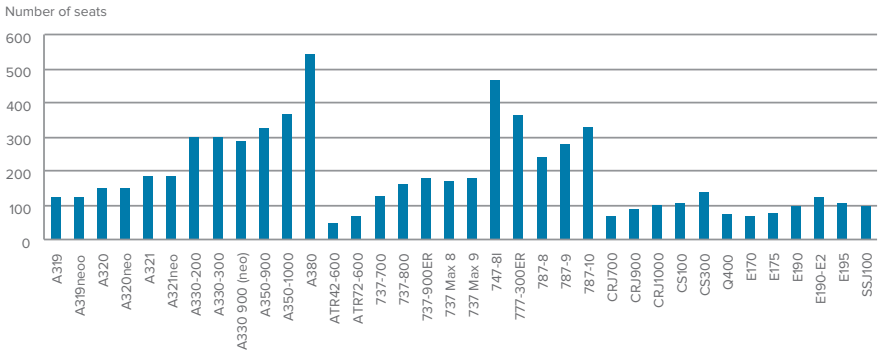
The information used to estimate the indicative maintenance reserves has been collected from a wide variety of sources. While *Airfinance Journal* has made every effort to normalise the data, direct comparisons between aircraft types may be misleading.

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.

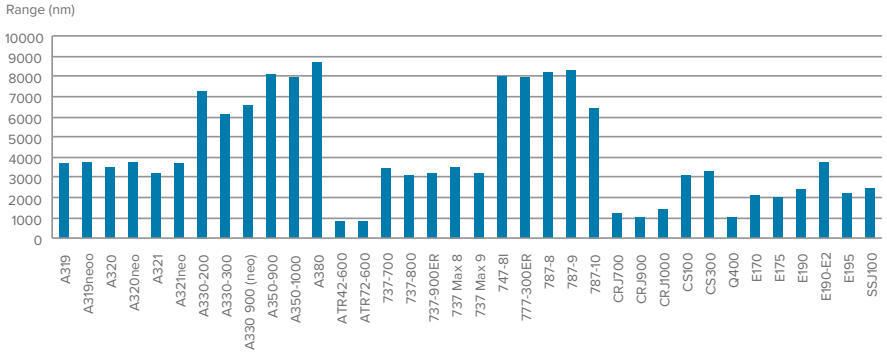
Seating/range
The numbers quoted for seating capacity are based on the manufacturers' selling standards. Large variations are possible, particularly for widebody aircraft. The ranges shown are for still-air conditions, optimum flight levels and are based on the typical seating figure and the operating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

Fleet information
Data is based on *Airfinance Journal*'s Fleet Tracker December 2017.

Current production aircraft seating



Current production aircraft range



Aircraft data index

Aircraft **data**

A319

SEATING/RANGE	
Max seating	145
Typical seating	124
Typical range	3,700nm (6,850km)
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	22,000lbs (98kN)
FUELS AND TIMES	
Block fuel 200nm	1,710kg
Block fuel 500nm	3,140kg
Block fuel 1,000nm	5,620kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET (INCLUDING CORPORATE JET VERSIONS)	
Entry into service (planned)	1996
In service:	1,378
Operators (current and planned)	171
In storage	45
On order	9
Built peak year (2005)	142
Estimated production 2018	5
Average age (years)	12.3
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

A319neo

SEATING/RANGE	
Max seating	156
Typical seating	124
Typical range	3,750nm (6,950km)
TECHNICAL CHARACTERISTICS	
MTOW	64 tonnes/76 tonnes
OEW	40 tonnes
MZFW	58.8 tonnes
Fuel capacity	23,760 litres/26,750 litres
Engines	Leap-1A/PW1100G
Thrust	22,000lbs (98kN)
FUELS AND TIMES	
Block fuel 200nm	1,450kg
Block fuel 500nm	2,670kg
Block fuel 1,000nm	4,780kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET (INCLUDING CORPORATE JET VERSIONS)	
Entry into service (planned)	2018
In service:	none
Operators (current and planned)	6
In storage	none
On order	52
Built peak year	Not applicable
Estimated production 2018	2
Average age (years)	less than one
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

Maintenance reserves are based on A319 current engine model pending confirmation of manufacturer's claimed reductions for new engine model.

A320

SEATING/RANGE	
Max seating	180
Typical seating	150
Typical range (with sharklets)	3,500nm (6,500km)
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	25,000lbs (120kN)
FUELS AND TIMES	
Block fuel 200nm	1,850kg
Block fuel 500nm	3,390kg
Block fuel 1,000nm	6,080kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET (INCLUDING CORPORATE JET VERSIONS)	
Entry into service	1988
In service:	4,067
Operators (current and planned)	281
In storage	123
On order	300
Built peak year (2013)	352
Estimated production 2018	160
Average age (years)	9.0
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	180
Typical seating	150
Typical range (with sharklets)	3,750nm (6,950km)
TECHNICAL CHARACTERISTICS	
MTOW	73.5 tonnes/78 tonnes
OEW	44.5 tonnes
MZFW	62.8 tonnes/64.3 tonnes
Fuel capacity	23,760 litres/26,750 litres
Engines	Leap-1A/PW1100G
Thrust	27,000lbs (120kN)
FUELS AND TIMES	
Block fuel 200nm	1,570kg
Block fuel 500nm	2,880kg
Block fuel 1,000nm	5,170kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET (INCLUDING -100S)	
Entry into service	2016
In service:	162
Operators (current and planned)	79
In storage	4
On order	3,398
Average age (years)	less than one year
Estimated production 2018	407
Average age (years)	0.7
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

