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DVB's new man at the helm

David Goring-Thomas on bringing the bank back to profitability

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ISSUE no. 391

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Changes are inevitable, but 2017 still looks positive

Although airlines were at their most prosperous in 2016, the industry will continue to see innovative new ways of financing aircraft this year, writes Jack Dutton.

In 2016, the airline industry was at peak profitability, according to a recent report from the International Air Transport Association. While 2017 is likely to be a strong year for airlines, global airline profit is likely to fall 16%, from $35.6 billion in 2016 to $29.8 billion in 2017.

What will be the main reasons for this? There will be many. Stagnant economic growth projected for some of the main global superpowers in 2017 will dampen the demand for air travel. New appointments of world leaders and a rise in populism leading to more political uncertainty will also have a negative impact on demand and yields.

Terrorism also remains a threat for the airline industry. One example that stands out is Turkey, which since June 2015, has witnessed 19 terrorist attacks and a military coup. This has eroded demand to travel in Turkey and the domestic carriers have felt its negative effects. Turkish Airlines deferred 167 of its orders and remarketed its aircraft, including eight of its Airbus A330s. Although Pegasus Airlines has not publicly announced any order deferrals, it made three of its fleet available for wet lease.

Another main area of concern for airlines in 2017 is the predicted persistency of the strength of the US dollar. A strong dollar will hurt airlines which earn their revenues in other currencies, but pay for new equipment and pay back their loans in dollars. Rises in interest rates, which are projected to occur this year, will also lead to an increase in borrowing costs for lessors and airlines.

Overcapacity is also a problem for airlines, especially those which operate a lot of widebody aircraft. There is no doubt that all airlines will be affected in some way (usually negatively) by global fuel costs creeping up.

This year will undoubtedly see a shift of trends, though not all will be negative for the industry. There will be some changes in financing strategy, when airlines and banks look to manage their portfolios, and new markets will open for aircraft financiers.

In our cover story, an interview with David Goring-Thomas, DVB Bank's new member of the board responsible for the bank's aviation practice, we learn that the bank is looking to tap a new market, through debt funds. In the fourth quarter of 2016, the bank closed its first debt fund initiative, raising $400 million with a German asset manager and German pension provider. DVB is sourcing aircraft finance senior loans, which can be for airlines or lessors. Goring-Thomas sees this market as one of potential, looking to "at least double" DVB's presence in the market in 2017.

Market observers say that this financing trend will continue this year. Other banks, such as Investec and Natixis, tapped the debt fund market in 2016. In September, Natixis Asset Management, a subsidiary of the French bank, launched a new area of management expertise, real asset private debt, combining three complementary, high potential sectors – aircraft, infrastructure and real estate – to meet the needs of institutional investors. The French asset manager says the new platform, which has a €3 billion ($3.36 billion) target in assets by 2018, will meet the challenge posed by persistently low interest rates, and to address investors' need for diversification, private debt financing of real assets is a potential source of performance.

Meanwhile, Investec Aviation Finance closed its second aircraft debt fund for European insurers in April. Investec Aviation Finance, a unit of Investec Bank, closed its first fund, the Aquila Debt Fund, in 2014, and now has some $700 million across the two funds, says the company. The target yield of the new portfolio is 4% to 4.5% after fees, matching the return achieved for the Aquila fund since inception.

The Investec Aviation Finance team plans, over several months, to build a portfolio of secured aviation debt, comprising mainly senior with some mezzanine tranches, up to a target size of $500 million. This fund is open for further investors.

On page 10, we speak to Dublin-based Stellwagen, a company that has been increasing its presence in the market over the last year. During this time, Stellwagen brought in Korean and Spanish investors into some its deals for widebody aircraft acting mainly as senior lenders. When Canadian boutique merchant bank Acasta agreed to buy the company for $270 million in December, it showed that there is still plenty of new appetite for investing in aviation assets.

That said, new investors need to be educated and familiarised with the assets they are investing in. Our Air Investor supplement provides parties that are looking to invest in new aircraft guidance on the best types to invest in, depending on their company's needs. You can find useful data on aircraft values and logistics, as well as opinions from appraisers on different asset types.

As more investors enter aviation and bank on this industry, 2017 will continue to be a strong year for aviation finance, despite the unforeseeable events that may be just around the corner.

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Hogan Lovells promotes aviation counsel to partner

Law firm Hogan Lovells has promoted Richard Goss from counsel to partner.

Goss, who is based in London, has been at the law firm since August 2004, where he started as a trainee solicitor, according to his Linkedin page.

