January/February 2020

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Staying the course

Boeing's Max travails and further tensions between the US and Iran have failed to slow down merger activity and financing in the aviation sector, writes **Oliver Clark**.

What links the crisis over Boeing's 737 Max programme with the current tensions in the Middle East? Beyond a heavy reliance on oil, nothing perhaps. But it could be argued that both reveal that political and economic realities ultimately trump the short-term flux of events.

There can have been little cheer at Boeing at the start of this year. The manufacturer must have hoped that the removal of its chief executive officer, Dennis Muilenburg, in mid-December would draw a line under the Max PR disaster that saw Boeing face a barrage of negative press reports and political criticism last year over its handling of the Max crisis.

But the airframer finds itself in hot water once again with the release of a cache of embarrassing internal messages from Boeing employees. One described the 737 Max as being "designed by clowns, who in turn are supervised by monkeys", while others mocked the Federal Aviation Administration and boasted of deceiving safety regulators.

Then there is the less colourful, but no less damaging, report in the New York Times that Boeing had discovered more potential design flaws in the aircraft, including that wiring bundles that control the tail could be too close together and could cause an accident.

But maybe the original equipment manufacturer can take some solace from the words of Air Lease's chief executive officer, John Plueger, who told a Bank of America Merrill Lynch conference in January that the 737 Max is "here to stay".

He says: "When the Max re-enters service it will probably be the most scrutinised and tested and recertified commercial aircraft that has ever been flying out there today. So there is a de facto presumption that I think is correct that this aircraft is here to stay.

"The fact of the matter is the world's airlines need this aircraft. Airbus cannot possibly produce enough aircraft to substitute. It is based on a proven design."

Appraisers contacted by *Airfinance Journal* did not see any reason why the current grounding should affect the residual value of the Max, and believed that the halt to production in January was a "logical move".

Boeing's share price has taken a hit during the crisis. The price peaked at $441 on 1 March 2019, just before the Ethiopian Airlines crash, and was down 33% to $332 on 10 January. Investors remain rattled by the ongoing disclosures of design problems with the Max programme. But the share price is likely recover in time.

Similarly, fears that the killing in a US drone attack of Iranian general Qassem Suleimani could spark a general conflict between the two states appears to have receded after the Islamic republic launched what seems to have been a largely symbolic rocket attack against US troop bases in Iraq.

Donald Trump, the US president, then reciprocated by limiting his reaction only to further sanctions on the Iranian regime. It appears that cooler heads have prevailed, although a tense week ended with Iran admitting its military "unintentionally" shot down a Ukraine International Airlines 737-800 soon after it left Tehran's Imam Khomeini airport on 8 January, killing all 176 people on board.

The market also had some cool heads, with the price of oil, which spiked at just below $70 immediately after news of the drone strike, since falling back to about $65.

Increasingly pessimistic forecasts from bodies such as International Air Transport Association regarding a softening demand and airline profitability does not seem to have translated into a dampening of the appetite of the world's lessors.

Funding at major lessors continues. In January, Avolon raised $1.75 billion of unsecured notes through a dual-tranche private offering, while Air Lease also borrowed $1.4 billion through a public offering. The same month, Singapore-based Avation revealed it had received a takeover bid from an undisclosed party, suggesting that the string of buy-outs and mergers in 2019 will continue this year.

There is still plenty of appetite in the market for portfolio purchases from lessors such as DAE Capital, which has openly discussed its intention to pursue takeovers – to BBAM, which is being touted as a possible suitor because of Singapore sovereign wealth fund GIC's 30% shareholding in the lessor, and to NAC, which has acquired various regional fleets over the years.

Airfinance Journal also understands that the pace of asset-backed securitisations is set to continue, with a number expected to hit the market this month.

So, what do all these events tell us? Perhaps that when a business model is working, and in the absence of a better alternative, staying the course is probably the best strategy.

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Printed in the UK by Buxton Press, Buxton, Derbyshire.

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CDB Aviation announces Hannigan as new CEO

CDB Aviation has named industry veteran Patrick Hannigan as its new chief executive officer (CEO), succeeding Peter Chang, whose planned retirement caps three years of leading the transformation of the business into a full-service, global aircraft leasing platform.

The lessor says Hannigan's appointment comes at a "pivotal time" in its "robust" development, with the goal of furthering its growth momentum. Hannigan, formerly CDB Aviation's president and chief commercial officer, has more than two decades of experience in finance, marketing, sales, and profit and loss oversight.

He was a founding shareholder of Avolon Aerospace Leasing. Hannigan served as senior vice-president, marketing, for RBS Aviation Capital (now SMBC Aviation Capital). He also held the role of vice-president, marketing, at GE Capital Aviation Services, where he spearheaded the development of the company's operations in the Middle East and Africa. Hannigan has also held executive positions at Diageo and Deloitte and Touche. He is a fellow of the Institute of Chartered Accountants Ireland.

"Together with our shareholder, our board and our top-notch global team, we will continue to focus on building mutually beneficial relationships with airline customers, financial partners and industry OEMs [original equipment manufacturers], while delivering excellence in the way that meets the changing needs of the airline community and generates industry-leading shareholder value," said Hannigan.

Outgoing CEO Chang says: "In establishing CDB Aviation as a Chinese lessor with a true global reach and scale, we have instilled an execution-driven culture of competency among our team, which will serve as the foundation for the company's continued growth and success."

Patrick Hannigan

Walsh to retire from **IAG**

International Airlines Group (IAG) chief executive officer, Willie Walsh, is to step down from his post in March and retire from the business in June. He will be replaced by Iberia CEO, Luis Gallego, whose own successor at the Spanish flag carrier will be announced in "due course".

Walsh was instrumental in creating IAG in 2011-12. Beginning as a merger between British Airways and Iberia, IAG has grown to become one of Europe's largest airline groups after the acquisitions of Vueling and Aer Lingus. It is also in the process of taking over Air Europa.

In 2017, it created a low-cost division – Level – operating short- and long-haul flights initially from Spain before expanding to bases across Europe.

Before heading IAG, Walsh was CEO of British Airways and before that held the same position at Aer Lingus, the carrier where he began his career as a pilot.

"Willie has been the main driver of this unique idea that is IAG. I hugely admire his commitment, strong leadership and clear vision, always ready to take on whatever challenges lay ahead of him," said IAG's chairman, Antonio Vazquez.

Gallego started his career in the airline industry in 1997 with Air Nostrum before moving on to Clickair prior to its merger with Vueling where he worked with Alex Cruz, now BA's chairman and CEO, and other IAG executives.

Boeing replaces CEO amid Max crisis

Boeing has replaced embattled chief executive officer Dennis Muilenberg with chairman David Calhoun.

Muilenburg resigned from his position in mid-December, becoming the highest profile casualty of a crisis that has gripped the manufacturer since the fatal crashes of two Boeing 737 Max aircraft, in October 2018 and March 2019.

Boeing said its board of directors had decided that a change in leadership was necessary to "restore confidence" in the company moving forward as it works to repair relationships with "regulators, customers and all other stakeholders".

Lawrence Kellner, the US manufacturer's newly appointed chairman of the board, said: "On behalf of the entire board of directors, I am pleased that Dave has agreed to lead Boeing at this critical juncture. Dave has deep industry experience and a proven track record of strong leadership, and he recognises the challenges we must confront. The board and I look forward to working with him and the rest of the Boeing team to ensure that today marks a new way forward for our company."

Muilenburg had been in his post since July 2015. Last October, he was stripped of his title as chairman, with the role going to Calhoun.

Brauns retires from **NordLB**

Harald Brauns retired from German financier Norddeutsche Landesbank Girozentrale (NordLB) in the final quarter of 2019.

Brauns established the aircraft finance business for the bank in 1984 and built up a team of nearly 40 employees in Germany, New York and Singapore, financing more than 600 aircraft over the years.

He moved to a managing director position on 1 October 2017 until the fourth quarter of last year, when he was appointed as a director for investment firm DP Aircraft I.

The Guernsey-based firm said Brauns replaced Angela Behrend-Gornemann, who retired from her position as a director at the end of October.

"We are delighted that Harald has joined the board," said Jon Bridel, chair of DP Aircraft I. "His extensive aircraft leasing experience with many airlines at all stages of the cycle will be of great benefit to the company going forward."

NordLB announced Frank Wulf as the new head of its aircraft finance business division in the summer of 2017.

Wulf joined from DVB Bank, where he held various management posts from 1998 onwards.

Based in London, he was managing director and regional head of aviation Europe, Middle East and Africa for DVB from 2006 onwards.

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MUFG names new global aviation team

MUFG named David Goring-Thomas in the final quarter of last year as global head of its aviation finance business, after its completion of the acquisition of DVB Bank's aviation finance lending business.

Goring-Thomas, who is based in London, was previously board member responsible for aviation finance at DVB Bank. He will be tasked with ensuring a smooth integration into MUFG's business.

At DVB Bank, he succeeded Bertrand Grabowski as a member of the board of managing directors in November 2016, taking responsibility for the aviation finance and land transport finance businesses of the bank.

Before joining DVB Bank in 1998, Goring-Thomas worked at the Long-Term Credit Bank of Japan, the Swiss Bank Corporation and NatWest Bank.

MUFG finalised part of its acquisition of DVB's aviation finance division on 19 November. That closing was on the lending portfolio for about €4 billion ($4.42 billion).

The acquisition of DVB's aviation investment management and asset management businesses, which will be transferred to a newly established subsidiary of BOT Lease in the UK, where those businesses will be held, should be finalised in the first half of this year.

Sources expect the second closing to be at the end of the first quarter of 2020.

MUFG also appointed Marilyn Gan as managing director and head of origination of Asia-Pacific aviation. Gan will be based in Singapore and oversee the strategic growth of MUFG Bank's aviation financing portfolio in the Asia-Pacific region. Before joining MUFG, Gan had worked for DVB since 2006, most recently as regional head of aviation finance for Asia-Pacific.

Gan spent the earlier part of her career with Singapore Aircraft Leasing Enterprise.

Earlier in January the Japanese bank revealed further senior management appointments on its aviation finance business.

MUFG veteran Hajime Kawada was named deputy global head of aviation finance. Responsible for strategic planning and business development, he is based in London.

Leading the global origination teams is Eelco van de Stadt, head of global origination and credit product, and Olivier Trauchessec, head of global origination and structured solutions.

Underneath them are the regional origination teams, with Vicente Alava-Pons taking the lead for London with deputy head Tye Holmes, Subbu Alagappan heading up New York, and Marilyn Gan leading the Singapore- and Hong Kong-based teams, supported by co-head Jiro Nomura.

David Goring-Thomas

Other senior appointments include: Kieran O'Keefe as head of aviation advisory in London; Bert van Leeuwen as head of aviation research in Amsterdam; and James Treseder-Griffin as head of global aviation loan capital markets in London.

Guido Schmitz, formerly head of aviation credit at DVB, also joined MUFG as managing director, aviation credit.

Amedeo promotes Lapidus and Vourlioti

Amedeo has appointed Gabriella Lapidus as executive vice-president and head of sales, trading and strategic partnerships. She now leads the management of aircraft sales and trading activity, as well as stakeholder relationships, including the development of existing and new investment and equity channels across the business.

Lapidus, who joined Amedeo in 2014, was previously senior vice-president trading and equity capital markets.

Angeliki Vourlioti has been appointed executive vice-president and head of pricing, analytics and strategic finance. She now leads the management and oversight of all pricing and analytical functions, and will be responsible for the development of existing and new strategic financing channels, with a particular focus on banks and senior financing sources.

Vourlioti, who joined Amedeo in 2013, was previously an executive director at the company.

BGC names aviation brokerage Piiq Risk Partners

BGC Insurance has named its aviation and aerospace reinsurance brokerage division Piiq Risk Partners.

To date, BGC has hired 28 individuals in the UK and USA to form the nucleus of the brokerage and has said it has "significant aspirations" to attract additional talent into the organisation in 2020.

Philip Smaje joined as chief executive officer, on 1 January 2020. Marcel Chad has been in place as president since June 2019. Bruce Fine, managing partner US, joined in September.

Also in September the firm hired former Boeing Capital veteran Kostya Zolotusky as a managing partner.

"Piiq has a unique opportunity to align the resources of our parent company, which is focused on the use of innovative technology, with an entrepreneurial spirit that puts clients' outcomes first," said Chad.

BGC has hired other executives from companies including Sompo International and Marsh.

Ye Tian to head new Sino-Japanese lessor

Ping An Leasing's head of aviation, Joe Ye Tian, was appointed as chief executive officer of newly formed leasing company Clover Aviation Capital last month.

Clover Aviation Capital, which was formed last September, is a joint venture between Mizuho and Chinese insurance giant Ping An. Ye Tian had been with Ping An Leasing since 2015.

Ping An Leasing was established in Shanghai in January 2012 and is a wholly owned subsidiary of Ping An Insurance, specialising in leased assets. It launched its aviation business in July 2015 and established a regional office in Dublin.

Ping An has been looking for a buyer for the past year and *Airfinance Journal* reported last October that it was offloading some or all of its recently launched aircraft leasing portfolio to Japan's Mizuho. The Chinese lessor has a nine-aircraft portfolio, according to *Airfinance Journal*'s Fleet Tracker. It also holds a purchase and leaseback agreement for 10 Boeing 737 Max 8 and Max 9 aircraft with Mexican Dragon Aircraft.

Bridging the **gap**

Dublin City University's Year of Inclusion in aviation initiative seeks to break down the barriers to pursuing a career in aviation and leasing and, in the process, make the sector more sustainable, writes **Oliver Clark**.

To give some impression of the gender imbalance in the global aviation finance and leasing sector, Amelia Anderson, former managing director and assistant treasurer, American Airlines, recalls the poor attendance at previous women's networking events around the Dublin conference week.

"There would be the quote unquote 'women's networking event' which you could hold in my living room at that time," Anderson tells *Airfinance Journal*, adding: "I went to some of the early ones back then and they were very poorly attended, I think it is fair to say."

While women would make up a "few hundred" of the delegates at shows as recently as 2014, the "vast majority" of attendees were men, she recalls.

The experience crystallised an existing belief that more had to be done to level the playing field and encourage greater inclusion and diversity in the sector.

In 2015, together with Dana Barta, executive director, head of aviation finance team, global capital markets, Morgan Stanley, Anderson founded Advancing Women in Aviation Roundtable (AWAR), a not-for-profit organisation designed to build awareness and create actionable strategies to promote the development and advancement of women leaders in the aviation industry.

She is now part of a new initiative, Dublin City University's (DCU) Centre of Excellence for Diversity and Inclusion's Year of Inclusion, launched to promote diversity within the Irish aviation sector.

Anderson is chairing a committee which will seek to build and grow knowledge and awareness of diversity and inclusion across the aviation industry, with an initial focus on building gender balance.

The committee includes representatives from Boeing, Aer Lingus, Dublin Airport Authority, Ryanair, KPMG, Arthur Cox and 30% Club, Aircraft Leasing Ireland and Ireland's Department of Transport, Tourism and Sport.

Anderson says the committee's broad range of industry expertise and reach means it represents the "perfect opportunity" to develop strategies for promoting greater inclusion in the sector while also helping organisations to recruit a more diverse workforce and enhance their sustainability credentials.

The committee will set itself four goals during the year of inclusion around research – using data to provide benchmarks and drive change – provide thought leadership through events and workshops to build inclusion, provide consulting services by leveraging existing knowledge to accelerate progress and provide learning opportunities by building knowledge and action plans through targeted and specific development.

Underpinning these goals are plans for a public commitment in the form of an inclusion pledge, which commits signatories to demonstrating inclusion in their organisations through specific actions.

Sandra Healy, director of the Centre of Excellence for Diversity and Inclusion at DCU, tells *Airfinance Journal* that much of the early work of the committee will be to use quantitative and qualitative data to build a "benchmark of where the industry is in relation to diversity".

Other work will include focus groups and case studies to develop examples of best practice that can then be applied by organisations.

Healy says that DCU was spurred to its work when a number of organisations in Ireland approached the university looking for support around diversity and inclusion.

"What we realised at that point was that there were obviously systematic challenges that need to be addressed within the industry and instead of working with each organisation one at a time, we made the proposal of: 'why don't we help the industry come together and focus on the year of diversity and inclusion in Ireland'," she says.

Healy has previously worked on similar action plans for greater diversity and inclusion in other sectors such as insurance.

While time will tell what actions will be needed in the aviation sector, she says it is unlikely there will be a "silver bullet" solution.

Daire Keogh, deputy president of DCU, says the involvement of its centre of excellence "plays to the university's strengths of research, around community to build a network of collaborators".

Keogh tells *Airfinance Journal*: "Part of doing is about it being the right thing to do, but there is also the other element of it that is, in a small economy like ours, enterprise focused like Ireland, the battle for talent is one of the biggest issues.

L/R: **Brid Horan, Co-Chair, Balance for Better Business, Amelia Anderson, Peter Barrett, chief executive officer, SMBC Aviation Capital**

"All our industry is welcoming, our industry is open and our industry is inclusive. That is one of the things that this year of inclusion in aviation is about, which is holding up the industry in all its complexity and all its opportunity as a welcoming place for a diverse workforce that is Ireland, Europe and the world more broadly."

Both Keogh and Anderson say that building diversity and inclusion is an opportunity for lessors and airlines to make themselves more attractive employers and so provide them with a pipeline of future talent.

It can also enhance their perception as a sustainable business and progress their social development goals (SDGs).

Anderson points out that one of the benefits of becoming a higher-level sponsor of the initiative is that DCU will "come into your organisation and do the work it takes to map your SDG efforts".

She credits SMBC Aviation Capital's chief executive officer, Peter Barrett, as an early proponent of greater diversity in the sector and as one of AWAR's "very first supporters", and she sees the latest initiative as very beneficial for lessors such as SMBC Aviation Capital.

"One of the reasons I know this is important to people like Peter Barrett, for example, is he is looking at where does SMBC Aviation Capital get its workforce for the coming decade, for the coming generation.

"In fact," she adds, "Peter has been telling me for years that they try to have a diverse workforce, they try to recruit women and people of colour into their firm, but it's extremely difficult for them to find those people."

Ready to **pounce**

Newcomer Zephyrus Aviation Capital is waiting for the right opportunities to acquire additional aircraft portfolios, its president and chief executive officer, Damon D'Agostino, tells **Dominic Lalk**.

How quickly time can pass. In the summer of 2018, nobody in aviation finance and leasing was aware that a group of CIT Aerospace top executives was in the process of defecting. Their shared goal was to set up a new leasing platform – Zephyrus Aviation Capital – and, in October that year, they entered the market with a bang: closing their first structured asset-backed securities (ABS) financing, the $336.6 million ZCAP 2018-1 transaction used to acquire 21 aircraft on lease to 19 airlines from Avolon.