Maintenance reserves are based on A320 current engine model pending confirmation of manufacturer's claimed reductions for new engine model

A321-200

SEATING/RANGE	
Max seating	236
Typical seating	185
Maximum range (Non ER version)	3,200nm (5,950km)
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	27,000-33,000lbs (120-148kN)
FUELS AND TIMES	
Block fuel 200nm	2,310kg
Block fuel 500nm	4,230kg
Block fuel 1,000nm	7,590kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET (INCLUDING -100S)	
Entry into service	1996
In service:	1,441
Operators (current and planned)	108
In storage	41
On order	378
Built peak year (2013)	215
Estimated production 2018	12
Average age (years)	6.2
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

A321neo

SEATING/RANGE	
Max seating	240 (maximum certified capacity)
Typical seating	185
Maximum range	3,700nm (6,850km)
TECHNICAL CHARACTERISTICS	
MTOW	89.0 tonnes/93.5tonnes
OEW	48 tonnes
MZFW	73.3 tonnes/75.6 tonnes
Fuel capacity	23,600 litres/29,580 litres
Engines	Leap-1A/PW1100G
Thrust	32,000lbs (143kN)
FUELS AND TIMES	
Block fuel 200nm	1,960kg
Block fuel 500nm	3,600kg
Block fuel 1,000nm	6,450kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET (EXCLUDING FREIGHTER VERSIONS)	
Entry into service	2017
In service:	13
Operators (current and planned)	53
In storage	none
On order	1,456
Build peak year (2013)	Not applicable
Estimated production 2018	177
Average age (years)	less than one
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

Maintenance reserves are based on A321 current engine model pending confirmation of manufacturer's claimed reductions for new engine model.

A330-200

SEATING/RANGE	
Max seating	440
Typical seating	300 (two class)
Maximum range	7,270nm (13,450km)

TECHNICAL CHARACTERISTICS	
MTOW	230 tonnes/242 tonnes
OEW	121 tonnes
MZFW	168 tonnes/170 tonnes
Fuel capacity	139,090 litres
Engines	PW4000/CF6-80E1/Trent 700
Thrust	68,000-72,000lbs (303-316kN)
FUELS AND TIMES	
Block fuel 1,000nm	12,720kg
Block fuel 2,000nm	23,710kg
Block fuel 4,000nm	45,680kg
Bock time 1,000nm	184 minutes
Block time 2,000nm	299 minutes
Block time 4,000nm	529 minutes
FLEET (EXCLUDING FREIGHTER VERSIONS)	
Entry into service	1998
In service:	515
Operators (current and planned)	105
In storage	52
On order	2
Build peak year (2013)	51
Estimated production 2018	22
Average age (years)	8.6
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$260-275 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

A330-200 Freighter

SEATING/RANGE	
Max Payload	65 tonnes
Maximum range	4,000nm (7,400km)

TECHNICAL CHARACTERISTICS	
MTOW	233.0 tonnes
OEW	115 tonnes
MZFW	178.0 tonnes
Fuel capacity	97,530 litres
Engines	RR Trent700/PW4000/GE CF6-81
Thrust	68,000-72,000lbs (302-320kN)
FUELS AND TIMES	
Block fuel 1,000nm	12,720kg
Block fuel 2,000nm	23,710kg
Block fuel 4,000nm	45,680kg
Bock time 1,000nm	184 minutes
Block time 2,000nm	299 minutes
Block time 4,000nm	529 minutes
FLEET (EXCLUDING FREIGHTER VERSIONS)	
Entry into service	2010
In service:	37
Operators (current and planned)	10
In storage	1
On order	7
Build peak year (2012)	8
Estimated production 2018	7
Average age (years)	4.4
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$260-275 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

A330-300

SEATING/RANGE	
Max seating	440
Typical seating	300 (two class)
Maximum range	6,100nm (11,300km)

TECHNICAL CHARACTERISTICS	
MTOW	230 tonnes/242 tonnes
OEW	121 tonnes
MZFW	173 tonnes/175 tonnes
Fuel capacity	97,530 litres
Engines	PW4000/CF6-80E1/Trent 700
Thrust	68,000-72,000lbs (303-316kN)
FUELS AND TIMES	
Block fuel 1,000nm	13,120kg
Block fuel 2,000nm	24,460kg
Block fuel 4,000nm	47,120kg
Bock time 1,000nm	184 minutes
Block time 2,000nm	299 minutes
Block time 4,000nm	529 minutes
FLEET	
Entry into service	1993
In service:	674
Operators (current and planned)	73
In storage	19
On order	102
Build peak year (2014)	74
Estimated production 2018	37
Average age (years)	7.7
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$260-275 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

A330-900neo

SEATING/RANGE	
Max seating	440
Typical seating	287
Maximum range	6,550nm (12,130km)

TECHNICAL CHARACTERISTICS	
MTOW	242 tonnes
OEW	115 tonnes
MZFW	181 tonnes
Fuel capacity	139,090 litres
Engines	Trent 700
Thrust	68,000lbs (303kN)
FUELS AND TIMES	
Block fuel 1,000nm	11,280 kg
Block fuel 2,000nm	21,040 kg
Block fuel 4,000nm	40,520 kg
Bock time 1,000nm	184 minutes
Block time 2,000nm	299 minutes
Block time 4,000nm	529 minutes
FLEET	
Entry into service	2018
In service:	none
Operators (current and planned)	11
In storage	none
On order	211
Build peak year	Not applicable
Estimated production 2018	33
Average age (years)	Not applicable
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$260-275 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