Goss mainly focuses on aviation finance, representing operating lessors, operators and financial institutions on a diverse range of multijurisdictional transactions, including sale and leasebacks, operating leases, export credit and predelivery payment financings for aircraft and helicopters.

His experience extends across other financing and restructuring work, and also includes non-aviation assets, trade and commodity finance and general banking.

Goss spent six months on secondment to Standard Chartered Bank's aviation finance team based in Dublin, gaining insight from an operating lessor perspective.

Natixis makes senior aviation finance appointments

French bank Natixis has announced the appointment of four senior aviation finance staff.

Hyung Jin (Ryan) Ahn has been appointed director, aviation finance, Asia-Pacific. He reports to Wui Jin Woon, who has been appointed head of aviation finance, Asia Pacific.

Ahn is responsible for originating, maintaining and developing relationships with clients in the Asia-Pacific region and will be based in Natixis' Singapore office. He was formerly vice-president at BBAM (US), the commercial aircraft financier and manager. Before this, he was director at Old Hill Partners (formerly the Patriot Group) with responsibility for sourcing debt across various real asset classes, including commercial aircraft. Ahn joined the bank on 8 December.

Based in Natixis' Singapore office, Woon has more than 15 years' experience spanning capital markets and corporate finance, including with Hong Kong Aviation Capital, Awas and RBS Aviation Capital (now SMBC Aviation Capital). Woon joined the bank on 29 June. His role was not announced publicly, though *Airfinance Journal* revealed his appointment last April.

Jocelyn Noel has been appointed executive director, aviation finance, based in Natixis' London office. Noel is responsible for coordinating distribution of aviation paper globally. He has been with Natixis' aviation finance team for almost 10 years, and was formerly global capital markets director at Natixis Securities Americas. Noel assumed his new role at the bank on 1 September.

Evgeny van der Geest has been appointed associate, aviation finance, also based in Natixis' London office. He was previously with Flight Ascend Consultancy, leading its risk advisory department. Van der Geest joined the bank on 22 August.

Corley is Calc's new SVP

China Aircraft Leasing Group Holdings (Calc) has appointed Matt Corley as its new senior vice-president of marketing, North and South America.

Corley will have responsibility for aircraft sales and marketing in the Americas, with a key focus on leasing aircraft in the region. He is based in Seattle.

Corley joins Calc from Metric AirFinance, where he was managing partner and oversaw all aspects of aircraft sales, marketing, managing and consulting for the boutique firm. Before that, he developed asset management infrastructure and protocols for a new aviation fund on behalf of RPK Capital in his role as managing director and general partner. He also spent eight years with Macquarie AirFinance, working his way up to the position of senior vice-president marketing, Americas.

He began his career as a Boeing engineer before moving to GATX Capital Corporation, where he spent 17 years in GATX Air in technical, fleet planning and trading roles.

DAE confirms Grabowski arrival

Dubai Aerospace Enterprise (DAE) has confirmed the appointment of Bertrand Grabowski as senior strategic adviser, after *Airfinance Journal* broke the news on 2 January. He will report to DAE's chief executive officer, Firoz Tarapore.

Grabowski was most recently the member of the board of directors of DVB Bank in charge of aviation and rail. Grabowski, who had been at DVB for 11 years, left the German bank on 30 November.

He joined DVB in May 2005 as board member responsible for the bank's aviation activity, as well as rail financing.

Previously, Grabowski spent four years at Citibank's London asset finance group, with primary responsibility over Europe and Japan.

Before his spell at Citibank, he worked in various positions at Banque Indosuez (later renamed Crédit Agricole Indosuez) as head of the Tokyo-based Asian aviation team for eight years and Tokyo branch manager. He also was the bank's New York branch manager with direct responsibility over all American-based asset finance and leveraged buy-out and private equity activities for three years.

Flybe hires new chief executive

UK regional carrier Flybe appointed Christine Ourmieres-Widener as its new chief executive officer (CEO) in December.

Ourmieres-Widener was formerly CEO of rival airline CityJet. The appointment comes two months after the surprise departure of Saad Hammad as CEO.

Ourmieres-Widener will assume her new role on 16 January.

In August, Flybe drew £40.6 million ($50 million) under a facility with German lender NordLB to fund the ownership of six Bombardier Q400 aircraft.

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AerCap promotes Juhas to CFO role

Ireland-based AerCap has named Peter Juhas as its chief financial officer.

He has been at AerCap since September 2015 as its deputy chief financial officer. Before joining AerCap, Juhas was the global head of strategic planning for AIG, where he led the development of the company's strategic and capital plans, as well as mergers, acquisitions and other transactions, including the sale of ILFC to AerCap in 2014.