A year and a half later, the team, led by Zephyrus president and chief executive officer, Damon D'Agostino, is ready to pounce again. The Dublin-based lessor is eyeing portfolio acquisitions that will further grow the platform to 60-75 aircraft by 2022.

"Frankly, if the market continues to soften then I think you will see us grow in a larger fashion. That's what we would like to see. That creates a lot of interesting opportunities to grow more aggressively. If the market doesn't soften or is slow then our growth will be a little bit more moderate. We don't have internal targets where we say we want x number of aircraft by 2025. We're just waiting for the right opportunities, and if that's 30 good aircraft then that's 30 aircraft and if that's 50 good aircraft then it'll be 50 good aircraft for us," D'Agostino tells *Airfinance Journal* exclusively.

Capital is not necessarily a limiting factor in Zephyrus's quest for greater market share. "Our shareholder and our partners at Virgo Investment Group are extremely disciplined, in a good way. In terms of capital allocation, we're getting anything that we need from Virgo – it's all available to us. So we have a lot of flexibility in the sense that we can deploy capital for deals that we really believe in and that are sensible. There's no predefined amount to deploy. We're very fortunate," says D'Agostino.

The Zephyrus team has learned that more often than not the sweet spot in aircraft acquisitions is in single transactions rather than bulk purchases.

"When we did the initial trade with the Avolon portfolio, it was our view that we would do a couple of other portfolios of similar size, on the order of 10, 15, 20 aircraft. What I've observed since then [October 2018] is that these kinds of portfolios have much more competition – many more people are looking at them, trying to gobble them up. For us, that sort of competitive dynamic is not something that we want to engage in, so we steered away, to be very honest with you, from the larger portfolio trades because they've gotten so much more competitive," says D'Agostino.

"What we found is that we can add more value and get the right returns by doing deals with a couple of aircraft here and there and building strategic relationships. Our strategy is to build deep relationships with a couple of key parties so that they can learn and see that we're good partners to do deals with – we're sensible, we're pragmatic and that will lead to the right type of follow-on deals and transactions," adds the lessor chief.

As of January, the Zephyrus portfolio comprised nine Airbus A320-family aircraft, seven Boeing 737NGs and four widebody A330s with leases attached to operators including Air France, Qantas Airways, Air Transat, KLM, Air Busan and Vueling Airlines.

The lessor has no immediate plans to deviate from mid- to late-life aircraft.

"We still like this space. We still believe in it very much. That being said, if the dynamics, if the market changes, then of course we'll be very much open to newer aircraft too. As a management team we've got plenty of experience with Neos and Maxs in our past lives. But it's not in our plan right now," says D'Agostino.

He confirms industry observations that new A330 asset values remain under immense pressure.

"If I had A330s that are coming back now that are younger, then yes, I would be somewhat concerned. But again, our assets are older and that makes it a lot easier, also because there's a lot of potential for cargo conversions for older A330s. New and younger A330s are without a doubt in a very difficult market right now. I would not be sleeping well if we had a bunch of young A330s in our portfolio that were in default," he says.

Zephyrus cautions that consolidation and liquidation in both the airline and leasing sectors are inevitable in 2020. "The softness observed in the airline space is definitely going to translate into some weakness with the lessors. In my view, the lessors that are going to get hurt are the ones that didn't have margins to begin with. Some deals in the past few years were actually loss leaders, deals that are likely booked on false assumptions of residual book values or misleading economics," D'Agostino says.

He adds: "The market is highly cyclical but, that said, there will be some lessors that will be much more affected than others and, in that sense, I think that we will definitely see some consolidation. It's already started. CMIG Leasing is a good example and Ping An is another. You'll definitely see parties exiting the leasing space. Without a doubt."

"If the market continues to soften then I think you will see us grow in a larger fashion. That's what we would like to see. That creates a lot of interesting opportunities to grow more aggressively."

Damon D'Agostino, president and chief executive officer, Zephyrus Aviation Capital

Norwegian turns to slot security financing

The European low-cost carrier has joined a relatively small number of airlines to use airport slots in bond financing, writes **Oliver Clark**.

Norwegian's use of its slots at London Gatwick airport as security for the extension of the maturity of two unsecured bonds in 2019 marked a rare public disclosure of this type of transaction.

The slots formed part of a security package against which the airline successfully extended the maturity of bonds totalling €350 million ($388 million) last September, which gives some indication of the value of the slots in question.

While airport slot trading among airlines is a well-established practice in the UK, the use of slots as security for raising financing is a much rarer phenomenon.

Virgin Atlantic became the first airline to experiment with the structure when it closed a £220 million ($334 million) senior note transaction using its take-off and landing slot portfolio at London Heathrow airport in December 2015.

In 2012, International Airlines Group (IAG) reportedly tried to launch a similar financial product but dropped the plan after receiving a cold reception from potential investors.

In September 2018, American Airlines added $500 million to a credit facility in a transaction backed by its slots at Heathrow.

The practice is also established in the USA. In August 2019, Jetblue Airways increased the size of its secured revolving credit facility with Citibank by $125 million to $550 million and extended the term, partly backed by slots and related assets at New York's JFK and LaGuardia and Washington Reagan National airports.

So can we expect to see more airlines turning to slot securitisation financing in the future?

"It is difficult to comment if there is more appetite but from what we have seen, it is definitely a yet-to-be fully explored area of financing which has gained traction since the Virgin one," Youcef Berour-Minarro, a senior analyst at IBA, tells *Airfinance Journal*.

"We have worked with various first-tier and second-tier airlines that have expressed an interest in this area and we expect to see more in the near future," he adds.

Advantages

Minarro says that unlike aircraft that have a finite commercial lifespan, slots are "perpetual assets" that an airline can expect to retain indefinitely, as long as it adheres to IATA slot guidelines.

Investors can expect the security value to be at a lower level than the slots' appraised values, and as with other aviation assets, the appraised values are supported by trading values where data points can be gathered, he says.

A source tells *Airfinance Journal* that using airport slots as security is a good alternative to borrowing money at commercial rates that would otherwise be "very expensive".

"If they can borrow against a valuable asset like slots they are likely to obtain discounted finance and a lot of airlines at the moment need liquidity – times are hard," the source says.

"They can use their slots to secure finance that's going to protect them in the longer term, if they don't own anything else. If their buildings are leased, if their aircraft are leased, if

everything else is leased, if the only asset they hold that's of any value is slots – then being able to secure finance against them is clearly a good thing," the source adds.

Rex Rosales, partner at Herbert Smith Freehills, says that the airlines most likely to be interested in this form of financing are those in the "middle" tier ranking with "fairly strong credits".

He believes that top-tier airlines such as the likes of IAG and American Airlines that have banks "falling at their feet" to provide unsecured debt have little need for such a product, while lower-tier airlines will not be of interest to investors.

The advantages for investors who extend credit secured against slots is that unlike aircraft that depreciate over time, slots "tend to appreciate", Rosales says. Many airlines will have been allocated slots for free under local co-ordinator rules, so they are effectively able to raise money against an asset they got for free.

"At Heathrow airport, investors have really bought in to it, and the appraiser's reports demonstrate that there is significant value in the slots at Heathrow and that there have been many trades and that the value has been increasing over time," he says.

Rosales says the typical investors attracted to this type of asset are insurance companies and pension funds seeking a "stable investment". He says the slots do not necessarily need to be investment grade rated to attract potential investors.

Risk factors

One risk of using slots as security is that the regulations governing their possession and repossession are arguably less robust than those governing assets such as aircraft or engines.

Richard Davey, global head of aviation at PA Consulting, says there is a risk of losing slots in the event of an airline failure.

> *"At Heathrow airport, investors have really bought in to it, and the appraiser's reports demonstrate that there is significant value in the slots at Heathrow."*
>
> **Rex Rosales**, partner at Herbert Smith Freehills

"Generally speaking there is a misunderstanding among financial institutions on this subject – slots are not assets, they are rights – rights that are allocated by a co-ordinator at a particular airport. A financial entity cannot hold the slots themselves.

"It is legal under IATA guidelines to swap slots between airlines for financial compensation in the secondary market, but under aviation law it is the operating airline that holds the slots, they do not necessarily recognise slot leasing deals.

"In the event of an airline going down, the creditors will need to move quickly to sell the slots before the airline's operating licence lapses. While there can be an appeals process you are very much held hostage to the whims of the national slot co-ordinator. If the licence lapses then at that point the slots will go back into the pool and the value invested in them is lost. It is a risk," he says.

"A key issue is how an investor can generate value from slots in the event of a bankruptcy – the mistake that lawyers make when they seek power of attorney from a financial institution, with the intention of taking control of the slots, is that the only entity that can acquire and hold slots is another airline with an operating licence," Davey says.

A source says that the legal definition of what a slot is, and who can own them, has largely been clarified in the UK following the legal action that secured the possession of Monarch Airlines's slots by creditor KPMG in November 2017.

"From a financial investor's point of view it's a high-risk investment because of the risk of losing those slots or what happens to that airline in administration if you haven't got the same clarity as we have in the UK after the Monarch case," he says.

One way of seeking to avoid the threat of losing slots is for those being securitised to be held in a separate subsidiary that can continue operating in the event of the parent airline collapsing or losing its licence.

Thus Virgin Atlantic established Virgin International to hold the slots it planned to mortgage in 2015. In an investor presentation from September 2019, Norwegian outlined the structure under which its Gatwick slots would be mortgaged.

The Scandinavian carrier transferred its Gatwick slots to Norwegian Air Norway (NAN), while removing 35 of the 36 aircraft operated by the carrier, leaving it the minimum number allowed for it to retain its operating licence.

"The LGW slots will subsequently be the most important asset of NAN. NAN will enter into arm's length slot usage agreements with group companies. The bondholders will be offered security over the shares in NAN and pledge over intra-group claims owed by NAN," the airline said.

While slot securitisation financing may seem to only make sense for airlines in specific circumstances, the rising value of slots and the increasing congestion at UK and mainland European airports suggests it will become more popular in the years ahead.

More investor appetite for **ABS E-notes**

The proportion of equity notes in asset-backed securitisation deals continued to increase last year, according to *Airfinance Journal* research.

There were 17 commercial aircraft asset-backed securitisation (ABS) issuances in 2019, including nine transactions comprising E-note certificates with total equity *Airfinance Journal*'s Deal Tracker shows investment reaching $1.5 billion. This compares with five E-note issuances out of a total of 12 ABS deals in 2018.

Airfinance Journal understands that up to three ABS transactions, of which one included E-note certificates, were in the pipeline in December, but those are now expected in January or February, subject to market conditions.

These transactions could feature E-note certificates.

Last year, $929 million of E-notes featured across nine ABS issuances, highlighting the continued appetite for leasing companies and asset managers in the sector.

In 2018, the aviation-related ABS total issuance volume reached $7.3 billion, an all-time high. This included an estimated $589 million of E-note certificates.

Some sponsors may keep a proportion of the E-note certificates, whose amount and percentage relative to the ABS issuance volume vary. But six transactions featured amounts higher than $100 million in 2019, according to Deal Tracker.

In the latest Air Lease-sponsored transaction, Thunderbolt III, which closed on 8 November, the equity portion totalled 17% of the transaction. The Thunderbolt III deal saw $90 million of equity certificates issued. In August 2018, Thunderbolt II issued $450 million through two-class notes. In addition, the deal included $105 million of equity certificates, or 19% of the issuance.

The Horizon 2019-1 transaction included $101 million of E-notes (or 14.4% of the total issuance). The other Horizon issuance, Horizon 2019-2 from the last quarter, included $116 million of E-notes (20.8% of the total issuance).

GECAS's START II ABS in June included 17.3% of equity certificates. This was up from the 2018 START transaction, which included 14.5% of equity certificates.

Castlelake-sponsored ABS transactions have included E-notes over the past three years. The 2017 CLAS 2017-1 deal included $119 million of E-notes, or 13.1% of the issuance. The CLAS 2018-1 deal included $156 million of E-notes, or 14.5% of the issuance. Last year's CLAS 2019-1 deal included $70 million of E-notes, or 7.5%.

The PION 2019-1 transaction from last summer included $115 million of E-notes, or 17.8% of the issuance. The tradable E-note structure drew BOC Aviation back to the ABS market after an absence of four years. The Silver 2019-1 transaction included $123 million of E-notes, or 22.5% of the issuance.

DAE Capital returned to the ABS market in December with Falcon 2019-1. The deal included a $124 million E-note tranche, representing 19.4% of the issuance.

The previous year's Kestrel 2018-1 transaction, in which DAE Capital was a sponsor, did not include any E-notes.

"As an asset manager you don't necessarily need to get sale treatment at any particular time, but rather you are just trying to maximise returns for your investors. In trying to maximise returns for your investors, you could decide that the time to offer debt and equity are different times," says one lawyer source.

"As a fund, all aircraft need to eventually be sold, but they need to be financed until the right time to sell," he adds.

Another source says the value of the E-notes is affected by the pricing of the debt because the debt coupon is an input cost into the final valuation of the E-notes.

"Getting the debt done first locks in the rates and the amounts of debt. Then the issuer can focus on only an equity process at some time thereafter, which could be very quickly or years later.

"Depending on the timing of when the issuer is trying to monetise their equity position, some funds might have equity structures that warrant holding the equity for a longer period of time rather than selling out quickly," he says.

ABS featuring E-Notes (*Airfinance Journal* Deal Tracker)

Anchor leader role

Privately-owned investment firm Floreat is looking at increasing its exposure in the aircraft ABS market after two equity participation investments in the final quarter of last year.

In an interview with *Airfinance Journal*, Floreat Aviation Capital managing director Mark Rogers, who is responsible for originating and marketing commercial aircraft leasing investment opportunities to institutional investors globally, says the firm ultimately aims to be the first European anchor equity investor in commercial aircraft ABS transactions.

"We concluded that, currently, the best way to invest in a diverse pool of aircraft is via the ABS market: with our risk/return appetite, this is at the E-note tranche," says Rogers.

The firm is the largest investor in one of the most recent aircraft ABS offerings – Air Lease's Thunderbolt III – and it also acquired some equity certificates in GECAS's START III.

Rogers sees the equity deals in the aircraft ABS market as typically a "US investor product" that now needs increasing investment appetite and competition from the other side of the Atlantic.

"We are seeing increasing appetite for E-certificates from London-based structured credit investors and we are keen to help expand the London investor base," he says.

Like other platforms, Floreat is cherry-picking its investments. "Where we have concerns on either the asset or lessee composition of the ABS portfolios, we won't invest," adds Rogers.

For Rogers, the quality of the servicer is essential. "Repossessing aircraft by a lessor which has over 200 airline relationships does provide equity investors with additional confidence, particularly as the lessors seek to reposition those aircraft," he says.

When Floreat engages in an investment, it has three parameters: the platform, the assets and the lessees.

As a potential anchor investor, and with a "patient capital" investment culture, Floreat is happy to consider a lock-up period until the maturity date.

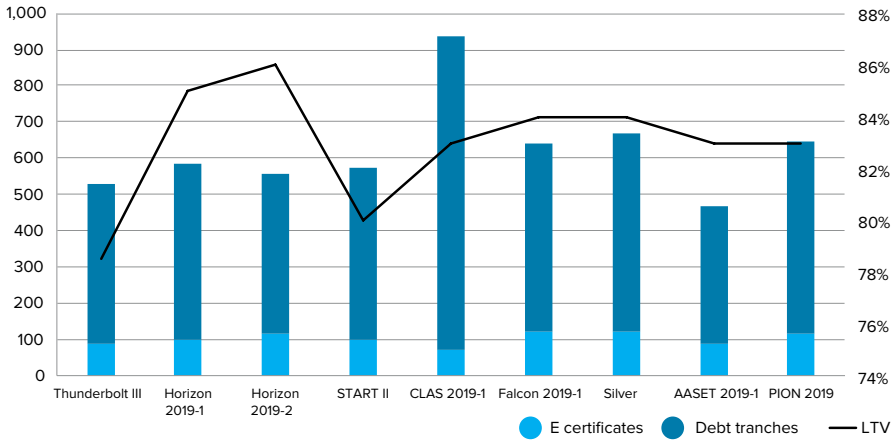
There is a growing market acceptance for 144A tradable equity and this has expanded ABS's investor bases. The tradable E-note structure can attract a greater number of investors, as opposed to a single investor.

"The other advantage of the tradable E-note is the ability for investors to take exposure to a 20-plus aircraft portfolio for tickets as low as $1 million," says Rogers.

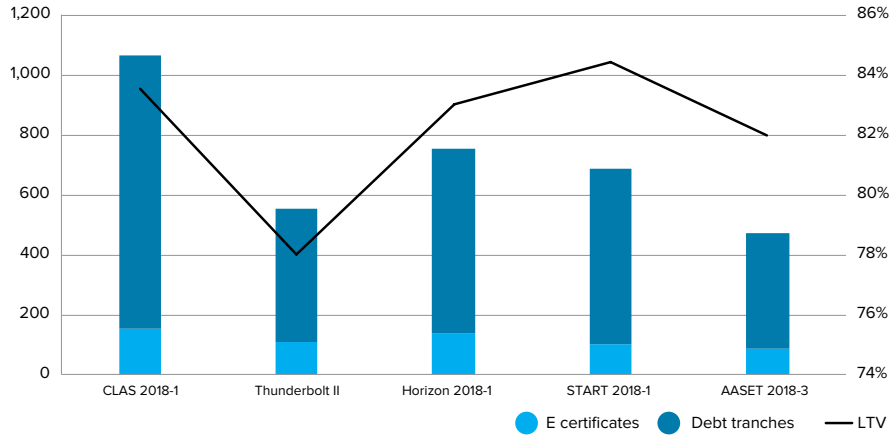
However, he cautions that investment banks need to increase liquidity in the E-note secondary market.

"I understand that from a capital charge, E-notes are expensive to position on a bank's trading books; however, if an investment bank is in a management group for structuring and underwriting an ABS deal, perhaps they should all play an active role in trading the E-notes in the secondary market. Ultimately, the greater the liquidity, the more investors are likely to invest in E-notes," he adds.

2019 ABS featuring E-Notes



2018 ABS featuring E-Notes



Asian investors

Without question, the highlight of 2019 was the number of ABS deals with 144A tradable equity. The first ABS with 144A equity (GECAS's START) closed about 18 months ago. There have been 15 closed 144A equity offerings, with several programme issuers: GECAS with START, START II and START III; Air Lease with Thunderbolt (which was not 144A), Thunderbolt II and Thunderbolt III; BBAM with Horizon, Horizon II and Horizon III; and Castlelake with its three CLAS 144A equity offerings.