Maintenance reserves are based on A330-300 model pending confirmation of manufacturer's claimed reductions for new engine model

A350-900

SEATING/RANGE	
Max seating	440
Typical seating	325
Maximum range	8,100nm (15,000km)

TECHNICAL CHARACTERISTICS	
MTOW	268 tonnes
OEW	161 tonnes
MZFW	192 tonnes
Fuel capacity	138,000 litres
Engines	Trent XWB
Thrust	84,000lbs (374kN)
FUELS AND TIMES	
Block fuel 1,000nm	11,810kg
Block fuel 2,000nm	22,010kg
Block fuel 4,000nm	42,410kg
Bock time 1,000nm	179 minutes
Block time 2,000nm	291 minutes
Block time 4,000nm	512 minutes
FLEET	
Entry into service	2014
In service:	123
Operators (current and planned)	43
In storage	none
On order	598
Build peak year (2017 estimated)	45
Estimated production 2018	110
Average age (years)	1.0
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$290-295 per engine flight hour
Engine LLP	$265-270 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

Airbus A350-1000

SEATING/RANGE	
Max seating	440
Typical seating	366
Maximum range	7,950nm (14,800km)

TECHNICAL CHARACTERISTICS	
MTOW	308 tonnes
OEW	116 tonnes
MZFW	220 tonnes
Fuel capacity	156,000 litres
Engines	Trent XWB
Thrust	97,000lbs (432kN)
FUELS AND TIMES	
Block fuel 1,000nm	13,860kg
Block fuel 2,000nm	25,840kg
Block fuel 4,000nm	49,770kg
Bock time 1,000nm	179 minutes
Block time 2,000nm	291 minutes
Block time 4,000nm	512 minutes
FLEET	
Entry into service (planned)	2018
In service:	none
Operators (current and planned)	10
In storage	none
On order	183
Build peak year (2017 estimated)	Not applicable
Estimated production 2018	22
Average age (years)	Not applicable
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$310-315 per engine flight hour
Engine LLP	$285-290 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

Maintenance reserves are based on A350-900 model pending confirmation of manufacturer's claimed reductions for new engine model

A380

SEATING/RANGE	
Max seating	853
Typical seating	544 (four class)
Maximum range	8,700nm (15,200km)

TECHNICAL CHARACTERISTICS	
MTOW	575 tonnes
OEW	277 tonnes
MZFW	369 tonnes
Fuel capacity	320,000 litres
Engines	GP7200/Trent 900
Thrust	70,000lbs (311kN)
FUELS AND TIMES	
Block fuel 1,000nm	26,590kg
Block fuel 2,000nm	50,580kg
Block fuel 4,000nm	104,290kg
Bock time 1,000nm	146 minutes
Block time 2,000nm	265 minutes
Block time 4,000nm	501 minutes
FLEET	
Entry into service	2007
In service:	215
Operators (current and planned)	16
In storage	3
On order	111
Build peak year (2012)	30
Estimated production 2018	6
Average age (years)	4.5
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
Typical seating	48
Maximum range	800nm (1,480km)

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	340kg
Block fuel 200nm	560kg
Block fuel 500nm	1,210kg
Bock time 100nm	33 minutes
Block time 200nm	55 minutes
Block time 500nm	122 minutes
FLEET	
Entry into service	2012 (1996 for -500)
In service:	33 (260 all versions)
Operators (current and planned)	19
In storage	42
On order	33
Build peak year (2014)	11
Estimated production 2018	20
Average age (years)	2.8
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
APU	$15-20 per propeller hour
Component overhaul	$115-120 per flight hour

ATR72-600

SEATING/RANGE	
Max seating	78
Typical seating	70
Maximum range	825nm (1,526km)
TECHNICAL CHARACTERISTICS	
MTOW	22.8 tonnes
OEW	14 tonnes
MZFW	20.8 tonnes
Fuel capacity	6,370 litres
Engines	PW127M
Thrust	2,475 shp
FUELS AND TIMES	
Block fuel 100nm	370kg
Block fuel 200nm	610kg
Block fuel 500nm	1,310kg
Bock time 100nm	36 minutes
Block time 200nm	58 minutes
Block time 500nm	125 minutes
FLEET	
Entry into service	2011 (1998 for -500)
In service:	348 (743 all versions)
Operators (current and planned)	74
In storage	42
On order	286
Build peak year (2015)	8
Estimated production 2018	77
Average age (years)	2.4
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
APU	$15-20 per propeller hour
Component overhaul	$125-130 per flight hour

Boeing 737-700

SEATING/RANGE	
Max seating	149
Typical seating	126
Maximum range (with winglets)	3,440nm (6,370km)
TECHNICAL CHARACTERISTICS	
MTOW	70.1 tonnes
OEW	38 tonnes
MZFW	54.7 tonnes
Fuel capacity	26,020 litres/40,580 litres
Engines	CFM56-7B
Thrust	26,300lbs (116kN)
FUELS AND TIMES	
Block fuel 200nm	1,810kg
Block fuel 500nm	3,190kg
Block fuel 1,000nm	5,590kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	1998
In service:	1,058 (includes 737-700C)
Operators (current and planned)	86
In storage	29
On order	10
Build peak year (2004)	111
Estimated production 2018	none
Average age (years)	12.9
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 propeller hour
Component overhaul	$210-220 per flight hour