Before joining AIG in 2011, Juhas was an investment banker at Morgan Stanley for 11 years. While at Morgan Stanley, he led the initial public offering of AerCap in 2006.

From September 2006 until October 2015, he was chief executive officer of the Lufthansa low-cost subsidiary Germanwings. After the announcement of the integration of Germanwings into Eurowings, Winkelmann was appointed chief executive officer of the Lufthansa hub in Munich.

Air Berlin hires new CEO

Struggling German carrier Air Berlin has hired Thomas Winkelmann as its new chief executive officer.

Winkelmann will assume his new role on 1 February. He succeeds Stefan Pichler, who is leaving the company after working for two years on the strategic turnaround of the group.

Pichler achieved this by entering into a wet-lease agreement with the Lufthansa Group for 38 aircraft and through selling the short- and medium-haul touristic business to Etihad Aviation Group, in order to create a new European leisure airline group in a joint venture with Tui.

Air Berlin will now focus on developing its long-haul network out of Berlin and Düsseldorf, with initially 75 aircraft.

Winkelmann has more than 18 years' experience in the airline industry. He started his career in 1998 with Lufthansa Group, initially accountable for the sales organisation in South America and the Caribbean and subsequently taking over the sales and service organisation as vice-president for North and South America.

Aerolineas Argentinas CEO resigns

Isela Costantini, the chief executive officer of Aerolineas Argentinas, has resigned from the airline after having taken over in January 2016.

She is stepping down for personal reasons, an airline spokeswoman tells *Airfinance Journal*.

Mario Dell Acqua, former chief executive officer at logistics company Intercargo, will replace Costantini.

Embraer appoints Meijer

Brazilian manufacturer Embraer has named Arjan Meijer as its chief commercial officer of the commercial aviation division. He will report to John Slattery, chief executive officer and president.

Before joining Embraer in April 2016, Meijer spent 15 years at KLM, where he worked on engineering, technical services and fleet development. His last role was managing director of KLM Engineering.

Aircastle boosts airline team

Aircastle has announced that Sin Jin Lim and Tom Gathercole will be joining the company's airline coverage team in January 2017. They will be based in Singapore and Dublin, Ireland, respectively.

Lim brings to Aircastle 20 years' experience in the aircraft leasing industry, including extensive technical and marketing expertise. He worked with GECAS before joining Aircastle.

Gathercole joins Aircastle from Avolon, where he was a lawyer and had significant commercial negotiation experience and transaction execution responsibilities throughout the Europe, Middle East and Africa region.

Cathay Pacific non-exec director retires

Ian Sai Cheung Shiu has resigned as a non-executive director from Cathay Pacific Airways' board of directors, according to a filing to the Hong Kong Stock Exchange.

Shiu said his resignation was because of his retirement and he is not aware of any disagreement with the board.

Shiu served on the board for eight years, having been appointed on 1 October 2008.

Wizz Air CFO to leave in March

Sonia Jerez Burdeus, the chief financial officer (CFO) of Hungarian low-cost carrier Wizz Air, plans to leave the airline at the end of March.

Burdeus says she will move back to Spain for personal reasons. She will remain at the airline until 31 March.

Wizz Air has begun the recruitment process for a new CFO.

The airline recently secured financing for 10 new Airbus A320 and A321 aircraft planned for delivery in 2017 and 2018. Wizz Air mandated Bank of Communications Financial Leasing and BOC Aviation for nine-year sale and leaseback deals.

SMBC Aviation Capital expands airline marketing team

Dublin-based SMBC Aviation Capital has announced four senior appointments to its airline marketing team bringing the total number of team members to 16.

Michael Sheldon has joined from Delta Airlines as senior vice-president airline marketing based in the US, while Samuel Ng has joined the team from China Aircraft Leasing Company as vice-president airline marketing based in Hong Kong.

Jamie Cahillane and Cora McCormack have both been appointed senior vice-president airline marketing from within SMBC Aviation Capital. Based in Dublin, both responsible for managing and developing airline relationships throughout Europe, the Middle East and Africa.

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Choppy waters for financiers

A couple of big decisions made in Washington at the end of 2016 have set the scene for the year ahead. Joe Kavanagh examines how rising interest rates and a lack of export credit agency support for Boeing are affecting aircraft finan .

Two developments that took place in the last month of 2016 are disrupting years of continuity in aviation finance. On 14 December, the US Federal Reserve raised short-term interest rates for the second time in a decade. A few days earlier, the US Congress passed up the chance to loosen restrictions on the country's export credit agency, US Export-Import Bank (Ex-Im), which has been prevented from supporting major exports throughout 2016.