"Once a leasing company has closed one 144A equity offering, subsequent 144A equity offerings are streamlined in many ways, including being faster, less expensive and less of a burden on the leasing company," says Milbank partner Drew Fine.

In 2019, two 144A transactions featured Asian investors: one with Korean equity (ACG's Mach 1) and one with Japanese equity (Stratos/JP Lease JOL Air). This was after DAE's Kestrel Aircraft Funding 2018-1, the transaction that saw the first mid-life aircraft portfolio sale with E-notes sold to Asian investors.

"The ABS with Japanese operating lease equity was also a great achievement as it provides another market in which to issue ABS equity at attractive prices," says Fine.

For him, one new feature in three ABS deals in 2019 is the issuance of a letter of credit by a bank. This enables the leasing company to receive the ABS proceeds on the ABS closing day and avoid the "negative carry" that an ABS typically has because the proceeds of the ABS would typically sit in an escrow account and can only be released as and when each aircraft is transferred into the ABS.

As to 2020, there are already about 15 ABS transactions being discussed for the first two quarters of the year. Many of those will have 144A tradable equity and one with Korean equity. *Airfinance Journal* also understands that some transactions could be debt refinancings of previous deals that closed in the 2015-17 period.

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NatWest returns to aviation asset finance market

The UK bank is back with a new strategy. **Olivier Bonnassies** reports.

Re-entering the aviation market after an absence of almost 10 years requires skill, expertise and a good understanding of the market.

The NatWest aviation team has closed two high-profile transactions over the past few months and, while growing the franchise is important, it is not the primary driver.

"The main objective is to support our customers in our core geographic footprint. Building our franchise and having the ability to cross-sell the bank's product suite remains an important aspect of our aviation strategy," says Jacob Lloyd, director, aviation, in an exclusive interview with *Airfinance Journal*.

"We want to drive sustainable growth," he adds.

Aviation asset finance is back at the UK bank.

Historically, Royal Bank of Scotland (RBS) held dominant positions in both aviation and rail owning full operating leasing businesses, namely RBS Aviation Capital and Angel Trains.

In 2008, RBS made the decision to sell these businesses at the height of the financial crisis. The aviation business was eventually sold in 2011 to SMBC.

In the intervening period, RBS continued to cover the aviation market through its Lombard franchise but on a very limited mandate.

The new NatWest strategic mandate was developed when the specialist asset finance business was moved back into the structured finance business.

"We spent most of 2018 researching the market and, on the back of that, built a three-year strategy that complemented the wider objectives of the core corporate bank. The strategy and growth mandate received the full support of the bank's executive," says Shaun Pickering, director, aviation.

The NatWest aviation team includes two directors and three vice-presidents who are originators and four associates who are movable across other sectors such as rail. The team reports to Alan Parry, head of asset finance.

"It's all about supporting our customer base in jurisdictions where the bank has an on-the-ground presence," says Lloyd. "So for us, it's predominantly a UK and Western Europe focus."

"Back in 2016, there was a lot more appetite from the top-tier carriers to use the bank market to fund their growth at sensible returns. There is so much liquidity now that it is more difficult to secure the right opportunities."

Jacob Lloyd, director, aviation, NatWest

The front-line team consists also of a portfolio management function and has internal aviation asset management capabilities.

"That level of technical support is extremely beneficial to the team as we move into new asset classes," he adds. "We are looking at finding the right opportunities to get the growth we want."

Lloyd says: "I would like to say that we want to support the top carriers in Western Europe in terms of broader mandate but, realistically, it is about re-entering the market safely, especially at a time when liquidity is very strong, so the opportunities may not necessarily be there."

Still, the franchise has closed two transactions involving eight aircraft, both used and new.

"We are building the book safely working with strong counterparties, liquid aircraft and sensible structures," he adds.

One of the transactions, which closed in the second half of last year, includes new narrowbodies for a US customer where the bank has a very defined mandate.

The other transaction includes turboprop aircraft. "I don't think we will do a significant amount in the regional aircraft space, but this was an opportunity for us working with an existing relationship," says Pickering.

He adds: "We are looking more towards the narrowbody market and, to a certain degree, widebodies for the right counterparty and structure."

The current environment is challenging. "The top-tier airlines are using competitive structures such as AFIC-backed Jolco [Japanese operating lease with call option] financing today. Those transactions were bank debt deals two years ago," observes Lloyd.

"Back in 2016, there was a lot more appetite from the top-tier carriers to use the bank market to fund their growth at sensible returns. There is so much liquidity now that it is more difficult to secure the right opportunities," he adds.

"This is why we don't have a defined budget. We have a three-year plan and that's what we work to. We don't need or want to take unnecessary risk," he says.

"We have the benefit of coming into the market with a clean aviation balance sheet. Perhaps we are not restricted as much as other players in terms of headroom," says Pickering.

But NatWest will not be shy to participate in club and syndicate deals as it continues to book-build and grow its commercial aviation experience.

Lloyd says: "We want to become trusted adviser to the sector over the next few years but we're realistic and know that takes time."

Virgin spreads its wings

The UK carrier has turned to a variety of financial products as it implements its fleet modernisation programme, **Oliver Clark** finds out from the airline's chief financial officer, Tom Mackay.

Virgin Atlantic's reputation for quirkiness and innovation was on show for the financing of its first Airbus A350 deliveries. In August, the London-based airline tapped the Japanese operating lease with call option (Jolco) market to finance its first A350-1000 from an order of 12.

Financial Products Group (FPG) was the Jolco arranger in the transaction, while Bank of China UK branch provided the debt portion.

The UK carrier turned next to a commercial loan when it used Aviation Capital Group's (ACG) Aircraft Financing Solutions programme to fund another A350-1000 delivery.

Apple Bank for Savings closed a senior loan to finance a portion of the purchase price, while Rand Merchant Bank (RMB) through FirstRand Bank (London Branch) provided a subordinated secured loan for a portion of the remainder of the aircraft purchase price.

Commenting on the ACG transaction at the time, Virgin Atlantic's chief financial officer, Tom Mackay, described it as an "innovative financing structure" that was a first for the airline and supported the diversification of its funding sources.

The carrier opted for a French lease structure to finance a third A350 delivery, in a transaction that was closed by BNP Paribas. The French bank was the sole arranger of commercial debt covering the aircraft as well as the French lease. BNP Paribas acted as security trustee.

Virgin tapped the commercial debt market again for the financing of a fourth A350-1000 delivery, securing a senior debt loan from Bank of China UK branch.

RMB through FirstRand Bank (London Branch) granted a junior loan into the offshore finance lease structure.

In an interview with *Airfinance Journal*, Mackay expresses his satisfaction with the range of products and competitive pricing that were on offer.

"We were really pleased with the process, really pleased with the selection and opportunities there that were open to us. I think the market is still in a good place," he says.

"There are still a lot of providers out there who would like to provide financing and some really good partners out there," adds Mackay. Virgin has now taken delivery of four of 12 units it has on order. Of the remainder, Mackay says three will be delivered through operating leases while the airline looks to other financing sources for the remaining five.

The carrier will take delivery of one owned and three leased A350s this year. The other four are coming in 2021, all of which Virgin will look to own, adds Mackay.

He says the airline is assessing how it will finance these deliveries, but is tight-lipped on the details. Virgin is open to continuing to work with banks which it has done business with before, he adds.

"The reality is you like to have a relationship with banks that you continue to work with. We have an RCF [revolving credit facility] as well with six banks and we try to continue our relationships with banks that provide other financial services as well," he says.

"Very much like anyone, you want to keep working with the partners with whom you have a good partnership and I would expect to go to my existing partners again," he adds.

The A350-1000 order is part of a fleet modernisation plan that will see Virgin phase out its older Boeing 747s, A330s and A340s in favour of more fuel-efficient 787-9s, A350-1000s and A330-900neos. Virgin has 14 A330-900neos on order with six options.

Airfinance Journal's Fleet Tracker shows that Virgin has 17 787-9s, 13 A330s, eight 747s, seven A340s and four A350s. Of this total, 15 are owned by the airline and the rest are leased from a variety of lessors.

Mackay describes the A350s as having a "fundamentally different" position on fuel burn from the A340s, which the carrier leases on similar routes.

He says that Virgin has not yet decided how it will finance its future A330-900neo deliveries, although Jolcos, French operating leases and Airbus's Balthazar product are "definitely" on the list for consideration.

Mackay says it will be "interesting" to see what happens over the next year or two in terms of the US economy "beginning to slow down" and the impact of Brexit in terms of liquidity and interest rates.

A key objective for Virgin since it started taking delivery of the 787s has been to move away from a fleet that is predominately leased to one where a greater proportion of the aircraft are owned.

"Our drive is to get to a blend of about 50% owned and 50% operating lease which we will achieve at the end of the A330-900neo delivery programme," he says.

"Historically, Virgin has been very much a 100% operating lease business and I guess we are looking to strengthen our balance sheet with owned aircraft and it also gives us more control over the fleet and what we do with it and the timing of any actions that we may take," he adds.

Mackay says the airline will consider firming up its A330-900neo options depending on the "strength of the [UK] economy" as it gets to those exercise dates.

Of the eight 747s Virgin operates, all will be withdrawn in 2021, while the airline has not yet decided how it will dispose of the four 747s it owns.

According to Mackay, Virgin has no intention of extending the leases on the former Air Berlin A330-200s it took in 2018 to fill the gap created when issues with the Rolls-Royce Trent 1000 disrupted its 787-9 operations. The aircraft will be replaced with A330-900s at completion of the lease term in 2021.

Virgin will not need to make any future fleet decisions until at least 2026, when it may have to consider replacing its 787-9s.

This will come ahead of a crucial time for Virgin as London Heathrow airport expects to open it's new runway in 2028-29.

With its principal bases of Heathrow and Gatwick extremely slot constrained, the creation of new capacity via the new runway will be key to any meaningful expansion of the airline's route network.

"Addressing the point that IAG today has 60% market share and we are the second-biggest operator at Heathrow and have less than 5% of the slots, we view that as extremely uncompetitive for the consumer."

Tom Mackay, chief financial officer, Virgin Atlantic

Virgin has become a vocal critic of the UK's current slot allocation system, which it argues does not provide enough capacity for it to grow into a competitor to challenge the dominance of International Airlines Group (IAG).

The airline has published a wish-list of destinations it would like to fly to if more slots could be secured, including long-haul destinations such Beijing, Sydney and Singapore, but also European and domestic connections.

The allocation system is under review by the UK government, and Mackay says the number of slots Virgin secures will be a major factor in any future fleet orders.

"There is obviously a huge binary item coming in 2028-29 with the third runway and we are pushing very hard with our 'Britain's second flag carrier' campaign for a fundamental shift in the slot allocation system," he says.

"Addressing the point that IAG today has 60% market share and we are the second-biggest operator at Heathrow and have less than 5% of the slots, we view that as extremely uncompetitive for the consumer," adds Mackay.

In the meantime, there are not "huge growth opportunities" for Virgin at Heathrow, but the carrier is looking at other activities, such as what feeder opportunities Connect Airways can provide at airports such as Manchester and Heathrow.

The other pillar of Virgin Atlantic's financial strategy is expected to come from the enhanced passenger revenue opportunities the airline hopes to accrue through a deeper relationship with 49% shareholder Delta Air Lines, Air France-KLM and other members of SkyTeam.

Richard Branson's Virgin Group has now dropped plans to sell 31% of its 51% stake in the airline to Air France-KLM, but the carriers remain committed to closer cooperation across their networks.

The US Department of Transportation recently approved Virgin's inclusion in Delta's transatlantic joint venture with Air France and KLM with the UK carrier replacing Alitalia.

Virgin also intends to enter into a joint venture with China Eastern Airlines and Air France-KLM on services between Europe and China.

Should Virgin look at new aircraft orders at a future date, Mackay would consider the idea of a group order with Delta and its other equity partners.

"It is something we could do in the future. One of the moves we have done in taking the A330-900 is it is an aircraft that Delta already operates, same with the A350, so we are already benefiting from their operational and engineering capabilities and the same with Air France-KLM," he says.

Another area of focus for Virgin is developing its UK regional feed through cooperation with Connect Airways, formerly known as Flybe, in which Virgin has a 30% stake.

Mackay believes that these relationships mean that Virgin has a "stronger corporate proposition to the corporate market because we will be jointly selling Virgin, Delta, Air France-KLM and Connect Airways – we will be selling as one corporate relationship".

So, could Virgin look at a wider involvement in the Latin American market after Delta's investment in a 10% stake in LATAM?

"Of course we are looking at it," he says, while adding it is "too early to say what it means".

Boutique **all the way**

Bahrain's Gulf Air is awaiting deliveries of more than 20 new aircraft over the next three years, many of them earmarked for sale and leasebacks, Gulf Air chief executive officer Kresimir Kucko tells **Dominic Lalk**.

The past two years have passed very quickly for Gulf Air chief executive officer (CEO) Kresimir Kucko. After taking the helm of the airline in November 2017, Kucko wasted no time formulating a new strategy for the legacy carrier that was once the predominant airline in the Middle East but that came under immense pressure from the inorganic growth of regional neighbours Emirates Airline, Etihad Airways and Qatar Airways.

Kucko quickly realised there was little point in trying to compete with his "big three" Gulf Cooperation Council (GCC) peers, so instead he decided that the only way forward for Gulf Air was "going the boutique route" – adding destinations and on-board amenities overlooked by the competition's hasty quest for market dominance.

Gulf Air's rejuvenation drive began with putting together a brand new fleet plan that culminated in the ordering of 10 Boeing 787-9s, 17 Airbus A321neos, 12 A320neos and 10 A220s.

"The major role of the 10 Boeing 787-9s that we have ordered is to replace the A330 fleet and to further develop our long-haul network. The last A330 was phased out from the fleet in January," Kucko tells *Airfinance Journal*. Lessors and arrangers take note: "We have already received seven 787s – six on sale and leaseback [SLBs] basis with DAE Capital and one with SMBC Aviation Capital (SMBC AC). We are expecting the last three 787s from that order to be delivered in April, July and December 2020. We are currently talking to lessors about SLBs for those final aircraft," says Kucko. SMBC AC and a number of other global lessors are in the running for that mandate after Sanad Aero Solutions unexpectedly dropped out. SMBC AC also supported the induction of Gulf Air's first six A320neos through SLB deals.

The 10 787-9s are replacing six A330-200s, the last of which left the fleet only recently. Gulf Air kept them in service a bit longer than originally anticipated because its 787s were undergoing Rolls-Royce Trent 1000 replacement work. But that was fine because it was Rolls-Royce Finance itself that acquired the six A330s, that initially delivered in 1999 and 2000, from the airline, possibly with an offer too good to resist.

On the narrowbody front, Gulf Air has taken delivery of five of 12 on-order A320neos. It will start accepting 17 A321neo variants – nine standard A321neos and eight extended-range A321LRs – from July. Six of the 13 A320neos have been mandated to SMBC AC under SLBs and the carrier is in the market with financing requests for proposals for the first tranche of the A321neo order.

> *"We are expecting our last three 787s to be delivered in April, July and December 2020. We are currently talking to lessors about SLBs for those final aircraft."*
>
> **Kresimir Kucko**, chief executive officer, Gulf Air

"We have 17 A321neo aircraft on order and they are starting to be delivered from the second quarter of 2020. But, as we all know, there's an issue with Airbus at the moment and all A321neo aircraft are delayed by six to seven months. In our original plan, we were hoping to have the first four A321LRs in the second quarter of 2020, but now it looks like we might only have one, depending on how fast Airbus can resolve its issues.

For now, the first one is scheduled for July and the next two in October and November, so the fourth aircraft might only arrive the following year, in 2021," says Kucko.

While Gulf Air is very pleased with its SLB transactions, the carrier also wants to own some of its future orders. "We want to eventually own some of the aircraft, so we are also exploring different options of financing other than SLBs," he says.

Quizzed about why Gulf Air did not opt for the increasingly popular A321XLR, Kucko had a simple answer. "The selection of the A321LR perfectly suits our network requirements. At the moment, for our current network and future expansion plans, we don't need the extra range the A321XLR offers," he says.

The airline's chief remains relatively tight-lipped about Gulf Air's order for 10 A220s. According to the original contract with Bombardier, deliveries of the rebranded aircraft to Gulf Air should have already commenced.

"The order still exists but at this point we are not considering the introduction of the A220 to our fleet for our regional network due to capacity restrictions, predominantly in business class," says Kucko.

Gulf Air's bread-and-butter business is East-to-West (Asia-Europe/USA) traffic via Bahrain and vice versa, and intra-Gulf or "GCC flights". In its five-year plan to 2023, the Bahraini carrier is looking to boost its route network and inflight offerings to lure passengers away from the competition.

"The GCC region remains a very strong part of our business and operations. We've been growing significantly in the GCC region over the past years and at the moment we have the strongest regional network. We would like to maintain that position but, at the same time, we are creating a stronger East-to-West connection, providing our passengers with seamless transfers through our Bahrain hub," says Kucko, noting that Bahrain airport will open a new passenger terminal in 2020.

"Journeys through our hub should not last much longer than using direct services, where there is any. To support traffic growth between East and West, we are adding daily flights to Kuala Lumpur in 2020, as well as a second daily frequency to Bangkok. In the West, we're launching flights to Milan, Munich and Mykonos," reveals Kucko.

Bahrain's flag carrier also plans to go to the US. "We're aiming to expand our network to include flights to the United States in the coming years. For now, we are only looking at New York, using our 787-9 with crew rest sections," he says.

That is not all. Gulf Air's wish list goes on. "In our five-year plan to 2023 we are planning on adding more destinations in Asia, especially in China. China is a megamarket and we need to be there eventually, especially Beijing, with the finishing of their new terminal. Hong Kong we're also looking at very closely. Singapore is on our radar as well and we are in the process of seeking preferable slots there," says Kucko.

"By 2023, we will have some vacant A320s that will be fully owned by Gulf Air, so one of the options that we are studying is to establish a subsidiary with a different business model."

Kresimir Kucko, chief executive officer, Gulf Air

Kucko takes immense pride in the airline's new-generation aircraft, their interiors and how much they have raised Gulf Air's passenger awareness and popularity.

"The customer feedback on our 787s has been absolutely fantastic. There are 26 Falcon Gold business-class seats, although I prefer to refer to them as first class. By industry standards, with an 89-inch pitch and great width, it is actually a first-class seat," he says.