Boeing 737-800

SEATING/RANGE	
Max seating	189
Typical seating	162
Maximum range (with winglets)	3,115nm (5,767km)
TECHNICAL CHARACTERISTICS	
MTOW	79 tonnes
OEW	41.1 tonnes
MZFW	61.7 tonnes
Fuel capacity	26,020 litres/40,580 litres
Engines	CFM56-7B
Thrust	27,300lbs (121kN)
FUELS AND TIMES	
Block fuel 200nm	2,000kg
Block fuel 500nm	3,530kg
Block fuel 1,000nm	6,190kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	1998
In service:	4,554
Operators (current and planned)	208
In storage	46
On order	439
Build peak year (2016)	408
Estimated production 2018	210
Average age (years)	7.2
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 propeller hour
Component overhaul	$210-220 per flight hour

Boeing 737-900ER

SEATING/RANGE	
Max seating	215
Typical seating	180
Maximum range	3,200nm (5,924km)
TECHNICAL CHARACTERISTICS	
MTOW	85.1 tonnes
OEW	42.5 tonnes
MZFW	67.8 tonnes
Fuel capacity	29,660 litres
Engines	CFM56-7B
Thrust	27,300lbs (121kN)
FUELS AND TIMES	
Block fuel 200nm	2,080kg
Block fuel 500nm	3,660kg
Block fuel 1,000nm	6,420kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2001
In service:	411
Operators (current and planned)	22
In storage	1
On order	62
Build peak year (2015)	73
Estimated production 2018	17
Average age (years)	4.3
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 propeller hour
Component overhaul	$210-220 per flight hour

Boeing 737 Max 8

SEATING/RANGE	
Max seating	200
Typical seating	172
Maximum range	3,515nm (6,510km)

TECHNICAL CHARACTERISTICS	
MTOW	82.2 tonnes
OEW	45.1 tonnes
MZFW	65.9 tonnes
Fuel capacity	25,810 litres
Engines	CFM Leap-1B
Thrust	26,780lbs (119kN)
FUELS AND TIMES	
Block fuel 200nm	1,720kg
Block fuel 500nm	3,040kg
Block fuel 1,000nm	5,320kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service (planned)	2017
In service:	36
Operators (current and planned)	52
In storage	none
On order	2,201
Build peak year	Not applicable
Estimated production 2018	197
Average age (years)	less than one
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 propeller hour
Component overhaul	$210-220 per flight hour

Maintenance reserves are estimates based on 737-800 model pending in-service feedback and confirmation of claimed savings

Boeing 737 Max 9

SEATING/RANGE	
Max seating	220
Typical seating	178-193
Maximum range	3,215nm (5,960km)

TECHNICAL CHARACTERISTICS	
MTOW	88.3 tonnes
OEW	45.1 tonnes
MZFW	71.0 tonnes
Fuel capacity	25,810 litres
Engines	CFM Leap-1B
Thrust	27,300 (121kN)
FUELS AND TIMES	
Block fuel 200nm	1,790 kg
Block fuel 500nm	3,150 kg
Block fuel 1,000nm	5,520 kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service (planned)	2018
In service:	0
Operators (current and planned)	9
In storage	none
On order	317
Build peak year	Not applicable
Estimated production 2018	16
Average age (years)	Not applicable
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 propeller hour
Component overhaul	$210-220 per flight hour

Maintenance reserves are estimates based on 737-900 model pending in-service feedback and confirmation of claimed savings

Boeing 747-8I

SEATING/RANGE	
Max seating	605
Typical seating	467
Maximum range	8,000nm (14,815km)

TECHNICAL CHARACTERISTICS	
MTOW	447.7 tonnes
OEW	218 tonnes
MZFW	295 tonnes
Fuel capacity	238,610 litres
Engines	GEnx-2B67
Thrust	66,500lbs (374kN)
FUELS AND TIMES	
Block fuel 1,000nm	20,370kg
Block fuel 2,000nm	38,760kg
Block fuel 4,000nm	79,910kg
Bock time 1,000nm	146 minutes
Block time 2,000nm	265 minutes
Block time 4,000nm	501 minutes
FLEET	
Entry into service	2011
In service:	38 plus 5 BBJs
Operators (current and planned)	5
In storage	1 plus 3 BBJs
On order	2 plus 4 freighters and 2 BBJs
Build peak year (2015)	11
Estimated production 2018	none
Average age (years)	3.2
INDICATIVE MAINTENANCE RESERVES	
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 747-8F

SEATING/RANGE	
Max Payload	137.7 tonnes
Maximum range	4,120nm (7,630km)

TECHNICAL CHARACTERISTICS	
MTOW	447.7 tonnes
OEW	197 tonnes
MZFW	329.8 tonnes
Fuel capacity	226,180 litres
Engines	GEnx-2B
Thrust	66,500 (296kN)
FUELS AND TIMES	
Block fuel 1,000nm	20,730kg
Block fuel 2,000nm	38,760kg
Block fuel 4,000nm	79,910kg
Bock time 1,000nm	146 minutes
Block time 2,000nm	265 minutes
Block time 4,000nm	501 minutes
FLEET (EXCLUDING FREIGHTER VERSIONS)	
Entry into service	2010
In service:	76
Operators (current and planned)	12
In storage	0
On order	29
Build peak year (2013)	20
Estimated production 2018	8
Average age (years)	3.8
INDICATIVE MAINTENANCE RESERVES	
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 777-300ER

SEATING/RANGE	
Max seating	550
Typical seating	365 (three class)
Maximum range	7,930nm (14,685km)
TECHNICAL CHARACTERISTICS	
MTOW	351.5 tonnes
OEW	168 tonnes
MZFW	238 tonnes
Fuel capacity	181,280 litres
Engines	GE90-115BL
Thrust	115,300lbs (504kN)
FUELS AND TIMES	
Block fuel 1,000nm	15,610kg
Block fuel 2,000nm	29,840kg
Block fuel 4,000nm	60,900kg
Bock time 1,000nm	152 minutes
Block time 2,000nm	277 minutes
Block time 4,000nm	525 minutes
FLEET	
Entry into service	2003 for ER-model (1997 for original -300)
In service:	757 plus 46 non ER models
Operators (current and planned)	46
In storage	1
On order	109
Build peak year (2016)	89
Estimated production 2018	34
Average age (years)	5.5
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	7,650nm to 8,200nm (14,200km to 15,200km)
TECHNICAL CHARACTERISTICS	
MTOW	227.9 tonnes
OEW	110 tonnes
MZFW	172 tonnes
Fuel capacity	126,920 litres
Engines	GEnx/Trent 1000
Thrust	64,000lbs (280kN)
FUELS AND TIMES	
Block fuel 1,000nm	10,170kg
Block fuel 2,000nm	18,970kg
Block fuel 4,000nm	36,540kg
Bock time 1,000nm	178 minutes
Block time 2,000nm	265 minutes
Block time 4,000nm	510 minutes
FLEET	
Entry into service	2011
In service:	34
Operators (current and planned)	51
In storage	5
On order	94
Build peak year (2014)	103
Estimated production 2018	24
Average age (years)	2.5
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 flight hour
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	8,300nm (14,370km)

TECHNICAL CHARACTERISTICS	
MTOW	252.7 tonnes
OEW	120 tonnes
MZFW	181 tonnes
Fuel capacity	138,700 litres
Engines	GEnx1B/Trent 1000
Thrust	71,000lbs (320kN)
FUELS AND TIMES	
Block fuel 1,000nm	10,480kg
Block fuel 2,000nm	19,500kg
Block fuel 4,000nm	37,630kg
Bock time 1,000nm	178 minutes
Block time 2,000nm	265 minutes
Block time 4,000nm	510 minutes
FLEET	
Entry into service	2014
In service:	263
Operators (current and planned)	58
In storage	2
On order	591
Build peak year (2017)	131
Estimated production 2018	165
Average age (years)	1.3
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 flight hour
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

Boeing 787-10

SEATING/RANGE	
Max seating	440
Typical seating	330
Maximum range	6,430nm (11,9100km)

TECHNICAL CHARACTERISTICS	
MTOW	254.0 tonnes
OEW	130.0 tonnes
MZFW	192.7 tonnes
Fuel capacity	126,370 litres
Engines	GEnx-1B/Trent 1000
Thrust	76,000 (340kN)
FUELS AND TIMES	
Block fuel 1,000nm	11,310 kg
Block fuel 2,000nm	21,080 kg
Block fuel 4,000nm	40,620 kg
Bock time 1,000nm	146 minutes
Block time 2,000nm	265 minutes
Block time 4,000nm	501 minutes
FLEET	
Entry into service (planned)	2018
In service:	0
Operators (current and planned)	13
In storage	none
On order	258
Build peak year	Not applicable
Estimated production 2018	24
Average age (years)	Not applicable
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$120-125 per flight hour
Higher checks reserve	$90-95per flight hour
Engine overhaul	$310-315 per engine flight hour
Engine LLP	$315-320 per engine cycle
Landing gear refurbishment	$75-80 per cycle
Wheels brakes and tyres	$105-110 per cycle
APU	$125-130 per APU hour
Component overhaul	$330-335 per flight hour

Bombardier CRJ700

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

TECHNICAL CHARACTERISTICS	
MTOW	33 tonnes
OEW	20.1 tonnes
MZFW	28.3 tonnes
Fuel capacity	10,990 litres
Engines	CF34-8C5B1
Thrust	12,670lbs (56kN)
FUELS AND TIMES	
Block fuel 200nm	1,150kg
Block fuel 500nm	1,950kg
Block time 200nm	45 minutes
Bock time 500nm	88 minutes
FLEET	
Entry into service	2001
In service:	331
Operators (current and planned)	27
In storage	18
On order	1
Build peak year (2005)	68
Estimated production 2018	1
Average age (years)	12.1
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
Maximum range	1,040nm (1,940km)

TECHNICAL CHARACTERISTICS	
MTOW	36.5 tonnes
OEW	21.8 tonnes
MZFW	31.8 tonnes
Fuel capacity	10,990 litres
Engines	CF34-8C5
Thrust	13,360lbs (59kN)
FUELS AND TIMES	
Block fuel 200nm	1,240kg
Block fuel 500nm	2,100kg
Block time 200nm	45 minutes
Bock time 500nm	88 minutes
FLEET	
Entry into service	2003
In service:	407
Operators (current and planned)	25
In storage	11
On order	25
Build peak year (2008)	59
Estimated production 2018	3
Average age (years)	7.2
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

Bombardier CRJ1000

SEATING/RANGE	
Max seating	104
Typical seating	100
Maximum range	1,425nm (2,640km)
TECHNICAL CHARACTERISTICS	
MTOW	40.8 tonnes
OEW	23.2 tonnes
MZFW	35.2 tonnes
Fuel capacity	10,990 litres
Engines	CF34-8C5A1
Thrust	13,3600lbs (59kN)
FUELS AND TIMES	
Block fuel 200nm	1,320kg
Block fuel 500nm	2,200kg
Block time 200nm	45 minutes
Bock time 500nm	88 minutes
FLEET	
Entry into service	2011
In service:	57
Operators (current and planned)	6
In storage	1
On order	14
Build peak year (2011)	17
Estimated production 2018	6
Average age (years)	4.3
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