The carrier's A321LRs will also have lie-flat seating in Falcon Gold business class, "so they will be predominantly used on our European network – for example, to Paris, Frankfurt and Milan," says the CEO. State-controlled Gulf Air is also in the process of rolling out Wi-Fi connectivity on all its 787-9s and incoming A321LRs.

The airline is studying the addition of a low-cost carrier after Etihad decided on a tie-up with budget Air Arabia and Emirates continues to rely on Flydubai for budget operations.

"By 2023, we will have some vacant A320s that will be fully owned by Gulf Air, so one of the options that we are studying is to establish a subsidiary with a different business model," says Kucko.

In the interim, Gulf Air is looking to grow its feeder network. "What we are now focusing strongly on is commercial partnerships with other airlines. The latest codeshares we have announced are with Etihad, Turkish Airlines, Sri Lankan Airlines and KLM Royal Dutch Airlines, just to name a few. More will follow early next year," he reveals.

"We are also not closed to joining one of the alliances and continue to explore opportunities there," he adds. "Our clear focus, however, is on perfecting our 'boutique concept' that we launched in early 2019. This means focusing more on millennials, premium leisure and corporate passengers. Our route launches to Malaga and Male in 2019 and our 2020 launches to Milan, Mykonos and Munich all cater very nicely to our niche market concept," he says.

Kucko is a seasoned airline veteran with close to 30 years' industry experience. He spent more than 25 years at Croatia Airlines, including five years as the president and CEO of the Star Alliance member.

As of January, the Gulf Air fleet comprised 34 aircraft: seven 787-9s (six from DAE Capital, one from SMBC AC), six A321s (four owned, two from CDB Aviation), 16 A320s (eight owned, four from Vermillion Aviation, two from Carlyle Aviation Partners and one each from JP Lease and Standard Chartered) and five A320neos from SMBC AC.

Undiminished appetite

DAE Capital is eyeing another large lessor purchase after failing to reach acceptable terms with either Boeing or Airbus for new narrowbodies, DAE Capital chief executive officer Firoz Tarapore tells **Dominic Lalk**.

There is no stopping DAE Capital chief executive officer Firoz Tarapore. Hailing from a global financial institution where he was managing director and head of corporate finance and treasury, Tarapore tells *Airfinance Journal* that "capital is not a limiting factor" in the lessor's evaluation of suitable takeover targets.

"We are looking for the right combination of key factors – the ability to build scale and relevance, the price of that opportunity and whether the platform brings attractive assets, order positions, or unique platform value," says Tarapore.

"We have demonstrated a strong capability to integrate leasing platforms through our successful merger with AWAS a couple of years ago and so we may be better able to leverage our acquisition and merger skills than some others," he adds.

DAE's 2017 purchase of Irish lessor AWAS more than tripled the size of the Dubai-based lessor's fleet, although there has been little change in its portfolio size since.

That could change very quickly if DAE finds an amicable acquisition target. Tarapore tells *Airfinance Journal* that another giant takeover similar to AWAS could be on the cards.

"Our balance sheet strength allows us to evaluate opportunities regardless of size. We could easily do a transaction today that is at least as sizeable as AWAS was in 2017 when we acquired it. Liquidity is not a limiting factor," says Tarapore.

Apart from outright mergers and acquisitions, DAE Capital continues to evaluate individual portfolio acquisitions.

"We have a strong trading platform which is constantly evaluating the market for opportunities to acquire portfolios. We have a unique franchise that allows us to seamlessly acquire across the gamut of available assets – from brand new, new technology assets to mid-life or older assets, from narrowbody to widebody aircraft, to ATR72-600s. We are active," says Tarapore.

"Our decision to use the ABS [asset-backed securities] markets as part of a turnkey solution for asset sales works independently from our decision to acquire assets. We have signalled to the market that we are likely to come to the market with at least one ABS transaction every year. That is still on track," he adds.

Last October, DAE launched a $514 million ABS. This came 10 months after its Kestrel 2018-1 $379 million issuance.

Falcon 2019-1 Aerospace (Falcon Cayman) and Falcon 2019-1 Aerospace USA (Falcon 2019-1 USA) have issued three-tranche notes, the proceeds of which were used to acquire 23 aircraft on lease to 17 airline customers.

The $404 million A-series notes feature a 66% loan-to-value (LTV). The $73.47 million B-series notes have a 78% LTV. The $36.74 million C-series notes have an 84% LTV. The series-A notes and the series-B notes amortise on a 13-year straight-line schedule and the series-C notes amortise on a seven-year straight-line schedule.

As of 31 August 2019, the initial weighted average aircraft age of the portfolio was about 10.4 years with a weighted average remaining lease term of about 4.5 years. The portfolio consists of 20 narrowbody aircraft (65.5% by value) and three Airbus A330-300 widebodies (34.5% by value). All aircraft were owned by DAE.

The weighted average remaining initial lease term of about 4.5 years was the same as the previous DAE-sponsored aircraft ABS transaction (Kestrel 2018-1) and comparable to other recent mid-life aircraft ABS transactions.

This was the fourth term securitisation of aircraft managed by DAE, which acts as servicer for Falcon 2019-1. In February 2017, the lessor issued Falcon 2017-1, while it manages AWAS's Diamond Head Aviation 2015 $261 million transaction.

Separately, in September, DAE signed a $300 million seven-year unsecured term loan with a group of six banks, taking the firm's long-term liquidity raised in the past 18 months to $3.5 billion. The firm says the new loan will be used to repay secured debt and support the future financing needs of the business.

Furthermore, that same month DAE received a $1.4 billion investment mandate to source and manage aircraft on behalf of a financial institution. Under the deal, DAE will acquire the assets, while DAE's Aircraft Investor Services (AIS) platform will manage them on behalf of the investor.

The lessor will also assist the investor with the capital structure for the acquired aircraft, and the mandate will target primarily used narrowbody and widebody aircraft sourced through DAE's global relationships in secondary-market trading and sale and leaseback channels.

The addition of this mandate will bring DAE's managed portfolio to more than $2.7 billion of assets. Coupled with other ongoing projects, DAE expects its managed portfolio to grow to its target of $5 billion.

For the nine months ended 30 September 2019, DAE reported a $260.5 million net profit, down from $290.5 million in 2018. Total revenues were flat year-on-year at $1.07 billion.

DAE's unsecured debt ratio reached 57% in the second quarter, and during the third-quarter briefing Tarapore said this had grown to "almost 60%". This compares with just 26% at 30 June 2018.

Asked about his comfort level with unsecured debt, he added: "Increasing the portion of unsecured debt and maintaining these higher levels is a key component of our overall financing strategy. You should expect this number to increase in the near and medium term. Some of our assets, such as 35-year life assets or assets with very long first leases, are not candidates for unsecured funding but, other than that, most of our funding is unsecured."

DAE Capital's undiminished appetite for mergers, acquisitions and portfolio purchases was born out of necessity after the lessor failed to grow organically through direct orders with Airbus and Boeing because of pricing disagreements.

"DAE expects to eventually be a significant lessor of Airbus A320neo and Boeing 737 Max aircraft. To date, however, DAE has avoided significant exposure to these assets largely because we felt the economics were not justified. Both Airbus and Boeing priced their new-technology narrowbody assets at a significant premium to the aircraft being replaced. DAE does not believe the premium being demanded is justified. DAE ultimately expects to have good opportunities to invest at the right price in the future," says Tarapore.

At 30 September 2019, the lessor's fleet included 301 owned and 51 managed aircraft. Of those, 60 aircraft were widebodies. They comprise 27 A330s (15 -200s and 12 -300s), four A350-900s, 12 787s, 14 777-300ERs and three 767-300ERs. Tarapore is comfortable with this ratio.

"Widebody passenger aircraft represent between 25% and 30% of our portfolio value. We are comfortable with this range. As we migrate out of current-technology widebody assets, we will add 787s and A350s," he says.

For the past 12 months, industry leaders have been bemoaning fast-declining A330 asset values. Tarapore, surprisingly, does not view this as an issue.

"We have been active in the secondary placement market for the A330 for several years. We have had no difficulty in placing A330 assets at a wide variety of airline business models. The A330 market is still a highly liquid market and we would expect it to remain so," says Tarapore.

DAE Capital leases its 27 A330s to Air Leisure, Air Transat, Asiana Airlines, Brussels Airlines, Garuda Indonesia, Hong Kong Airlines, I Fly, Philippine Airlines, Qantas Airways, Singapore Airlines, Thai AirAsia X and Turkish Airlines.

It is expected that a large number of A330s will come off their lease terms over the next two to three years, further eroding already fickle yields that started coming under pressure as more A350s and especially A330neos entered the market.

"The A330neo is an interesting asset offering. The price of the aircraft is attractive; however, the market is still very small. For now, the A330neo is more of a niche asset. Over time, as the A330 fleet ages, and if Boeing decides not to launch their New Middle Market aircraft (NMA) offering, the A330neo could start to build significant market share," says Tarapore.

Apart from the 60 widebodies and 56 ATR72-600 turboprops, the vast majority of the more than 300 aircraft in DAE's portfolio are A320-family and 737 next generation (NG) aircraft.

Echoing his industry peers, Tarapore tells *Airfinance Journal* that 737NGs continue to be in extremely high demand.

"The NG continues to lease very well. We do not have any real near-term availability. We believe the NG market prices are holding up well. As the Max eventually comes back into the system we would expect some decline in NG lease rates; however, the reliability and known maintenance costs of the NG are highly attractive and therefore we expect demand for the NG to remain relatively robust going forward," says Tarapore.

Airbus's A220 programme or Embraer's E-Jets are not on DAE's radar despite its 56 – albeit smaller – ATRs. "We have not generally found the 100- to 150-seat market to offer good risk-adjusted returns. As a result, the A220 is not on our target list," he reveals.

Quizzed about the ongoing US-China trade war and DAE's exposure to cash-strapped HNA Group, Tarapore remains unfazed.

"We do have exposure to a few airlines in the HNA Group. Overall, we note that many of the HNA airlines have relatively strong business franchises; as a result, we don't think that all HNA airlines will necessarily be equally affected by problems at the HNA Group level. We would not be surprised if one or two of the HNA carriers have serious difficulties or end up ceasing to trade but we believe the majority of the HNA carriers will be able to leverage their strong business positions to find a route to future success," says Tarapore.

DAE has exposure to the HNA stable of airlines with five aircraft – two A330-300s with Hong Kong Airlines, two 787-9s with Hainan Airlines and an A320 with West Air. The Hong Kong carrier is under immense pressure to remain in business after shedding its entire long-haul network and grounding the majority of its widebody fleet, including all but two A350s. Parent Hainan continues to keep about 10 787-9s because of a cash crunch and overordering.

"We believe that many of the smaller leasing platforms are not likely to withstand the test of a downturn where market presence and speed will be critical to transitioning and placing assets."

Firoz Tarapore, chief executive officer, DAE

"We watch the global macroeconomic situation closely. So far, the main effects of the trade war appear to be on traffic between the US and China where airlines are cutting capacity. Having said that, most of this capacity appears to be being absorbed elsewhere," says Tarapore.

He agrees with the prediction that there will be increased lessor consolidation and more airline bankruptcies in 2020.

"We believe that many of the smaller platforms are not likely to withstand the test of a downturn where market presence and speed will be critical to transitioning and placing assets. We would expect many of these smaller platform owners to look to build scale in mergers or to be acquired by a larger lessor in the future," says Tarapore.

Equally, he predicts that more airlines will go belly up this year. "With global airline deregulation continuing to take hold and new business models being tested, we would expect to see similar levels of airline failures as we've seen recently," says Tarapore.

In 2019, the industry witnessed many liquidations. These included Jet Airways, Wow Air, Thomas Cook Airlines, Primera Air, XL Airways, Aigle Azur, Adria Airways and Germania.

The **multi-tasker**

SMBC Aviation Capital's David Swan tells *Airfinance Journal* why aviation leasing has been such a passion for 28 years, and about the work that needs to be done to take the industry forward.

With the changing world of work, not many millennials will be able to boast about working in one industry with only two companies over a career spanning 28 years. However, such is the dynamic nature of aircraft leasing that it encouraged David Swan to build a long-term career in the industry.

"I have a real sense of pride, being involved from the early days and working with so many talented individuals to help build and create what is now the global centre for aircraft leasing."

As chief operating officer (COO) of SMBC Aviation Capital, and also as chair of industry representative body, Aircraft Leasing Ireland (ALI), he is now focusing his energy into "giving back and driving positive change".

His ISTAT mandate was unique: he was the first Irish person to serve on the board of ISTAT when he was elected in 2011. "Given that Ireland had been the global centre of the aircraft leasing industry for decades, it was strange that there had never been an Irish person on the board," he says in an interview with *Airfinance Journal*.

His mission was to internationalise the association and broaden its membership and that has been successful. ISTAT's membership has doubled since 2011 to more than 5,000, with most of the growth in Europe, the Middle East and Africa (EMEA) and Asia.

Today, he still works with the organisation. He is chair of the humanitarian committee of the ISTAT Foundation which donates more than $200,000 annually to aviation-related causes. He was also instrumental in the original evolution and design of the ISTAT PDP education initiative.

Initially a banker with KBC, Swan spent the early part of his career knee deep in restructurings such as GPA. "I learned some valuable lessons in those early workouts which have really helped me over the years," he admits.

"In the case of GPA, it was about growing too quickly while not accessing enough diverse funding to keep up with balance sheet commitments."

He also worked through the collapse of United Aviation Services, a Middle-Eastern lessor which ceased operations after the first Gulf War. "KBC Bank got stuck with an Airbus A310-200 aircraft, a very difficult aircraft to remarket. I learnt first-hand the pitfalls of financing unique aircraft types."

In 1996, he was seconded to Hong Kong, just before the handover to China, to set up KBC's aviation and project finance business in the region, making many long-time industry friends such as Robert Martin, chief executive officer (CEO) of BOC Aviation, who was then at HSBC, and Jose Abramovici, then regional head at Credit Lyonnais (now Credit Agricole-CIB).

Returning in 2001, he assumed the role of global head of aviation at KBC but soon followed a former colleague, Peter Barrett, in 2002 to the fledgling RBS Aviation Capital and has worked with Barrett ever since. Initially as a marketing dealmaker, he helped grow RBS's EMEA business (he convinced Ryanair to lease their first aircraft) before being promoted to the role of COO in 2004. The company was acquired by Japan's SMBC and Sumitomo Corporation in 2012 and continues to thrive as one of the leading industry players.

Beyond his day job, Swan has become a prominent figure in initiatives aimed at supporting the global leasing industry as a whole.

He was the founder and inaugural chair of Aircraft Leasing Ireland (ALI) and was appointed to the executive board of Financial Services Ireland in 2017.

The desire to give the industry a united voice and avoid uncoordinated action on regulatory issues in the future was a major motivation behind Swan's efforts to bring the leasing community in Ireland together to establish its own dedicated industry body.

"What frustrated me was that while Ireland had been the centre of aircraft leasing for decades, there was no coordinated voice for this high-growth global industry, no IATA [International Air Transport Association] for lessors," he says. "My wife is also involved in the industry as an aircraft trader with Aircastle.

"I have a real sense of pride, being involved from the early days and working with so many talented individuals."

David Swan, chief operating officer, SMBC Aviation Capital

We have three sons and like many colleagues across the industry, I want to ensure that the industry continues to thrive here, providing great career opportunities across several disciplines. Complacency by the Irish government would be a tragedy."

The frustration led him to do something and he saw an overwhelming need to work with the Irish government to do more collectively to support and promote Ireland as the leading global centre for aircraft leasing.

"Irish lessors own and/or manage 65% of the global leased fleet and that has to be fostered by government initiatives and education programmes," he says.

Declan Kelly, the chief commercial officer of GECAS, Patrick Blaney, previously CEO of GPA, PwC's Yvonne Thompson and Tom Woods of KPMG all came on board to support the initiative.

"We had the same views and decided to use Ireland's biggest lobby group, IBEC, to get this initiative off the ground with the support of the minister of finance."

The Irish government also appointed Swan in 2018 to the IFS2025 industry advisory committee to support its financial services strategy into the next decade.

ALI's number of members has grown to 35 from 11 initially and all major lessors are now members.

While ALI was set up primarily as a body to represent the sector on regulatory issues, Swan has broader aspirations for the association.

He believes it can be a driver for education to train the next generation of lessors, encourage the wider adoption by the sector of technology and push for greater diversity and inclusion within the sector. The environment and sustainability will also be a critical area for action over the coming years.

Swan will pass the baton on next year. GECAS's Kelly will take over for a two-year period next summer and Orix's chief financial officer, Marie-Louise Kelly, will be the vice-chair of ALI. She will then be the face of the Irish-based aircraft leasing industry from 2022 to 2024.

GATS for technology change

On the edge of the *Airfinance Journal*'s Dublin conference in January 2017, Swan gathered a group of prominent players in aircraft finance in the SMBC Aviation Capital offices.

The brainstorming session included BOC Aviation's David Walton, GECAS's John Ludden, Milbank's Drew Fine, Goldman Sachs's Greg Lee, KPMG's Woods and Jeffrey Wool of Aviation Working Group (AWG).

The idea was to find a more efficient and more modern way of trading and financing aircraft via an electronic platform. The result was the creation of the Global Aircraft Trading System (GATS), a fully electronic system for buying and selling aircraft and engines on lease, created by AWG.

> *"The leasing industry still functions in quite an old-fashioned 'paper-based' way."*
>
> **David Swan**, chief operating officer, SMBC Aviation Capital

It took about two years to get full industry buy-in to the concept, agree the basic documents and platform design.

"That was the difficult stage and I have to hand it to Jeffrey Wool in leading that process with AWG's lessor, OEM [original equipment manufacturer] and bank members. There is now real momentum to do things differently in an industry that has operated in largely the same way for nearly 40 years. This is a big achievement," says Swan.

"The leasing industry still functions in quite an old-fashioned 'paper-based' way. It has not really evolved to keep pace with the sheer volume of transactions of this multibillion-dollar industry.

"There is still lots of room for innovation in the industry but trading is probably the most inefficient area. An aircraft might be traded five or six times during its lifetime. It can often take five to nine months after an LOI [letter of intent] is signed to exchange funds, particularly because we don't have standardised documents and we have to go through a novation process. All of which is very impactful on our airline customers as they need to have ancillary documents re-certified, re-agreed and re-signed off at different board meetings."

What's new? "Standardised documents have now been agreed by all AWG lessors, OEM and bank members and everything can be done online in much less time," he says.

"We will be using an electronic exchange developed by Fexco, an Irish financial services company, which will be launched in the second quarter of 2020. All documents for a GATS trade will be executed and delivered online, with e-signatures, and once the conditions are met, the airline will only have to tick the 'yes' box," adds Swan.

GATS will allow big savings of time because transaction timeframes can be reduced from five to nine months to a couple of weeks, as well as big savings on legal fees, Swan highlights.

He also praises the impact the system will have on the customer: the airline. "GATS allows the same airline controls and rights as before but essentially it will be a quicker process. It will involve less work by our lessees, effectively this will be limited to reviewing that the conditions initially agreed have been met. Many ancillary documents will not have to be re-done."

SMBC Aviation Capital has already agreed quite a number of leases in a GATS compliant structure. "We were the first lessor to have signed GATS compliant leases; for instance, our recently announced deal with Scoot for six Airbus A321neo aircraft is GATS compliant," he says.

A key factor in the success of GATS will be gaining the support of potentially sceptical airlines.

But Swan emphasises that the AWG members have been talking to airlines from the start. "We have been working with a panel of leading airlines for over 18 months to get their input and support. Each of the lessor members of the AWG has been speaking with their lessees promoting the initiative as a way to reduce the impact of increased aircraft trading, particularly with so many ABS [asset-backed securities] deals recently."

He concedes that the real acceptance and understanding of GATS from the airline community will only come after a few trades happen.

"Like with any new systems, there will be some tweaks. It will evolve but it is a start. The key message to get across is the way aircraft trading is done today is unsustainable. Change and innovation is vital for our industry."

What's next on the horizon?

Swan was recently appointed to the board of SMBC Aviation Capital's sister company SMBC Aero Engine Lease and looks forward to the growth opportunities that exist for this business.

Elsewhere, he continues to see other opportunities for continued positive change in aircraft leasing. "This is an industry that is only starting to embrace technology," and he believes that there is a lot more to come in terms of innovation.

It is also an industry that has been slow, like many others, to deliver change in diversity patterns. "We need like many others to embrace change in this area to encourage more females and more cultural diversity at senior levels at the very top of organisations and to ensure that this is prioritised within the industry. Not just because it's the right thing to do but because it will be good for business."

Finally, he believes the industry also has more to do in terms of its approach to climate change and that each company and the industry body, ALI, has its role to play in this.

"This is where the challenges lie for the future. The executives who built this industry into what it is today now need to show leadership to respond and to proactively address these very challenging issues. That is how we can continue to develop an industry that is robust for future generations."

As a multi-tasker, there is no doubt that Swan will continue to be at the centre of this positive change.

Singapore-on-Thames?

Could Brexit spur the UK's insurance market to invest further in aircraft financing or undermine it? **Oliver Clark** finds out.

The Conservative Party's resounding victory in the UK general election in December means the country's departure from the European Union (EU) seems all but assured.

But what is far from clear at this stage is what course the UK will take after Brexit, and the effect it will have on the powerhouse of its economy – the City of London.

In a speech at the party's conference last October, Boris Johnson, the prime minister, said Brexit offers the chance to create an "economic platform for dynamic free market capitalism", but details of what this will entail (with a deal or without a deal) – beyond a desire to sign free-trade deals with partners such the EU and USA – are scant.

Some European leaders fear that the UK could drift out of regulatory alignment with the EU bloc and seek to turn itself into a low tax, light regulation rival right on its doorstep, a "Singapore-on-Thames" as it has been described.

Equally, the status of the City as Europe's premiere financial hub could be damaged or undermined if investors and banks decide to move their cash and operations to continental rivals. Concern over passporting arrangements has already led some banks to relocate staff and operations out of the UK.

So will Brexit encourage UK insurers to move further into the aircraft finance space?

"While Brexit will have implications for all institutions that are working within Europe, I do believe that the entrepreneurial spirit of the insurers and the fact that aircraft are a global market will not meaningfully change the energy that is being applied in the evolution of aircraft finance," BGC Insurance managing partner Kostya Zolotusky tells *Airfinance Journal*.

"The overall requirement for aircraft finance over the next five years – for new and used aircraft – is about $1 trillion. The insurance industry participation in this is currently miniscule because that market is just starting to get a taste of that opportunity. How quickly it evolves will depend on that entrepreneurial spirit and the efficiency of pricing," he says.

Zolotusky says insurers come well behind commercial bank debt, the capital markets, export credit agencies or tax products in terms of their participation in aircraft financing.

In essence, the insurance market participates in aircraft finance in three ways. First, as a provider of debt and equity using the asset side of their balance sheets, investing in lessor equity, and buying enhanced equipment trust certificates, asset-backed securitisations and lessor debt.

Second, the insurers are using the liability side of their balance sheets to provide capital relief to banks which originate aircraft debt transactions by providing non-payment insurance for their aircraft deals.

The third approach, says Zolotusky, is also using the liability side of insurers' balance sheets to evaluate, originate and manage aircraft financing risk. This is through products such as Aircraft Finance Insurance Consortium (AFIC), in which Zolotusky had a key role in developing in his former role as managing director of Boeing Capital.

He points out that London-based insurers such as Fidelis and Endurance (which became part of Sompo International in 2017) played an important part in developing AFIC.

So far, Zolotusky says it is the "nimble" small insurers which have been most active. He expects them to establish an important market position over time, but this first mover advantage will not go on forever.

"There is no question in my mind that the big guys will come in as this market matures," he says.

Miria Whittle, manager, insurance, at EY, says that the liquid nature of aviation assets and the yield profile could spur greater interest in air finance among insurers over the coming years.

"We've increasingly seen insurers branch out into less traditional asset classes in search of yield. For the past seven years, this has been focused on illiquid assets such as infrastructure and commercial real estate debt," she says.

"Given the increase in volume of illiquid assets required to invest the large amount of annuity premiums being collected by insurers, many have been widening the envelope of illiquid assets being considered. Aviation finance could be an interesting opportunity for insurers due to the potential to access an investment-grade, long-term, stable income stream with significant collateral backing," she adds.

The "fungibility" of the collateral and the additional protection provided by the regulatory and operational environment – for instance, through agreements such as the Cape Town Convention – could prove attractive for insurers, believes Whittle.

However, the reliance of the repayment of the debt on the residual value of the aircraft might be considered to be a more challenging part of the investment for insurers to understand, she adds.

Whittle says that annuity writers are likely to be particularly interested in where it can be demonstrated that the asset meets the solvency II matching adjustment eligibility, thereby reducing the value of the liabilities that the assets back.

To meet the eligibility criteria, an insurer would need to demonstrate that, among other things, the asset provides fixed cash flows.

Whittle adds: "As a result, annuity writers are more likely to favour aviation debt (though equity may be considered for other areas of the balance sheet). We would note that aviation debt may need to go through a similar evolution to, for example, social housing debt whereby the nature of the borrowing changes from bank-friendly terms to insurance-friendly terms."

Assessing the role that Brexit will play in this dynamic is hard to gauge, says Whittle.

"It's very difficult to know at this stage, but Brexit is of course impacting insurer appetite, and certainty around how we will leave the EU will be welcome when it comes," she says.

But an asset-class specialist source in one of the largest UK insurer's annuity fund investment teams tells *Airfinance Journal* that the opportunities to participate in aircraft financing may not be as rosy as they may appear.

"We have seen financial metrics that are not as attractive as I would have hoped for under the asset class. The spreads we have seen on BBB assets would be in the order of 160 basis points and for that, given the risks associated with that asset class, it doesn't make sense at the moment to enter into that asset class," he says.

The source adds that the implementation of Basel IV is expected to open up a "massive market" for insurers into the future.

> *"It's very difficult to know at this stage, but Brexit is of course impacting insurer appetite, and certainty around how we will leave the EU will be welcome when it comes."*
>
> **Miria Whittle**, manager, insurance, EY

"That is why we keep it closely on the radar just to see if that is going to open up significant volume with increased spread as banks try to offload some of the debt financing on their balance sheet," he says.

Beyond the unfavourable metrics, the source says a key risk for insurers was the environmental, social and governance considerations. "Franchise risk", essentially the potential for an asset class to damage the brand or reputation, is also a factor.

For example, aviation's carbon footprint could be jarring for an insurer keen to develop its sustainability credentials. But the source says many insurers already invest in airport infrastructure, so aircraft could be a natural progression.

"So it's a bit of Catch-22. When you fund infrastructure in airports but you don't want to fund aircraft, and I know that is a big debate us as well as other insurers are having at the moment, to understand what the risks associated are and how to address those. I think if we were to go down the aircraft financing route we would probably partner with a large player to give us security in terms of expertise in the sector."

Assuming appetite among the UK insurers for airfinance develops, how big could their participation be?

"Almost impossible to guess. If you look today at how big the insurance industry is, their participation in aircraft finance doesn't even make a speck relative to the overall mountain of scope that the insurance markets cover – so unlimited for all practical purposes," says BGC Insurance's Zolotusky.

"So the question is: how efficient other markets for aircraft finance are relative to the efficiencies that will be able to be achieved by growing and maturing the insurance market participation.

"Today," he says, "you only have a handful of insurers that are participating in that space and, as you expand to a broader set of insurance companies and start developing the reinsurance market, the capacity is quite large."

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AIRFINANCE JOURNAL

A321LR/XLR – accessing new markets

With a further increase of the A321's range, Airbus hopes to extend the single-aisle aircraft's appeal, writes **Geoff Hearn**.

The Airbus A321neo is becoming the most popular model in the A320 new engine option family. The largest member of the range garnered close to 500 orders in 2019 compared with about 300 for the baseline A320neo model. Sales of the A321neo have been helped by the addition of longer-range models – the A321LR and A321XLR.

The manufacturer suggests the long-range variants can tap into new long-haul markets, which were not previously accessible with single-aisle aircraft.

Carriers such as American Airlines are ordering the aircraft to replace ageing Boeing 757s, which have previously offered the best payload-range capability of any single-aisle aircraft. What is more questionable is how far the new Airbus models can replace 767s, which form part of the so-called middle-of-the-market (MoM) requirement (*see box on following page*).

A321LR

The A321LR variant provides extended range for the A320neo family's longest fuselage version with the capability to operate sectors of up to 4,000 nautical miles (7,400km) with 206 passengers. The additional range is achieved by increasing the maximum take-off weight (MTOW) to 97 tonnes and by augmenting the fuel capacity with three additional centre fuel tanks.

The A321LR can operate transatlantic routes and, reflecting this, the manufacturer offers interior and seating layouts that facilitate operations on much longer routes than are the norm for single-aisle aircraft. These new layouts are offered in conjunction with the Airbus cabin flex (ACF) version of the A321neo, which was rolled out in January 2018.

The European Aviation Safety Agency and the US Federal Aviation Administration certified the A321LR's long-range capability in October 2018. The first A321LR was delivered to launch customer Arkia Israeli Airlines the following month.

A321XLR

The A321XLR is a further variant that was launched at the Paris air show in 2019 and has been ordered by several airlines – notably by four US carriers. The latest

Entry into service of the A321XLR is planned for 2023

US carrier to place an order was United Airlines, which is a significant development because the carrier had been holding out with a view to purchasing the muted Boeing MoM solution.

The XLR has a range of about 4,700 nautical miles and offers about a 30% reduction in fuel burn compared with the 757 model, according to the manufacturer. The XLR has a further increased MTOW of 101 tonnes, and is fitted with a rear centre fuel tank and an optional forward additional centre tank. Other significant changes include structural reinforcements and a modified landing gear, enhanced braking capability, higher tyre speed, and additional flap and slat configurations. Airbus is targeting 2023 for the XLR's entry into service.

Views on values

Oriel

Olga Razzhivina, senior ISTAT appraiser

The A321neo is the largest member of Airbus's single-aisle Neo family and entered service in 2017. The A321LR Neo version was the original long-range option designed to operate sectors up to 4,000 nautical miles. The XLR is a later development to increase the A321neo's range further.

Like other members of the Neo family, the A321 is offered with either LEAP-1A engines by CFM International or PW1100Gs by Pratt & Whitney. Dual engine suppliers can be seen as a negative, because the fleet is split – potentially reducing remarketability. Such a split is arguably one of the factors contributing to values of previous-generation A320s performing less well than those of the competing single-engine source 737-800. However, in large fleets multiple engine choice should not be a problem provided all variants are delivered in substantial numbers.

Single-source powerplant supply also carries risks if, for example, the engine experiences technical issues. Both Neo engine options continue to have entry into service problems, but the Pratt & Whitney engine seems to have more than its share. In the light of these problems, many customers have been delaying their engine selection decision. The LEAP-powered version is winning the sales battle, but the orderbook is very dynamic and Pratt & Whitney could regain market share, which is important in determining market values of the respective aircraft variants.

The LR and XLR versions of the A321 offer their extended range capability through different solutions. The originally announced LR requires installation of auxiliary tanks, which are removable. Thus, the aircraft can be converted into a baseline A321neo with only a small operating empty weight (OEW) penalty from the auxiliary tank provisions. This, arguably, creates a more versatile aircraft deployable on short and long-haul routes with optimised configuration for each. While this option may improve remarketability, it does not provide airlines with all the range they are looking for.

To address the airlines' range demands, Airbus had to redesign the auxiliary tanks with a larger fixed rear centre tank – which is the solution used on the XLR variant. The aircraft still requires an optional removable auxiliary fuel tank to reach the maximum advertised range of 4,700 nautical miles. Although it is still viable to operate the XLR on shorter routes, there is a penalty to the OEW, which has cost and performance implications.

The A321neo's new range capabilities are likely to offer airlines new opportunities in lower density markets. Despite only being available from 2023, more than 80 orders have already been switched to the

XLR. In Oriel's view, this more capable A321XLR version is likely to prove the more popular of the two long range offerings.

Collateral Verifications (CV)

Gueric Dechavanne, vice-president, commercial aviation services

The A321LR and XLR have gotten off to a good start and already account for almost 20% of the backlog for Airbus's largest single-aisle model. Although similar in some aspects, the two variants offer capabilities that provide different advantages to potential purchasers. The A321LR offers operators about 700 nautical miles more range in a three-class layout over the baseline A320neo, while the A321XLR offers a further range extension in the same seating configuration. These differing capabilities will appeal to operators with varying requirements. For operators which have a need for its maximum range capability, the XLR will be the aircraft of choice. However, that choice comes at a price, with about a $6 million premium over the baseline A321neo. From an operator's perspective, the A321XLR could be attractive for its additional range, but, as an investor/lessor, the XLR could be viewed as an asset that it is suitable only for specific markets.

The fact that the aircraft cannot be converted back to a baseline A321neo or A321LR, because of the additional modifications required to obtain the extra range, could have an impact on the marketability of used aircraft to secondary operators in the long term.

The additional MTOW may also deter operators which are more sensitive to landing fees. However, the various options now offered by Airbus, from the baseline A321neo to the XLR, should fulfil most market requirements. Adding to this the benefit of the commonality to other A320-family members, the long-term success of the programme looks assured.

A321XLR customers

Customer	Backlog
Air Arabia	20
Air Asia X	30
ALC	27
American Airlines	50
Cebu Pacific	10
Sky Airline	10
Czech Airlines	3
Flynas	10
GECAS	20
IAG	14
Indigo Partners	50
Jetblue Airways	13
Middle East Airlines	4
Qantas	36
Saudi Arabian Airlines	15
United Airlines	50
Vietjet Air	20

Source: Manufacturer announcements

A321 squeezes MoM

Industry insiders have long held the view that the Airbus A321 does not fulfil all of the requirements of the perceived size/range gap in the middle of the market (MoM) for commercial aircraft. This led to a conclusion that there was an opportunity for Boeing to launch an all-new model targeted at a segment that is mainly served by ageing Boeing 757s and 767s. The consensus has been that the A321 did not really have the capability to match the 757's payload range let alone act as a genuine replacement for the 767. However, the latest long-range iteration of the A321 (designated as the XLR) does look like a more genuine replacement for the 757, if not for the 767.

The size of the 767-replacement market is, however, a matter of debate. Some analysts have pointed out that if there is a substantial demand for a 767-sized aircraft, it seems odd that the A330-800 has failed to attract many orders and that the 787-8 is being outsold by larger members of the 787 family. The old engineering adage that shrunk aircraft are inefficient and uneconomic hardly applies in the case of the A330-800 and is even less justified for the baseline 787 model.

Oliver Stuart-Menteth, managing director, Fintech Aviation Services, believes the apparent lack of demand for the new smaller twin-aisle aircraft could be partially explained by the availability

The size of the Boeing 767 replacement market is a matter of debate

in the secondary market of good-quality widebodies. He questions: "If you can get an eight-year-old A330-200, that fulfils most if not all of your requirements, for between $230,000 and $250,000 per month, why would you go for a new 787-8 or A330-800 – both of which have much higher capital costs?"

Boeing suggests there is a gap both in its own product line and that of the competing Airbus models and has been touting its new mid-market aircraft (NMA) as a solution to potential customers. Whether Boeing believes there is a sufficiently large market might be open to question given the lack of a firm go-ahead for the NMA (presumably as the 797).

The line from Airbus is that there is little or no requirement for an aircraft to fill the MoM given that the A321LR/XLR covers the market up to 240 seats and flies 4,700 nautical miles, while the A330-800 starts at 250 seats and flies more than 7,000 nautical miles. One problem with the Airbus argument is that the seating figures quoted are not for equivalent layouts.

Determining equivalent seating capacities is a complex process and is influenced by operator requirements, but there is probably a gap of about 100 seats between the A321/737 Max 10 and the 787/A330-800 if the respective aircraft are equipped with equivalent long-haul configurations.

The most recent order for the A321XLR by United Airlines in December may have changed the market dynamics. United has been considering the A321XLR, among other options, to replace the 757 for some time. However, it is believed to have been holding back in the hope that it might be offered an aircraft that covers both its 757 and 767 replacement requirements. When the A321XLR was launched at the Paris air show, United's chief financial officer, Gerry Laderman, was reported as saying that the Airbus aircraft did not meet all of the airline's mid-market needs – namely providing a replacement for the larger 767, which has a high degree of commonality with the 757.

However, in the absence of Boeing offering the NMA, United has gone with the A321XLR, albeit that it has not ruled out ordering the Boeing aircraft should the US manufacturer launch it.

The most recent Airbus success may not be terminal for Boeing's new aircraft but it adds to the problems the US manufacturer is facing and to the tasks in front of its new chief executive officer.

Narrow margins between **widebody competitors**

Boeing and Airbus claim superior economics for the 787-10 and A350-900 respectively. **Geoff Hearn** looks at which manufacturer has the better case.

The number of orders for widebody aircraft is small compared with the huge backlogs in the single-aisle market (albeit with a cloud hanging over the 737 Max), but Airbus and Boeing are no less aggressive in seeking market share in the segment, with the competition between the Airbus A350-900 and Boeing 787-10 perhaps the most direct battle.