Bombardier CS100

SEATING/RANGE	
Max seating	133
Typical seating	108
Maximum range	3,100nm (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 23,3000lbs
FUELS AND TIMES	
Block fuel 200nm	1,340kg
Block fuel 500nm	2,510kg
Block fuel 1,000nm	4,500kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2016
In service:	14
Operators (current and planned)	9
In storage	0
On order	164
Build peak year (2017)	11
Estimated production 2018	15
Average age (years)	1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$55-60 per flight hour
Higher checks reserve	$50-55 per flight hour
Engine overhaul	$90-95 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 propeller hour
Component overhaul	$210-220 per flight hour

Maintenance reserves are estimates based on similar aircraft types pending in-service confirmation of manufacturer claims

Bombardier CS300

SEATING/RANGE	
Max seating	160
Typical seating	140
Maximum range	3,300nm (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 23,3000lbs
FUELS AND TIMES	
Block fuel 200nm	1,390kg
Block fuel 500nm	2,5610kg
Block fuel 1,000nm	4,700kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2016
In service:	14
Operators (current and planned)	10
In storage	0
On order	224
Build peak year (2017)	20
Estimated production 2018	35
Average age (years)	0.7
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$55-60 per flight hour
Higher checks reserve	$50-55 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 propeller hour
Component overhaul	$210-220 per flight hour

Maintenance reserves are estimates based on similar aircraft types pending in-service confirmation of manufacturer claims

Bombardier Q400

SEATING/RANGE	
Max seating	90
Typical seating	74
Maximum range	1,010nm (1,870km)
TECHNICAL CHARACTERISTICS	
MTOW	29.5 tonnes
OEW	17.8 tonnes
MZFW	26.3 tonnes
Fuel capacity	6,700 litres
Engines	PW150A
Thrust	5,070shp
FUELS AND TIMES	
Block fuel 100nm	525kg
Block fuel 200nm	855kg
Block fuel 500nm	1,860kg
Bock time 100nm	35 minutes
Block time 200nm	55 minutes
Block time 500nm	108 minutes
FLEET	
Entry into service	1999
In service:	513
Operators (current and planned)	64
In storage	38
On order	95
Build peak year (2007)	42
Estimated production 2018	22
Average age (years)	7.5
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	$35-40 per cycle
Wheels brakes and tyres	$45-50 per cycle
APU	$55-60 per propeller hour
Propeller	$15-20 per flight hour
Component overhaul	$145-150 per propeller hour

Embraer E170

SEATING/RANGE	
Max seating	80
Typical seating	70
Maximum range	2,100nm (3,890km)

TECHNICAL CHARACTERISTICS	
MTOW	35.99 tonnes
OEW	21 tonnes
MZFW	30.14 tonnes
Fuel capacity	11,670 litres
Engines	CF34-8E
Thrust	13,800lbs
FUELS AND TIMES	
Block fuel 200nm	1,120kg
Block fuel 500nm	2,260kg
Block time 200nm	44 minutes
Bock time 500nm	79 minutes
FLEET	
Entry into service	2004
In service:	156
Operators (current and planned)	25
In storage	36
On order	1
Build peak year (2004)	46
Estimated production 2018	1
Average age (years)	11
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

Embraer E175

SEATING/RANGE	
Max seating	88
Typical seating	78
Maximum range	2,000nm (3,706km)

TECHNICAL CHARACTERISTICS	
MTOW	37.5 tonnes
OEW	21.62 tonnes
MZFW	31.7 tonnes
Fuel capacity	11,670 litres
Engines	CF34-8E
Thrust	13,800lbs
FUELS AND TIMES	
Block fuel 200nm	1,180kg
Block fuel 500nm	2,390kg
Block time 200nm	45 minutes
Bock time 500nm	81 minutes
FLEET	
Entry into service	2005
In service:	491
Operators (current and planned)	18
In storage	1
On order	96
Build peak year (2016)	84
Estimated production 2018	47
Average age (years)	4.5
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

Embraer E190

SEATING/RANGE	
Max seating	114
Typical seating	98
Maximum range	2,400nm (4,448km)

TECHNICAL CHARACTERISTICS	
MTOW	47.8 tonnes
OEW	27.72 tonnes
MZFW	40.8 tonnes
Fuel capacity	16,210 litres
Engines	CF34-10E
Thrust	18,500lbs
FUELS AND TIMES	
Block fuel 200nm	1,340kg
Block fuel 500nm	2,710kg
Block time 200nm	46 minutes
Bock time 500nm	83 minutes
FLEET	
Entry into service	2005
In service:	526
Operators (current and planned)	67
In storage	30
On order	57 (excludes E2 models)
Build peak year (2011)	71
Estimated production 2018	5
Average age (years)	7.3
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

Embraer E190-E2

SEATING/RANGE	
Max seating	114
Typical seating	106
Maximum range	2,600nm (4,800km)

TECHNICAL CHARACTERISTICS	
MTOW	61.5 tonnes
OEW	Data not available
MZFW	Data not available
Fuel capacity	16,500 litres
Engines	Pratt & Whitney PW1919
Thrust	19,000lbs (85kN)
FUELS AND TIMES	
Block fuel 200nm	1,140kg
Block fuel 500nm	2,300kg
Block time 200nm	46 minutes
Bock time 500nm	83 minutes
FLEET	
Entry into service	2018
In service:	0
Operators (current and planned)	5
In storage	none
On order	83
Build peak year (2016)	Not applicable
Estimated production 2018	17
Average age (years)	Not applicable
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$45-50 per flight hour
Higher checks reserve	$35-40 per flight hour
Engine overhaul	No data
Engine LLP	No data
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$55-60 per cycle
APU	$70-75 per APU hour
Component overhaul	$18-185 per flight hour