However, as is the case with most Boeing versus Airbus competitions, the models do not align exactly in seating and/or range. The A350-900 sits between the 787-9 and the 787-10 in seating, although the Airbus aircraft has greater range than either of the Boeing variants.

A350-900

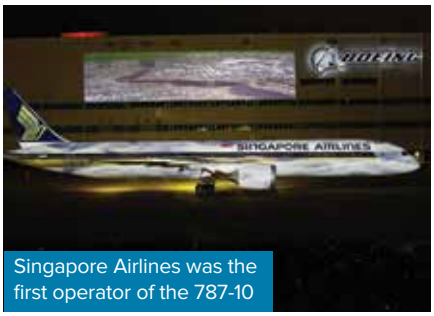
The A350-900 is a long-range, twin-engine, widebody aircraft. Although it was originally launched in 2004 with an improved A330 fuselage, comments from potential customers, especially lessors, persuaded Airbus to redesign and relaunch the A350 with a wider cabin cross-section. The manufacturer dubbed the redesigned models as XWB (extra widebody) variants.

The XWB family originally consisted of three variants: the A350-800, the A350-900 and the A350-1000. However, production of the A350-800 was cancelled as initial customers switched their orders to the larger A350-900, or the re-engined A330neo.

The A350-900 is designed to carry 325 passengers in a three-class cabin configuration with a maximum capacity of 440 in a single-class layout. The aircraft is powered by Rolls-Royce Trent XWB engines and has a range of about 8,100 nautical miles (15,000km).

The first A350-900 was delivered to launch customer Qatar Airways at the end of 2014 and entered service in January 2015.

In late 2017, Airbus introduced an aerodynamic performance improvement package, which provides 400 nautical miles of additional range and 1% lower fuel burn. The package includes a slightly higher winglet and a slight wing twist to optimise performance.



Singapore Airlines was the first operator of the 787-10

Qatar Airways received the first A350-900

787-10

The 787 was launched in April 2004 as the 7E7. The 787 family initially comprised three models, but the short-range 787-3 was dropped leaving the 787-8 and larger 787-9 as the two models on offer. Boeing subsequently launched the higher capacity 787-10 during the 2013 Paris air show.

The 787 was a radical departure from traditional commercial transport aircraft in terms of materials and systems architecture. Composites comprise about 50% of the primary structure of the 787 (including wing spars and floor beams) and reduce weight by about 20% compared with earlier airframe designs. The radical approach contributed to development delays and a troubled entry into service.

Like other members of the 787 family, the -10 offers a choice of two new-technology engines – the General Electric GEnx 1B and the Rolls-Royce Trent 1000 series – both delivering significantly improved fuel consumption and reduced noise and emissions compared with previous-generation engines. The 787-10 was the latest variant to be developed, entering service in 2018 with Singapore Airlines.

Leading characteristics

The A350 is the more capable aircraft in terms of seating and range but this comes at the expense of fuel burn. *Airfinance Journal* estimates that the Airbus model consumes about 5% more fuel on a typical operating sector than the 787-10 (and about 15% more than the 787-9).

How exactly this translates into fuel efficiency per seat is a matter of claim and counter claim by the respective manufacturers, but there is an industry consensus that the 787-10 leads the pack in fuel efficiency. If an airline does not need the extra range of an A350-900, the Boeing aircraft is a natural choice, but sales of the A350-900 would suggest that many airlines do require its additional capability.

Key data

A350-900 versus 787-9/10 models

Model	787-9	A350-900	787-10
Maximum seats	408	440	440
Typical seats two class	296	300-350	336
Typical range (nm)	7,530	8,100	6,345
Entry into service	2014	2015	2018
Delivered	502	293	44
Orders backlog	332	495	153
Orders in 2019	56	105	21

Source: Air Investor/*Airfinance Journal* Fleet Tracker plus additional research

Orders

Airbus targeted the A350-900 not only as a successor for its own A340-600, but also for the 777-200/-200ER market. Replacement of some A330-300s and A340-300s was also envisaged. The European manufacturer's strategy has had some success with a healthy number of orders for the XWB variants.

The A350-900 has a larger in-service fleet/order backlog than its direct competitor although, given the four years difference between their respective entries into service, this is unsurprising.

Taking the 787-9 orders into consideration puts a different perspective on things. The combined sales of the two members of the 787 family are about 30% higher than for the A350-900, but inclusion of figures for the A330-900 would restore parity.

Operating costs

Generalised comparisons of operating costs for aircraft of similar size and technology are sensitive to the assumptions used, and manufacturers are adept at using criteria that favour their respective aircraft. For example, Boeing says the 787-10 will deliver 25% better fuel per seat and emissions than the aircraft it will replace and a 10% improvement over the competition. However, it is not clear which competition is being referred to and on what assumptions the claim is based.

Making a fair comparison of widebody aircraft is even more difficult than it is for single-aisle competitors, not least because of the difficulties in determining equivalent seating capacities. To provide an independent view on the relative costs of the A350-900 and 787-9, *Airfinance Journal* has carried out its own analysis of operating costs based on information released by the manufacturers and on data assembled for Air Investor 2020.

There is little doubt from *Airfinance Journal*'s analysis that the 787-10 has a measurable advantage over the A350-900 both in terms of trip cost and cost per seat. In terms of cash cost per trip, the 787-10 has a 7% advantage over the A350-900, according to *Airfinance Jounal*'s analysis.

This advantage is increased to about 10% when looking at cost per seat but, as mentioned above, this is highly sensitive to assumptions on seating configurations. If capital costs are included in the analysis, the relative figures for the two types change only marginally – suggesting the manufacturers have pitched their list prices in line with the competition.

The caveat for these figures is that the A350-900 is a more capable aircraft in terms of capacity and range and this is reflected in higher leading weights – which, in turn, lead to higher operating costs.

Indicative relative cash operating costs (COC)

	787-9	A350-900	787-10
Relative trip cost	90%	Base	93%
Relative seat cost	99%	Base	90%

Indicative relative total direct operating costs (DOC)

	787-9	A350-900	787-10
Relative trip cost	85%	Base	94%
Relative seat cost	93%	Base	91%

Assumptions: 4,000 nautical mile sector; fuel price $1.80 per US gallon. Fuel consumption, speed, maintenance costs and typical seating layouts are as in Air Investor 2020. Capital costs based on estimated 2019 list prices.

Room for all

As with many of the Airbus versus Boeing battles, the outcome of the competition between the A350-900 and 787-10 may not be crucial to the respective companies. There is probably room for both models to succeed and even scope for airlines to buy some of each – although in such cases the 787-9 is probably a more likely choice than the 787-10. Lufthansa's March 2019 order for 20 787-9s and 20 A350-900s is an example of such a selection.

Lessors wary of widebodies

With about 8,000 deliveries forecast over the next 20 years, demand for widebody aircraft appears to be dwarfed by the requirement for single-aisle models, which is forecast to be about 30,000 aircraft over the same period. However, a more balanced picture emerges when the values of the respective markets are considered. The widebody deliveries are valued at about $2.6 trillion compared with about $3.8 trillion for the single-aisle aircraft.

Despite the value of the market, lessors remain wary of investing in widebody aircraft. Leased aircraft account for about 40% of the in-service commercial aircraft fleet, but the percentage is much lower for the widebody sector. Even for the more popular widebodies, such as the 787-9/-10 and the A350-900, leasing companies account on average for only 20% of orders. The concern for many lessors is the difficulty in placing widebodies in the secondary market and the consequent need to secure lease extensions with the current operator. This problem does not look likely to improve in the short term.

Aviation consultancy IBA has carried out a recent survey of leasing trends, which confirms that lease extensions are on the increase for narrowbodies, but that they are declining for widebody aircraft. The consultancy says that this reduction in widebody lease extensions will concern lessors, particularly for aircraft types that are difficult to place with new operators.

The 787-9 is relatively popular with lessors

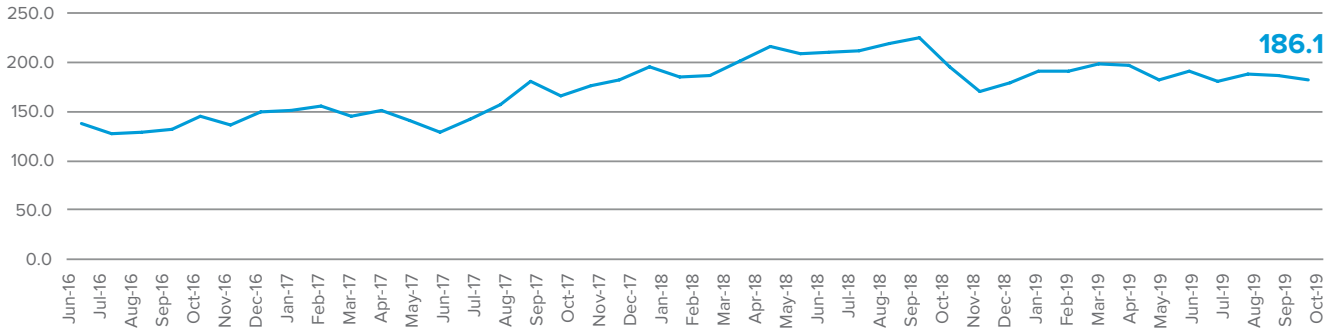
The consultancy adds: "Configuration of such widebodies to fulfill the next lessee's requirements poses a significant time and investment challenge. The situation is longstanding and we continue to be perplexed by original equipment manufacturers' failure to develop cheaper creative solutions for the secondary market."

Orders for new widebodies by leasing companies

Type	Leasing company orders	% of total orders
787-9	236	28
787-10	30	15
A350-900	150	19

Source: Airfinance Journal Fleet Tracker

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



Source: US Energy Information Administration

Commercial aircraft orders by manufacturer

	Gross orders 2019	Cancellations 2019	Net orders 2019	Net orders 2018
Airbus	1,131	363	768	747
Boeing (30 November)	243	327	-84	893
Bombardier	15	0	15	47
De Havilland of Canada	10	0	10	0
Embraer	55	0	55	47
ATR	43	0	43	52

Based on *Airfinance Journal* research and manufacturer announcements until 31/12/2019

Recent commercial aircraft orders (October-December 2019)

Customer	Country	Quantity/Type
Biman Bangladesh Airlines	Bangladesh	2 787
Czech Airlines	Czech Republic	4 A220-300
Sun Express	Germany	10 Max 8
Indigo Airlines	India	300 A320neo family aircraft
Vietjet Air	Vietnam	15 A321XLR
Cebu Pacific Airways	Philippines	16 A330neo
Emirates Airline	UAE	30 787-9
Emirates Airline	UAE	50 A350-900
Air Arabia	UAE	73 A320neo, 27 A321neo, 20 A321XLR
Easyjet	United Kingdom	12 A320neo family
Flynas	Saudi Arabia	10 A321XLR
GECAS	USA	12 A330neo, 20 A321XLR
United Airlines	USA	50 A321XLR
Sky Airline	Chile	10 A321XLR
Air France–KLM Group	France	60 A220-300
Congo Airways	Congo	2 E175
CIAF Leasing	Egypt	3 E190
Air Peace	Nigeria	3 E195-E2
KLM Cityhopper	Netherlands	6 E195-E2
United Republic of Tanzania	Tanzania	1 Dash 8-400s
Elin Group	Nigeria	3 Dash 8-400s
Air France KLM	France	10 A350s

Based on *Airfinance Journal* research up to 31/12/2019

Rating agency unsecured ratings

Airlines

	Fitch	Moody's	S&P
Aeroflot	BB(stable)	-	-
Air Canada	BB(stable)	Ba1(stable)	BB+(stable)
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	CCC+	-	B-(stable)
British Airways	BBB-(pos)	Baa3(pos)	BBB(stable)
Delta Air Lines	BBB-(stable)	Baa3(stable)	BBB-(stable)
Easyjet	-	Baa1(stable)	BBB+(stable)
Etihad Airways	A(stable)	-	-
GOL	B+(stable)	B1(stable)	B(stable)
Hawaiian Airlines	BB-(stable)	Ba3(stable)	BB-(stable)
Jetblue	BB(pos)	Ba1(stable)	BB(stable)
LATAM Airlines Group	BB-(stable)	Ba3(stable)	BB-(stable)
Lufthansa Group	-	Baa3(stable)	BBB(stable)
Qantas Airways	-	Baa2(stable)	-
Ryanair	BBB+(stable)	-	BBB+(stable)
SAS	-	B1(stable)	B+(stable)
Southwest Airlines	A-(stable)	A3(stable)	BBB+(stable)
Spirit Airlines	BB(neg)	-	BB-(stable)
Turkish Airlines	-	B1(neg)	B+(stable)
United Continental Holdings	BB(stable)	Ba2(stable)	BB(pos)
Virgin Australia	B+(stable)	B2(stable)	B+(stable)
Westjet	BB-(pos)	Ba3(stable)	B+(stable)
Wizz Air	BBB(stable)	Baa3(stable)	-

Source: Ratings Agencies - 10/01/2020

Lessors

	Fitch	Moody's	S&P	Kroll Bond Ratings
AerCap	BBB-(stable)	Baa3(pos)	BBB(stable)	-
Air Lease Corp	BBB(stable)	-	BBB(stable)	A-(stable)
Aircastle	BBB-(pos)	Baa3(stable)	BBB-(stable)	-
Avation PLC	BB-(stable)	-	BB-(stable)	-
Aviation Capital Group	BBB-(stable)	Baa2(stable)	BBB-(stable)	A-(stable)
Avolon Holdings Limited	BBB-(stable)	Baa3(stable)	BBB-(stable)	BBB+(stable)
AWAS Aviation Capital Limited	-	Ba2(stable)	BB+(stable)	-
BOC Aviation	A-(stable)	-	A-(stable)	-
CDB Aviation Lease & Finance	A+(stable)	A1(stable)	A(stable)	-
Dubai Aerospace Enterprise	BBB-(stable)	Ba1(stable)	BB+(stable)	BBB+(stable)
Fly Leasing	-	Ba3(pos)	BB(stable)	BBB(stable)
ILFC (Part of AerCap)	BBB-(stable)	Baa3(pos)	-	-
Park Aerospace Holdings	BBB-(stable)	Baa3(stable)	-	-
SMBC Aviation Capital	A-(stable)	-	A-(stable)	-

Source: Ratings Agencies - 10/01/2020

Manufacturers

	Fitch	Moody's	S&P
Airbus Group	A-(pos)	A2(stable)	A+(stable)
Boeing	A(neg)	A3(stable)	A-(developing)
Bombardier	B-(stable)	B3(stable)	B-(stable)
Embraer	BBB-(neg)	Ba1(stable)	BBB
Rolls-Royce	-	Baa2(stable)	BBB-(neg)
United Technologies	-	Baa1(stable)	BBB+

Source: Ratings Agencies - 10/01/2020

From everything being awesome to **changing times**

The world is in a volatile state, leaving aviation exposed, writes Adam Pilarski, senior vice president at Avitas.

A fairly short time ago I believed that the situation in aviation was expressed by a catchy and kitschy tune from *The Lego Movie* called *Everything is Awesome*. The world economy was humming along fine with the economic expansion approaching the longest timespan ever in recorded history. Airlines were making very respectable profits – actually raking the highest profits since the beginning of time. Airlines were purchasing aircraft at unprecedented levels – hence, deliveries of seats were the highest ever and backlogs were in the stratosphere. Anybody interested in adding capacity could order new deliveries but would have to wait for more than a decade.

The cyclicality of the industry, well documented throughout its history, seemed to be suspended and no longer relevant. Average annual traffic growth for the decade 2009-18 was 6.2%, well above the optimistic forecasts published by manufacturers for years of below 5%. Everything was indeed awesome for the industry and it appeared that the cyclicality we all dreaded seemed to have been replaced with a new, much happier reality.

Not everybody bought in to the idea that life had transformed dramatically and from now on everything would continue being awesome. The evidence though was very compelling. Everything was indeed awesome. Looking at the value of aircraft deliveries, it was obvious that things were different. Historical patterns showed that from the beginning of the jet era we have experienced cycles of seven to 10 years, including both the up and down part of the cycle. From 2004 to 2018, we witnessed a 14-year period of continuous growth with no sign of a downward part coming.

Some people, including yours truly, were concerned by certain factors. The tremendous growth was accompanied by clouds on the horizon. Part of the growth was coming from new players in the market in the Middle East and in China. There was nothing negative about this but worrying nonetheless because they did not appear to be driven by a pure profit motive and standard economic analysis but rather by government desire to develop the aviation leasing sector.

Our author at the *Airfinance Journal* Dublin 2019 conference.

> *Average annual traffic growth for the decade 2009-18 was 6.2%, well above the optimistic forecasts published by manufacturers for years of below 5%.*

Also, there were anecdotal stories from traditional lessors and airlines bemoaning the unreasonably low yields and their own inability to compete. I heard from many significant players that they could not understand how some airlines could make money with the existing ticket prices and from lessors the same with existing yields. There was speculation that there were simply too many aircraft produced, which then had to be leased out at very low rates and utilised by airlines using the added capacity to increase traffic via low ticket prices.

Some adjustments are already happening. The Middle East carriers are restructuring their fleets, replacing existing equipment with smaller units. A number of lessors were sold or are on the market. There are indications that some lessors, including the Chinese ones, are drastically reducing their growth. The bubble bursting did not happen as fast as I was predicting, partially because of manufacturing problems with aircraft and engine production. The unfortunate case of the Max grounding also slowed down the anticipated increase in supply and helped airlines retain higher yields than could be expected.

Brian Pearce, the chief economist of the International Air Transport Association stated that "clearly the environment today is very different from that expansion that we worked through over the past 10 years" with passenger traffic growing only marginally and cargo still falling. Airline profitability, which reached historically high levels, is dropping substantially. The US long expansion may enter recession, China is slowing down continuously and Europe may be on the brink of a recession. Trade wars continue, which not only hurts cargo but also passenger traffic. The world is more divided than ever before. In a recent election in Kentucky, the winning candidate won by less than 5,000 out of more than 1.4 million votes showing how polarised society is.

People do not see good options, not just in the USA but worldwide. Israel had two elections in a year and is getting ready for a third because its citizens are evenly split and do not like any choices. A similar situation happened in Bolivia where people seem to be polarised. In the UK, there were no outcomes that a large part of the population would embrace. The times when we voted for leaders who inspired us are gone. Today, the world goes for what is the least bad outcome.

There are dark clouds on the horizon, none conducive to trade, travel and cooperation. I am ready to replace the upbeat song of *Everything is Awesome* with the old classic *The Times They Are A-Changin'* by Nobel prize-winning poet Bob Dylan.