Maintenance reserves are estimates based on E190 model pending in-service feedback and confirmation of claimed savings

Embraer E195

SEATING/RANGE	
Max seating	122
Typical seating	108
Maximum range	2,200nm (4,077km)

TECHNICAL CHARACTERISTICS	
MTOW	48.79 tonnes
OEW	28.85 tonnes
MZFW	42.5 tonnes
Fuel capacity	16,210 litres
Engines	CF34-10E
Thrust	18,500lbs
FUELS AND TIMES	
Block fuel 200nm	1,420kg
Block fuel 500nm	2,870kg
Block time 200nm	47 minutes
Bock time 500nm	85 minutes
FLEET	
Entry into service	2006
In service:	151
Operators (current and planned)	18
In storage	9
On order	17 (excludes E2 models)
Build peak year (2011)	24
Estimated production 2018	7
Average age (years)	6.0
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

Sukhoi SSJ100

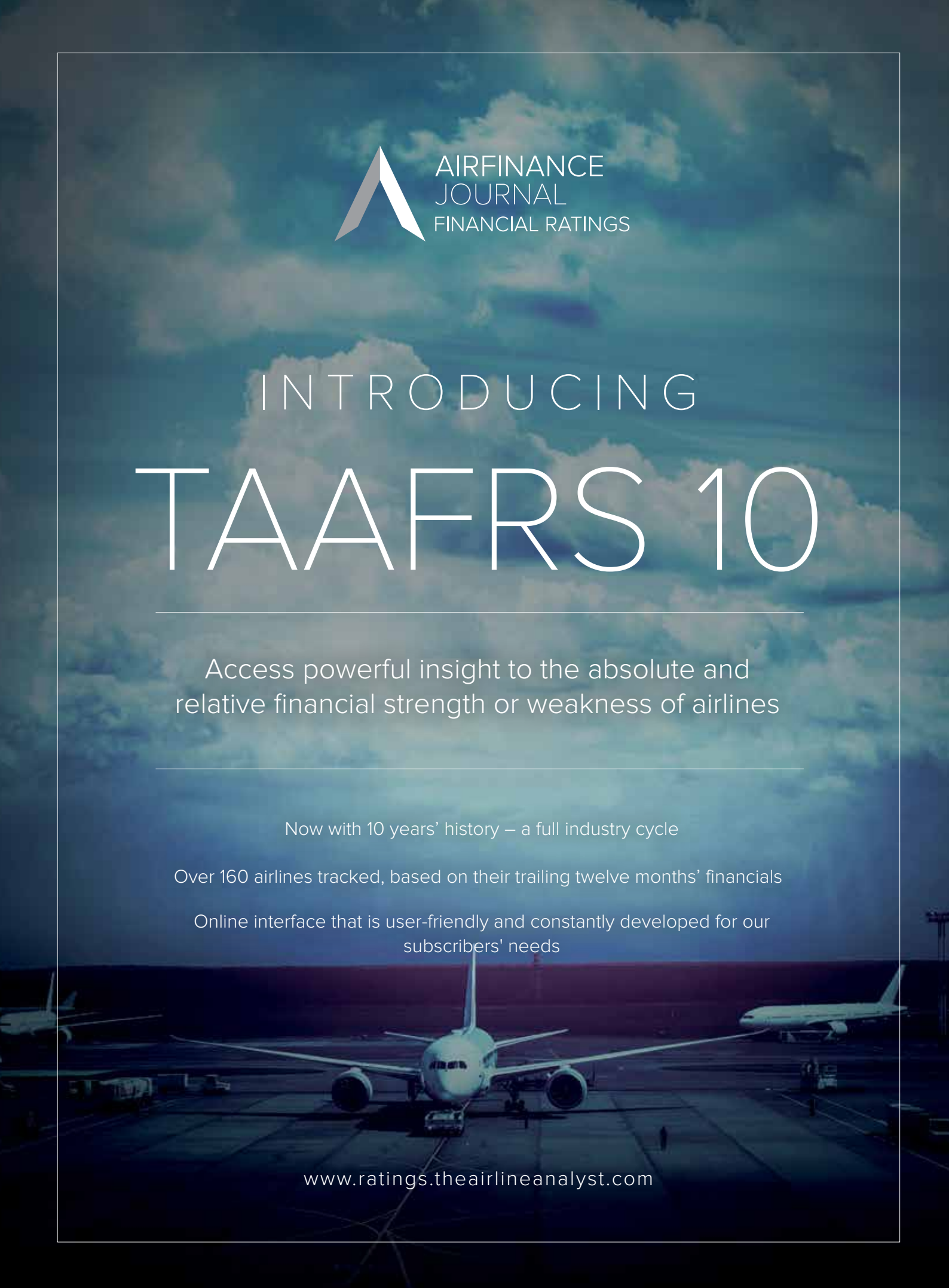
SEATING/RANGE	
Max seating	108
Typical seating	98
Maximum range (basic version)	1,645nm (3,048km)
Maximum range (LR version)	2,470nm (4,578km)
TECHNICAL CHARACTERISTICS	
MTOW (basic version)	45.8 tonnes
MTOW (LR version)	48.5 tonnes
OEW (basic version)	24.3 tonnes
OEW (LR version)	25.1 tonnes
MZFW (basic version)	36.6 tonnes
MZFW (LR version)	37.4 tonnes
Fuel capacity	13,135 litres
Engines	PowerJet SaM146-1S17/8
Thrust	17,800lbs with automatic power reserve
FUELS AND TIMES	
Block fuel 200nm	1,150kg
Block fuel 500nm	2,340kg
Block time 200nm	46 minutes
Bock time 500nm	83 minutes
FLEET	
Entry into service	2011
In service:	103
Operators (current and planned)	26
In storage	24
On order	155
Build peak year (2017)	26
Estimated production 2018	28
Average age (years)	2.8
INDICATIVE MAINTENANCE RESERVES	
Insufficient data available	

New aircraft market values ($ millions)

Model	Avitas view	CV view	IBA view	ICF view	Oriel view	Average
Airbus						
A319	36.1	35.7	37.2	35.6	33.7	**35.6**
A320	44.1	42.2	45.0	43.9	44.3	**43.9**
A320neo	48.4	50.5	49.7	47.6	46.5	**48.5**
A321	51.1	50.5	53.2	52.3	52.6	**51.9**
A321neo	54.4	57.3	58.7	57.0	58.3	**57.1**
A330-200	90.2	87.0	90.7	87.5	82.0	**87.5**
A330-300	102.3	100.0	102.8	101.5	97.6	**100.8**
A350-900	149.1	155.3	147.5	141.9	145.5	**147.9**
A380	216.5	245.7	230.6	214.1	202.3	**221.8**
ATR						
ATR42-600	15.8	18.0	15.4	15.0	18.0	**16.4**
ATR72-600	20.5	20.5	20.8	20.4	20.0	**20.4**
Boeing						
737-700	38.7	35.7	37.6	36.9	32.8	**36.3**
737-800	47.1	43.6	47.9	47.4	46.0	**46.4**
737-900ER	50.1	44.9	49.9	50.1	45.9	**48.2**
737 Max 8	51.3	51.5	51.7	51.3	49.3	**51.0**
747-8 Passenger	178.0	150.1	165.2	175.2	146.9	**163.1**
747-8 Freighter	185.8	181.9	173.9	185.8	190.6	**183.6**
777-200F	163.6	163.7	160.0	170.5	146.7	**160.9**
777-300ER	161.2	154.7	164.0	163.9	141.5	**157.1**
787-8	120.0	118.0	121.7	117.7	115.2	**118.5**
787-9	146.9	150.1	140.2	137.7	136.3	**142.2**
Bombardier						
CRJ700	25.3	21.0	24.0	22.7	21.8	**23.0**
CRJ900	27.8	25.7	25.0	27.1	25.1	**26.1**
CRJ1000	30.2	25.8	28.1	28.9	28.0	**28.2**
CS100	31.2	28.9	34.0	33.5	34.7	**32.5**
CS300	36.3	34.7	38.2	36.5	40.0	**37.1**
Q400	23.4	21.0	21.7	22.5	19.8	**21.7**
Embraer						
E170	28.7	23.0	25.6	24.1	24.3	**25.1**
E175	29.7	29.3	28.1	29.2	26.8	**28.6**
E190 (AR)	34.1	34.3	32.0	31.5	31.0	**32.6**
E195 (AR)	36.4	35.9	34.0	35.2	31.4	**34.6**
Sukhoi						
SSJ100	24.6	26.7	24.9	24.2	18.6	**23.8**

New aircraft lease rates ($'000s per month)

Model	Avitas view	CV view	IBA view	ICF view	Oriel view	Overall range
Airbus						
A319	270	255	275	225-275	230	**225-275**
A320	320	325	320	290-345	335	**290-345**
A320neo	370	375	350	330-390	360	**330-390**
A321	395	380	375	350-410	410	**350-410**
A321neo(ACF)	410	420	400	360-450	440	**360-450**
A330-200	720	670	690	600-750	730	**600-750**
A330-300	790	785	720	625-825	780	**625-825**
A350-900	1,040	1,100	1,125	950-1,150	1,050	**950-1,150**
A380	1,670	1,900	1,875	1,450-1,750	1,700	**1,450-1,900**
ATR						
ATR42-600	125	155	144	105-125	145	**105-155**
ATR72-600	160	180	160	145-165	150	**145-180**
Boeing						
737-700	270	250	275	220-270	230	**220-275**
737-800	330	345	340	310-375	335	**310-375**
737-900ER	350	365	370	330-380	365	**330-380**
737 Max 8	360	375	370	330-400	360	**330-400**
747-8 Passenger	1,300	1,100	1,175	1,050-1,200	1,200	**1,050-1,300**
747-8 Freighter	1,470	1,350	1,325	n/a	1,550	**1,325-1,550**
777-200F	1,200	1,200	1,220	n/a	1,150	**1,150-1,220**
777-300ER	1,264	1,150	1,325	1,150-1,350	1,050	**1,050-1,350**
787-8	870	900	975	850-950	925	**850-975**
787-9	1,092	1,100	1,100	950-1,100	1,000	**950-1,100**
Bombardier						
CRJ700	170	218	175	150-185	200	**170-200**
CRJ900	210	233	200	180-215	225	**180-233**
CRJ1000	230	233	220	190-230	255	**190-255**
CS100	265	250	250	230-280	280	**230-280**
CS300	310	280	280	280-310	305	**280-310**
Q400	190	195	180	170-200	190	**170-200**
Embraer						
E170	215	225	200	170-200	175	**170-225**
E175	218	250	220	190-210	230	**190-250**
E190 (AR)	255	280	255	230-250	270	**230-280**
E195 (AR)	275	280	265	240-270	275	**240-280**
Sukhoi						
SSJ100	180	190	200	170-210	165	**165-210**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