All this, of course, does not mean that aviation is a bad business. All the positives still exist with many good years awaiting us. But right now, indeed, the times they are a-changin'.

AIRFINANCE JOURNAL

An ***Airfinance Journal***

special supplement

Air Investor 2020

Airbus triumphs as Max takes a hit

A320neo family tops the charts in *Airfinance Journal*'s investors' poll.

It was a bad year for narrowbodies and, unsurprisingly, the 2019 investors' poll rating reflected the Boeing 737 Max situation at the US aircraft manufacturer.

On 17 December, Boeing opted to halt production temporarily, and while it may seem like a painful step for the embattled US manufacturer, appraisers are of the view that the decision was a logical, probably needed step, and should not have a major detrimental impact on the programme.

The question among those who took part in the survey was more of how big of a hit the Max family takes.

The Max 8 was the most impacted variant of the three-aircraft family and scored 3.73 points, versus 4.32 in the 2018 poll. The Max 10 was 0.43 points down year-on-year, while the Max 9 dropped 0.49 points over the 12-month period.

"Operational success," one of the four criteria in the *Airfinance Journal*'s investors' poll, showed where the Max family was (predictably) mostly impacted. In 2019, the Max 8 scored 2.92 points, or 1.29 points less than the previous year.

"Marketability" also impacted the Max 8 model for those taking part in the survey. In 2019, the Max 8 scored 3.86 points, or 0.72 points less than the previous year.

"Residual value" and "value for money" were understandably the least impacted because the consensus agrees the aircraft is a good investment. In 2018, the Max 8 scored 4.33 points for residual value, behind the Airbus A320neo (4.45), the 737-800 (4.48) and the A321neo (winner in this category with 4.52). In 2019, its residual value was 4.08, not much more than the A320 and the A321 models (4.00 points each), while the 737-800 was 4.18 and the A320/321neo aircraft scored 4.42.

Appraiser firms Ascend by Cirium and IBA do not believe the suspension will necessarily have a negative impact on 737 Max values, but neither do they rule it out given the varied factors and events that could impact on values over time.

"I don't feel there will be any impact on residual values for the Max. In fact, it will probably provide comfort that Boeing will get on top of the situation in a more sensible way," says IBA's Stuart Hatcher after the Boeing announcement to suspend production.

Airbus A321neo

For Hatcher, values are impacted if the demand for the model changes and, in particular, if there are large-scale cancellations. To date, this has not occurred with the Max.

It will be interesting to see how long the suspension of production lasts. Some industry observers talked about three to six months in the wake of the December announcement.

Single-aisles

Aircraft type	Residual value	Value for money	Operational success	Remarketing potential	Overall score	Last year's score	Difference
A321neo	4.42	4.53	4.39	4.44	**4.45**	**4.38**	0.07
A320neo	4.42	4.26	4.26	4.47	**4.36**	**4.24**	0.12
737-800	4.18	3.95	4.24	4.18	**4.14**	**4.57**	-0.43
A320	4.00	4.05	4.24	4.05	**4.08**	**4.36**	-0.28
A321	4.00	3.91	4.14	4.00	**4.01**	**4.26**	-0.25
A220-300	3.77	3.93	3.71	3.64	**3.76**	**3.43**	0.33
737 Max 8	4.08	4.07	2.92	3.86	**3.73**	**4.32**	-0.59
737 Max 10	3.27	3.58	N/A	3.27	**3.37**	**3.80**	-0.43
737-900ER	3.00	3.29	3.14	2.95	**3.10**	**3.16**	-0.06
737 Max 9	3.00	3.36	2.55	2.85	**2.94**	**3.43**	-0.49
737-700	2.88	2.82	3.19	2.82	**2.93**	**3.06**	-0.13
A319	2.85	2.86	3.40	2.52	**2.91**	**2.97**	-0.06
737 Max 7	2.42	2.42	N/A	2.27	**2.37**	**2.55**	-0.18
A319neo	2.27	2.33	2.27	2.20	**2.27**	**2.30**	-0.03

Twin-aisles

Aircraft type	Residual value	Value for money	Operational success	Remarketing potential	Overall score	Last year's score	Difference
A350-900	3.93	4.07	4.13	3.73	**3.97**	**3.86**	0.11
767-300ER	3.81	3.81	4.20	3.81	**3.91**	**3.37**	0.54
787-9	3.81	4.13	3.88	3.56	**3.84**	**4.23**	-0.39
787-10	3.40	3.64	3.64	3.43	**3.53**	**3.34**	0.19
777-9	3.09	3.60	N/A	3.30	**3.33**	**3.32**	0.01
777-300ER	2.84	3.32	3.89	2.79	**3.21**	**3.21**	0.00
A330-900neo	3.13	3.44	3.27	3.00	**3.21**	**3.07**	0.14
A330-300	2.80	3.38	3.70	2.81	**3.17**	**3.40**	-0.23
A350-1000	3.00	3.27	3.40	3.00	**3.17**	**3.17**	0.00
787-8	2.94	3.44	3.31	2.94	**3.16**	**3.45**	-0.29
777-8	2.64	2.80	N/A	2.70	**2.71**	**2.84**	-0.13
A330-200	2.26	2.85	3.37	2.30	**2.70**	**2.78**	-0.08
777-200ER	2.05	2.61	3.29	2.11	**2.52**	**2.16**	0.36
A330-800neo	2.47	2.67	N/A	2.40	**2.51**	**2.32**	0.19
747-400	1.81	2.38	3.53	1.75	**2.37**	**2.05**	0.32
777-200LR	2.07	2.71	2.50	2.07	**2.34**	**2.06**	0.28
747-8 pax	1.67	2.00	2.13	1.80	**1.90**	**1.80**	0.10
A380	1.25	1.88	2.75	1.38	**1.81**	**1.90**	-0.09
A350-800	1.80	1.70	N/A	1.56	**1.68**	**2.38**	-0.70
A340-500	1.31	1.56	1.56	1.56	**1.50**	**1.14**	0.36
A340-600	1.13	1.47	1.87	1.40	**1.47**	**1.23**	0.24

The other point is clearing the backlog. In 2016, the 737 production rate was 42 aircraft a month. It climbed to 47 aircraft a month in 2017 and 52 a month in 2018. Boeing anticipated 57 aircraft a month for 2019, but the year was at about 42 a month on average. Still, there are about 400 aircraft awaiting delivery.

In the single-aisle category, the A321neo and A320neo models were the highest-rated in 2019, with their average up from the previous year.

The A321neo scored 4.45 points, versus 4.38 the previous year. The A320neo model benefited from the Max problems and scored 4.36 points in 2019, versus 4.24 a year earlier.

The A320neo-family aircraft, though, was subject to delays because of engine issues, affecting monthly production rates.

The current environment has shifted to new-technology aircraft and the 737-800 model has lost its crown. It had topped the charts for many years as the market continued to favour current-technology narrowbody aircraft. The first A320neo aircraft are entering their fourth year of service, while the Max 8 would now have been at about 30 months of service.

Even so, the 737-800 remains among the most remarketable assets of the current-technology aircraft, beating the A320 and the A321 models.

The A220-300 recorded the best improvement of any single-aisle aircraft, perhaps because the market is more accepting of the model. Financing of the A220-300 has broadened over the 12 months and more customers have committed to the type, including leasing companies.

The A319neo and 737 Max 7 models continue to get rated at the same level.

Demand for the 737-700 remains mainly for part-out purposes, with the -7B engine still in high demand because of fewer -800 part-outs than expected. The market is closely watching the Southwest -700 fleet and its future use.

Demand has also been high for -5B engines, although one engine trading source says it has started to soften.

Widebodies

Investors' appetite clearly remains in "mainstream" aircraft, and few investors would venture outside the popular widebody types such as the A350/787 models.

The poll shows the A350-900 topping the widebody charts in 2019, beating the 787-9 in three of the four criteria: residual value, operational performance and remarketing potential.

In 2019, the A350-900 scored better than the previous year in three of the four categories and benefited from a drop in scores for the 787-9. One voter says the 787-9 remains the main sweet spot in the 787 market but engine issues have penalised the model. The A350-1000 and 787-10 models are gaining more

The Airbus A350-900 model topped the widebody category

acceptance with operators but not much traction with operating lessors.

"The 787-10 is a good aircraft but aircraft price has considerable variance (circa $30 million spread). It has slightly better marketing prospects than A350 but still a tough market (for lessors with forward orders)," says another source.

The availability of A350 and 787 aircraft is impacting the secondary leasing market and residual values, observes one source. The former favourite aircraft, the 777-300ER and A330-300 models, had a stable year. There is a lot of activity in this market but transition costs, at times, can prove difficult to move aircraft. The issue for both models is the number of aircraft hitting the market over the next few years.

The 767-300ER continues to enjoy some resurgence in residual value and remarketability because of freighter demand, according to one trader.

The A330-900neo is gaining more acceptance in the marketplace and this was reflected in the scoring. The in-service fleet was about 40 aircraft at the end of 2019 and, apart from one aircraft going back to the Toulouse factory for a few days, operators seem to be comfortable with the aircraft type's missions.

There has been a range of financial structures backing the model from operating lease, purchase and leaseback, export credit agency-backed cover and finance lease. Lessors accounted for 77 of the 285 direct firm orders for the A330-900 model, but none of the 14 A330-800 orders.

The four-engine models continue to score at the lowest levels. There is no positive prospect for the models, although some aircraft still find applications in the charter/ACMI market.

Regional aircraft

The ATR72-600 maintained its position at the top in the regional aircraft market category scoring 3.74 overall, a small increase over the previous year.

Turboprops have been struggling but the ATR72-600 is widely seen as the stronger player in the market. It benefits from a much higher customer base than the De Havilland of Canada Dash8 and more appetite from the leasing community.

The ATR72-600 variant is approaching 10 years of service and its predecessor, the ATR72-500, is finally seeing more conversions into freighters. De Havilland of Canada announced a fair number of sales at the November Dubai air show, and this will be welcome news for the Dash8 model.

The Bombardier CRJ900 dropped a couple of ranks in the regional table. Backlog is relatively low and the model's future may lie in the hands of Mitsubishi.

A year after introducing the Embraer E190-E2 and the E195-E2 models, the Brazilian manufacturer performed the first flight of its final E2 model, the E175-E2, last month. Both types are featured amongst the best improvers year-on-year. The E190/E195-E2 models are expected to continue their ascension towards the top of the table next, as more airlines operate the types.

Meanwhile, sales for the E175 continue and this is reflected in the investor survey: the E175 model scored higher in all four criteria, and was 0.39 points up overall, ending third in the rankings. The E190 model gained three places in the overall table, scoring higher in all four criteria.

Regionals

Aircraft type	Residual value	Value for money	Operational success	Remarketing potential	Overall score	Last year's score	Difference
ATR72-600	3.75	3.78	3.94	3.50	**3.74**	**3.40**	0.34
Dash 8-400	3.44	3.47	3.69	3.27	**3.47**	**3.22**	0.25
E175	3.36	3.36	4.00	3.00	**3.43**	**3.04**	0.39
ATR42-600	3.25	3.53	3.50	3.31	**3.40**	**2.84**	0.56
ATR72-500	2.97	3.47	3.68	3.24	**3.34**	**3.13**	0.21
E190	3.03	3.03	3.77	2.91	**3.18**	**2.83**	0.35
ATR42-500	2.93	3.13	3.27	3.20	**3.13**	**2.87**	0.26
CRJ900	2.86	3.14	3.43	2.96	**3.10**	**3.04**	0.06
E195-E2	2.82	3.09	3.19	3.14	**3.06**	**2.66**	0.40
E190-E2	2.91	3.14	3.15	3.00	**3.05**	**2.68**	0.37
A220-100	2.92	3.23	2.92	2.85	**2.98**	**2.88**	0.10
CRJ700	2.69	3.00	3.23	2.88	**2.95**	**2.45**	0.50
E195	2.73	3.00	3.29	2.70	**2.93**	**2.53**	0.40
CRJ200	1.75	2.67	3.25	2.46	**2.53**	**2.15**	0.38
ERJ145	1.87	2.67	3.21	2.27	**2.50**	**2.03**	0.47
E175-E2	2.27	2.68	N/A	2.33	**2.42**	**2.18**	0.24
E170	2.23	2.46	2.50	2.31	**2.38**	**2.13**	0.25
CRJ1000	1.83	2.42	2.50	1.92	**2.17**	**2.38**	-0.21
M100	1.88	2.00	N/A	1.86	**1.91**	**N/A**	N/A
M90	1.63	1.43	N/A	1.43	**1.49**	**1.76**	-0.27
SSJ100	1.25	1.42	1.25	1.08	**1.25**	**1.34**	-0.09

The **numbers**

The following pages include key data for current production commercial aircraft. Aircraft that have not yet entered service are not included, because the information available has not been confirmed by in-service experience.

Technical characteristics
The maximum take-off weight (MTOW) shows the maximum option available for the type in question. There may be lower weight versions 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 costs
The maintenance figures are intended as a guide to the order of magnitude of reserves associated with the various aircraft types. The figures are intended to reflect mature costs with no account taken of warranty effects and other reductions associated with new aircraft.

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

Engine maintenance cost estimates are based on figures quoted in the *Airfinance Journal guide to financing and investing in engines 2019, page 32*. 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 operational 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 as of 1 December, 2019.

Aircraft data index

Aircraft **data**

Airbus A220-100

SEATING/RANGE	
Max seating	133
Typical seating	108
Maximum range	3,400nm (6,300km)
TECHNICAL CHARACTERISTICS	
MTOW	63.1 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	1,330kg
Block fuel 500nm	2,450kg
Block fuel 1,000nm	4,380kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2016
In service:	36
Operators (current and planned)	8
In storage	5
On order	63
Build peak year (2019)	24
Estimated production 2020	20
Average age (years)	0.9
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$55-60 per flight hour
Higher checks reserve	$50-55 per flight hour
Engine overhaul	$95-100 per engine flight hour
Engine LLP	$125-130 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.

Airbus A220-300

SEATING/RANGE	
Max seating	160
Typical seating	140
Maximum range	3,350nm (6,200km)
TECHNICAL CHARACTERISTICS	
MTOW	69.9 tonnes
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	1,370kg
Block fuel 500nm	2,510kg
Block fuel 1,000nm	4,490kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2016
In service:	57
Operators (current and planned)	22
In storage	4
On order	384
Build peak year (2018)	30
Estimated production 2019	65
Average age (years)	1.5
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$55-60 per flight hour
Higher checks reserve	$50-55 per flight hour
Engine overhaul	$105-110 per engine flight hour
Engine LLP	$125-130 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.

Airbus A319neo

SEATING/RANGE	
Max seating	156
Typical seating	140
Typical range	3,700nm (6,850km)
TECHNICAL CHARACTERISTICS	
MTOW	75.5 tonnes
OEW	43 tonnes
MZFW	60.3 tonnes
Fuel capacity	26,730 litres
Engines	LEAP-1A/PW1100G
Thrust	24,100lbs (107kN)
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)	2020
In service:	none
Operators (current and planned)	5
In storage	none
On order	35
Built peak year	Not applicable
Estimated production 2020	Unknown
Average age (years)	Not applicable
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	$125-130 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.

Airbus 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:	4,188
Operators (current and planned)	278
In storage	131
On order	49
Built peak year (2013)	352
Estimated production 2020	20
Average age (years)	10.5
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$60-65 per flight hour
Higher checks reserve	$55-60 per flight hour
Engine overhaul	$105-110 per engine flight hour
Engine LLP	$125-130 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

Airbus A320neo

SEATING/RANGE	
Max seating	194
Typical seating	150-165
Typical range	3,400nm (6,300km)
TECHNICAL CHARACTERISTICS	
MTOW	79 tonnes
OEW	44.5 tonnes
MZFW	62.8 tonnes/64.3 tonnes
Fuel capacity	26,730 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	
Entry into service	2016
In service:	786
Operators (current and planned)	106
In storage	4
On order	3,082
Built peak year (2019)	295
Estimated production 2020	300
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	$105-110 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

Airbus A321-200

SEATING/RANGE	
Max seating	220
Typical seating	185
Maximum range	3,200nm (5,950km)
TECHNICAL CHARACTERISTICS	
MTOW	93.5 tonnes
OEW	48 tonnes
MZFW	73.8 tonnes
Fuel capacity	30,030 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:	1,600
Operators (current and planned)	103
In storage	49
On order	105
Built peak year (2013)	215
Estimated production 2020	10
Average age (years)	7.9
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$65-70 per flight hour
Higher checks reserve	$60-65 per flight hour
Engine overhaul	$120-125 per engine flight hour
Engine LLP	$125-130 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

Airbus A321neo

SEATING/RANGE	
Max seating	244
Typical seating	206
Maximum range	3,995nm (7,400km)
TECHNICAL CHARACTERISTICS	
MTOW	97 tonnes
OEW	50.1 tonnes
MZFW	73.3 tonnes/75.6 tonnes
Fuel capacity	30,030 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	
Entry into service	2017
In service:	249
Operators (current and planned)	88
In storage	0
On order	2,116
Build peak year (2019)	127
Estimated production 2020	400
Average age (years)	1.1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$60-65 per flight hour
Higher checks reserve	$55-60 per flight hour
Engine overhaul	$120-125 per engine flight hour
Engine LLP	$125-130 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.

Airbus A330-200

SEATING/RANGE	
Max seating	406
Typical seating	210-250
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	
Entry into service	1998
In service:	498
Operators (current and planned)	93
In storage	55
On order	11
Build peak year (2013)	51
Estimated production 2020	5
Average age (years)	10.4
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$265-270 per engine flight hour
Engine LLP	$245-250 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 A330-200 Freighter

SEATING/RANGE	
Max Payload	65 tonnes
Maximum range	4,000nm (7,400km)
TECHNICAL CHARACTERISTICS	
MTOW	233 tonnes
OEW	115 tonnes
MZFW	178 tonnes
Fuel capacity	97,530 litres
Engines	RR Trent700/PW4000
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	
Entry into service	2010
In service:	40
Operators (current and planned)	10
In storage	1
On order	1
Build peak year (2012)	8
Estimated production 2020	4
Average age (years)	6.3
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$265-270 per engine flight hour
Engine LLP	$245-250 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 A330-300

SEATING/RANGE	
Max seating	440
Typical seating	250-290
Maximum range	6,340nm (11,750km)
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:	696
Operators (current and planned)	74
In storage	30
On order	18
Build peak year (2014)	74
Estimated production 2020	10
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	$265-270 per engine flight hour
Engine LLP	$245-250 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 A330-800neo

SEATING/RANGE	
Max seating	406
Typical seating	220-260
Typical range	8,150nm (15,090km)
TECHNICAL CHARACTERISTICS	
MTOW	251 tonnes
OEW	110 tonnes
MZFW	176 tonnes
Fuel capacity	139,090 litres
Engines	Trent 7000
Thrust	68,000lbs (303kN)
FUELS AND TIMES	
Block fuel 1,000nm	10,940kg
Block fuel 2,000nm	20,390kg
Block fuel 4,000nm	39,290kg
Bock time 1,000nm	184 minutes
Block time 2,000nm	299 minutes
Block time 4,000nm	529 minutes
FLEET	
Entry into service (planned)	2020
In service	none
Operators (current and planned)	1
In storage	none
On order	10
Built peak year	Not applicable
Estimated production 2019	3
Average age	Not applicable
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100/flight hour
Engine overhaul	$265-270/engine flight hour
Engine LLP	$245-250/engine cycle
Landing gear refurbishment	$150-155/cycle
Wheels, brakes and tyres	$375-380/cycle
APU	$105-110/APU hour
Component overhaul	$420-425/flight hour

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

Airbus A330-900neo

SEATING/RANGE	
Max seating	440
Typical seating	260-300
Maximum range	7,200nm (13,330km)
TECHNICAL CHARACTERISTICS	
MTOW	251 tonnes
OEW	115 tonnes
MZFW	181 tonnes
Fuel capacity	139,090 litres
Engines	Trent 7000
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:	35
Operators (current and planned)	24
In storage	none
On order	247
Build peak year (2019)	32
Estimated production 2020	50
Average age (years)	Less than 1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$265-270 per engine flight hour
Engine LLP	$245-250 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.

Airbus A350-900

SEATING/RANGE	
Max seating	440
Typical seating	300-350
Maximum range	8,100nm (15,000km)
TECHNICAL CHARACTERISTICS	
MTOW	280 tonnes
OEW	116 tonnes
MZFW	195 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:	293
Operators (current and planned)	53
In storage	none
On order	495
Build peak year (2019)	80
Estimated production 2020	90
Average age (years)	2.1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$295-300 per engine flight hour
Engine LLP	$270-275 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	350-410
Maximum range	8,700nm (16,100km)
TECHNICAL CHARACTERISTICS	
MTOW	316 tonnes
OEW	129 tonnes
MZFW	223 tonnes
Fuel capacity	159,000 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	2018
In service:	31
Operators (current and planned)	14
In storage	4
On order	144
Build peak year (2018 estimated)	Not applicable
Estimated production 2019	30
Average age (years)	Less than 1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$315-320 per engine flight hour
Engine LLP	$290-295 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.

Airbus 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:	233
Operators (current and planned)	16
In storage	6
On order	50
Build peak year (2012)	30
Estimated production 2020	10
Average age (years)	6.3
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$160-165 per flight hour
Higher checks reserve	$145-150 per flight hour
Engine overhaul	$195-200 per engine flight hour
Engine LLP	$200-205 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	720nm (1,330km)
TECHNICAL CHARACTERISTICS	
MTOW	18.6 tonnes
OEW	11.7 tonnes
MZFW	17.0 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:	48 (265 all versions)
Operators (current and planned)	18
In storage	none
On order	17
Build peak year (2019)	10
Estimated production 2020	10
Average age (years)	4.6
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	$115-120 per flight hour

ATR72-600

SEATING/RANGE	
Max seating	78
Typical seating	72
Maximum range	825nm (1,526km)
TECHNICAL CHARACTERISTICS	
MTOW	23.0 tonnes
OEW	14 tonnes
MZFW	21.0 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:	474 (832 all versions)
Operators (current and planned)	94
In storage	45
On order	191
Build peak year (2015)	79
Estimated production 2020	80
Average age (years)	3.3
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 737-800

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:	4,845
Operators (current and planned)	225
In storage	74
On order	38
Build peak year (2016)	408
Estimated production 2019	30
Average age (years)	8.8
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$65-70 per flight hour
Higher checks reserve	$50-55 per flight hour
Engine overhaul	$120-125 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$45-50 per cycle
Wheels brakes and tyres	$70-75 per cycle
APU	$80-85 per APU hour
Component overhaul	$210-220 per flight hour

Boeing 737 Max 8

SEATING/RANGE	
Max seating	200
Typical seating	162-172
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	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	2017
In service:	None (Fleet grounded)
Operators (current and planned)	93
Grounded	355
On order	3,482
Build peak year (2018)	194
Estimated production 2020	Under review
Average age (years)	Not applicable
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$65-70 per flight hour
Higher checks reserve	$50-55 per flight hour
Engine overhaul	$120-125 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$45-50 per cycle
Wheels brakes and tyres	$70-75 per cycle
APU	$80-85 per APU hour
Component overhaul	$210-220 per flight hour

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	LEAP-1B
Thrust	27,300 (121kN)
FUELS AND TIMES	
Block fuel 200nm	1,790kg
Block fuel 500nm	3,150kg
Block fuel 1,000nm	5,520kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2018
In service:	None (Fleet grounded)
Operators (current and planned)	15
Grounded	28
On order	324
Build peak year (2018)	20
Estimated production 2020	Under review
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	$20-125 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$45-50 per cycle
Wheels brakes and tyres	$70-75 per cycle
APU	$80-85 per APU hour
Component overhaul	$210-220 per flight hour

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

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	
Entry into service	2010
In service:	90
Operators (current and planned)	15
In storage	0
On order	17
Build peak year (2013)	20
Estimated production 2019	6
Average age (years)	5.7
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$155-160 per flight hour
Higher checks reserve	$115-120 per flight hour
Engine overhaul	$170-175 per engine flight hour
Engine LLP	$260-265 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 767F

SEATING/RANGE	
Max Payload	52 tonnes
Maximum range	3,250nm (6,020km)
TECHNICAL CHARACTERISTICS	
MTOW	187 tonnes
OEW	81 tonnes
MZFW	133 tonnes
Fuel capacity	91,380 litres
Engines	GE CF6-80C
Thrust	63,300lbs (276kN)
FUELS AND TIMES	
Block fuel 1,000Nm	10,560kg
Block fuel 2,000nm	19,760kg
Block fuel 4,000 Nm	37,910kg
Bock time 1,000Nm	184 minutes
Block time 2,000Nm	301 minutes
Block time 4,000Nm	536 minutes
FLEET	
Entry into service	1995
In Service:	169
Operators (current and planed)	16
In Storage	none
On order	56
Built peak year (2019)	18
Estimated production 2020	12
Average age	8.4 years
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$100-105 per flight hour
Higher checks reserve	$75-80 per flight hour
Engine overhaul	$165-170 per engine flight hour
Engine LLP	$255-260 per engine cycle
Landing gear refurbishment	$65-70 per cycle
Wheels brakes and tyres	$70-75 per cycle
APU	$105-110 per APU hour
Component overhaul	$250-260 per flight hour

Boeing 777F

SEATING/RANGE	
Max Payload	102 tonnes
Maximum range	4,120 nm (7,630km)
TECHNICAL CHARACTERISTICS	
MTOW	348 tonnes
OEW	144 tonnes
MZFW	248 tonnes
Fuel capacity	181,280 litres
Engines	GE 90
Thrust	110,000lbs (489 kN)
FUELS AND TIMES	
Block fuel 1,000Nm	14,140 kg
Block fuel 2,000nm	26,350 kg
Block fuel 4,000 Nm	50,780 kg
Bock time 1,000Nm	152 minutes
Block time 2,000Nm	277 minutes
Block time 4,000Nm	525 minutes
FLEET	
Entry into service	2009
In Service:	178
Operators (current and planed)	25
In Storage	none
On order	55
Built peak year	Not applicable
Estimated production 2018	12
Average age	5.6 years
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	$400-410 per flight hour

Boeing 777-300ER

SEATING/RANGE	
Max seating	550
Typical seating	365 (three class)
Maximum range	7,370nm (13,650km)
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
In service:	759
Operators (current and planned)	47
In storage	12
On order	32
Build peak year (2016)	89
Estimated production 2020	12
Average age (years)	7.5
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$125-130 per flight hour
Higher checks reserve	$90-95 per flight hour
Engine overhaul	$295-300 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	359
Typical seating	248
Maximum range	7,300nm to (13,530km)
TECHNICAL CHARACTERISTICS	
MTOW	227.9 tonnes
OEW	120 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:	358
Operators (current and planned)	48
In storage	10
On order	57
Build peak year (2014)	104
Estimated production 2020	12
Average age (years)	4.3
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$110-115 per flight hour
Higher checks reserve	$80-85 per flight hour
Engine overhaul	$300-310 per engine flight hour
Engine LLP	$305-310 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	296 (two class)
Maximum range	7,530nm (13,950km)
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:	502
Operators (current and planned)	65
In storage	1
On order	332
Build peak year (2018)	120
Estimated production 2020	120
Average age (years)	1.6
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$110-115 per flight hour
Higher checks reserve	$85-90 per flight hour
Engine overhaul	$310-315 per engine flight hour
Engine LLP	$320-325 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	336
Maximum range	6,345nm (11,750km)
TECHNICAL CHARACTERISTICS	
MTOW	254.0 tonnes
OEW	135.0 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	11,310kg
Block fuel 2,000nm	21,080kg
Block fuel 4,000nm	40,620kg
Bock time 1,000nm	146 minutes
Block time 2,000nm	265 minutes
Block time 4,000nm	501 minutes
FLEET	
Entry into service	2018
In service:	44
Operators (current and planned)	14
In storage	0
On order	153
Build peak year (2019)	29
Estimated production 2020	50
Average age (years)	Less than 1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$120-125 per flight hour
Higher checks reserve	$90-95per flight hour
Engine overhaul	$315-320 per engine flight hour
Engine LLP	$320-325 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 CRJ900

SEATING/RANGE	
Max seating	90
Typical seating	88
Maximum range	1,550nm (2,871km)
TECHNICAL CHARACTERISTICS	
MTOW	38.3 tonnes
OEW	21.8 tonnes
MZFW	32.1 tonnes
Fuel capacity	10,990 litres
Engines	CF34-8C5
Thrust	14,510lbs (64.5kN)
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:	460
Operators (current and planned)	31
In storage	11
On order	33
Build peak year (2008)	59
Estimated production 2020	12
Average age (years)	8.9
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$50-55 per flight hour
Higher checks reserve	$35-40 per flight hour
Engine overhaul	$75-80 per engine flight hour
Engine LLP	$105-110 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:	62
Operators (current and planned)	8
In storage	2
On order	5
Build peak year (2011)	17
Estimated production 2019	5
Average age (years)	5.1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$50-55 per flight hour
Higher checks reserve	$35-40 per flight hour
Engine overhaul	$75-80 per engine flight hour
Engine LLP	$105-110 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

De Havilland of Canada Dash 8-400

SEATING/RANGE	
Max seating	90
Typical seating	74
Maximum range	1,100nm (2,040km)
TECHNICAL CHARACTERISTICS	
MTOW	30.5 tonnes
OEW	17.8 tonnes
MZFW	29.0 tonnes
Fuel capacity	6,700 litres
Engines	PW150A
Thrust	5,070shp
FUELS AND TIMES (LR cruise)	
Block fuel 100nm	480kg
Block fuel 200nm	740kg
Block fuel 500nm	1,550kg
Bock time 100nm	44 minutes
Block time 200nm	65 minutes
Block time 500nm	126 minutes
FLEET	
Entry into service	1999
In service:	521
Operators (current and planned)	62
In storage	35
On order	44
Build peak year (2007)	42
Estimated production 2020	16
Average age (years)	9.4
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$45-50 per flight hour
Higher checks reserve	$34-35 per flight hour
Engine overhaul	$150-155 per engine flight hour
Engine LLP	$45-50 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 E175

SEATING/RANGE	
Max seating	88
Typical seating	78
Maximum range	2,000nm (3,706km)
TECHNICAL CHARACTERISTICS	
MTOW	40.4 tonnes
OEW	22.0 tonnes
MZFW	32.0 tonnes
Fuel capacity	11,670 litres
Engines	CF34-8E
Thrust	13,800lbs (60kN)
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:	623
Operators (current and planned)	26
In storage	3
On order	179
Build peak year (2016)	84
Estimated production 2020	60
Average age (years)	5.9
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$45-50 per flight hour
Higher checks reserve	$35-40 per flight hour
Engine overhaul	$75-80 per engine flight hour
Engine LLP	$105-110 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-E2

SEATING/RANGE	
Max seating	114
Typical seating	106
Maximum range	2,850nm (5,280km)
TECHNICAL CHARACTERISTICS	
MTOW	56.4 tonnes
OEW	33 tonnes
MZFW	46.7 tonnes
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:	10
Operators (current and planned)	6
In storage	none
On order	37
Build peak year (2019)	7
Estimated production 2020	17
Average age (years)	Less than 1
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-E2

SEATING/RANGE	
Max seating	146
Typical seating	132
Typical range	2,600nm (4,800km)
TECHNICAL CHARACTERISTICS	
MTOW	61.5 tonnes
OEW	35.7 tonnes
MZFW	51.8 tonnes
Estimated fuel capacity	16,5000 litres
Engines	Pratt & Whitney PW1919
Thrust	19,000lbs (85kN)
FUELS AND TIMES	
Block fuel 200nm	1,140kg
Block fuel 500nm	2,300kg
Bock time 200nm	46 minutes
Block time 500nm	83 minutes
FLEET	
Entry into service	2019
In service	4
Operators (current and planned)	6
In storage	none
On order	122
Built peak year	Not applicable
Estimated production 2019	20
Average age (years)	Less than 1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$45-50 per flight hour
Higher checks reserve	$35-40/flight hour
Engine overhaul	No data
Engine LLP	No data
Landing gear refurbishment	$35-40/cycle
Wheels, brakes and tyres	$55-60/cycle
APU	$70-75/APU hour
Component overhaul	$180-185/flight hour

Maintenance reserves are estimates based on E195 model pending in-service feedback and confirmation of claimed savings.

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:	116
Operators (current and planned)	31
In storage	44
On order	134
Build peak year (2018)	28
Estimated production 2020	12
Average age (years)	4.7
INDICATIVE MAINTENANCE RESERVES	
Insufficient data available	

New aircraft market values ($ million)

Model	Avitas view	CV view	IBA view	MBA view	Oriel view	Average
Airbus						
A220-100	31.9	33.0	33.2	32.8	36.7	**33.5**
A220-300	37.0	39.0	39.0	36.9	43.5	**39.1**
A320	44.6	45.0	44.5	43.4	44.6	**44.4**
A320neo	50.9	52.0	51.9	48.4	50.1	**50.7**
A321	50.2	51.0	52.0	51.9	52.8	**51.6**
A321neo	59.4	59.0	58.7	56.1	57.2	**58.1**
A330-200	84.6	82.0	76.5	83.6	-	**81.7**
A330-300	94.7	90.0	86.0	96.7	93.7	**92.2**
A330 900neo	109.4	112.0	118.0	107.9	110.8	**111.6**
A350-900	154.7	158.0	155.0	145.7	150.3	**152.7**
A350-1000	167.5	173.0	170.5	161.8	169.6	**168.5**
A380	209.6	244.0	227.1	190.8	174.4	**209.2**
Boeing						
737-800	45.3	46.0	47.0	46.2	-	**46.1**
737 Max 8	50.9	-	50.9	-	50.3	**50.7**
737 Max 9	53.9	-	52.8	-	53.5	**53.4**
777-300ER	157.4	155.0	156.3	147.3	136.0	**150.4**
787-8	119.9	120.0	120.0	117.5	112.2	**117.9**
787-9	149.6	146.0	149.2	140.5	140.3	**145.1**
787-10	157.1	156.0	155.2	142.9	154.4	**153.1**
ATR						
ATR42-600	16.6	16.5	16.0	15.1	16.3	**16.1**
ATR72-600	20.9	21.0	20.8	19.1	18.2	**20.0**
Bombardier						
CRJ900	27.2	23.0	24.8	27.1	25.1	**25.4**
CRJ1000	28.7	-	27.4	-	27.5	**27.9**
De Havilland of Canada (ex-Bombardier)						
Dash 8-400	22.2	22.5	19.6	20.4	19.2	**20.8**
Embraer						
E175	29.6	28.0	28.2	29.4	27.3	**28.5**
E190-E2	35.8	32.0	32.5	-	34.4	**33.7**
E195	36.1	32.0	33.7	30.2	29.2	**32.2**
Sukhoi						
SSJ100	25.1	21.0	20.2	17.3	17.6	**20.2**

New aircraft lease rates ($'000s per month)

Model	Avitas view	CV view	IBA view	MBA view	Oriel view	Range
Airbus						
A220-100	220-260	230	238	220-236	270	**220-270**
A220-300	270-310	275	256	247-265	290	**247-310**
A320	300-340	320	295	290-312	330	**290-340**
A320neo	310-350	350	331	324-348	350	**310-350**
A321	335-375	360	339	347-373	380	**335-380**
A321neo	355-395	385	383	376-403	430	**355-430**
A330-200	645-685	600	612	484-520	-	**484-685**
A330-300	680-720	650	668	560-630	740	**560-740**
A330 900neo	720-760	775	853	640-700	830	**640-853**
A350-900	1,000-1,100	1,100	1,004	844-950	1,000	**844-1,100**
A350-1000	1,100-1,200	1,150	1,285	937-1,006	1,250	**937-1,285**
A380	1,620-1,720	1,950	1,862	1,105-1,186	1,400	**1,105-1,950**
Boeing						
737-800	300-340	335	-	309-332	-	**300-340**
737 Max 8	280-320	330	315	-	350	**280-350**
737 Max 9	310-350	335	330	-	380	**310-380**
777-300ER	1,050-1,150	1,150	1,146	853-995	995	**853-1,150**
787-8	830-870	875	850	681-731	820	**681-875**
787-9	955-995	1,000	985	813-873	940	**813-1,000**
787-10	1,050-1,150	1,100	1,193	828-889	1,080	**828-1,193**
ATR						
ATR42-600	115-135	145	135	119-128	145	**115-145**
ATR72-600	155-175	185	165	151-163	160	**151-185**
Bombardier						
CRJ900	190-210	205	193	215-230	210	**190-230**
CRJ1000	210-230	-	208	-	225	**208-230**
De Havilland of Canada (ex-Bombardier)						
Dash 8-400	160-180	195	165	162-174	170	**160-195**
Embraer						
E175	210-230	210	220	233-250	225	**210-250**
E190-E2	255-275	265	248		255	**248-275**
E195	240-260	230	253	246-264	235	**230-264**
Sukhoi						
SSJ100	160-180	170	175	137-147	150	**137-180**

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