Low interest rates have persisted in the years after the financial crisis, ensuring that borrowers have access to cheap capital. And although Ex-Im did not support Boeing deliveries in 2016, its absence from this market is a relatively new phenomenon.

With a new administration taking over in January, whose leading figure has expressed dislike for Ex-Im in the past, many are wondering about its future in 2017.

Rising interest rates

Announcing the rate hike, Janet Yellen, chair of the Federal Reserve, said the decision was based on improving fundamentals in the US economy. Calling it a "vote of confidence" in the country's future, she cited the fact that unemployment has fallen to 2007 levels.

The target range for its federal rate increased by a quarter point to between 0.5% and 0.75%, as many in the financial markets had expected. Policymakers also said they may carry out three further quarter-point increases, up from two as was previously planned.

Swaps are more expensive in the months after the US election. That has led to higher costs on structures that are typically used to finance aircraft, says Mike Morgan, co-founder at US financial adviser Burnham Sterling.

"The seven-year swap rate, a typical base rate for an aircraft financing, increased 80 basis points since mid-November," he says, "which equates to $2.2 million greater total interest that an airline would pay in a typical 12-year financing of a $50 million aircraft. The seven-year swap is still only about 2.3%, so more rate increases are possible," he adds.

This also affects leasing companies, which raise financing to fund their own acquisitions. As a result, lessors may increase their lease rates in order to protect their own returns.

"The environment of rising interest rates will also put pressure on lessors to achieve higher lease rate factors, as their funding costs are also increasing. This dynamic could shake up the finance market as lessors look for increased lease rate factors, and airlines look to avoid them," adds Morgan.

As an arranger of private placement deals, Morgan hopes that higher interest rates might lead airlines to access the private placement market in pursuit of cheaper financing.

He says: "That may drive more airlines to private placements to keep costs down, but cash constraints may require them to seek higher advance rate private placements. Our enhanced aviation investment vehicle product (EAIV) can achieve up to 100% financing, which we believe will look favourable relative to the operating lease alternative. We believe this all bodes well for the private placement market in 2017."

Leasing heads said they were prepared for higher rates in the run up to Yellen's announcement.

"If you are not locking in your five- and 10-year money now, you deserve to be fired, as it is cheap as chips to do so," said Avolon's Domhnal Slattery in December.

"From scratch, we've built our company to take advantage of all interest rate environments. We feel pretty good about preserving our returns for investors going forward," says ALC's John Plueger. The lessor has improved its corporate credit rating to bring down interest costs, he adds.

US Ex-Im's future

Meanwhile, support from the US Export-Import Bank looks uncertain in 2017.

Despite having been a constant feature in commercial aviation finance since its creation in 1994, a political deadlock in Washington has prevented the export credit agency from supporting deals since its mandate expired in July 2015.

Although the Senate approved its mandate in December 2015, Ex-Im is unable to approve deals larger than $10 million without a third board member. Several key Republicans, who see the bank as a form of corporate welfare, are blocking the appointment of the third member.

With a new administration taking over in January, the likelihood of its supporting Boeing exports in the near future looks slim. President-elect Trump and his key appointees have given no public signals about their position on the export credit agency. However, in 2015, he said the bank was "unnecessary" and described it as "featherbedding for politicians and others, and a few companies".

A lack of Ex-Im support would be manageable for many airline customers, which have other sources of debt available to them, as well as the services of operating lessors.

However, certain customers do rely on Ex-Im's support.

> "[Higher interest rates] may drive more airlines to private placements to keep costs down, but cash constraints may require them to seek higher advance rate private placements. Our enhanced aviation investment vehicle (EAIV) product can achieve up to 100% financing, which we believe will look favourable relative to the operating lease alternative. We believe this all bodes well for the private placement market in 2017."
>
> Mike Morgan, co-founder at US financial adviser Burnham Sterling.

Christian Wolff, head of transport finance at Helaba, says that current levels of commercial liquidity will help some customers to compensate for Ex-Im's absence.

"In the short term, the commercial aviation finance markets would possibly be able to compensate for a disappearance of Ex-Im Bank, up to a certain extent, particularly due to the current benign levels of commercial liquidity we have."

However, its presence will be missed by other customers, he adds. "In the long run, and especially in a next macroeconomic downturn scenario, there would be a gap, which will be more difficult to compensate for as it's a unique source of finance which a specific group of customers worldwide will always rely on," says Wolff.

General Electric (GE), which was the second-largest recipient of Ex-Im guarantees before its mandate expired, was forced to find alternatives in order to compete.

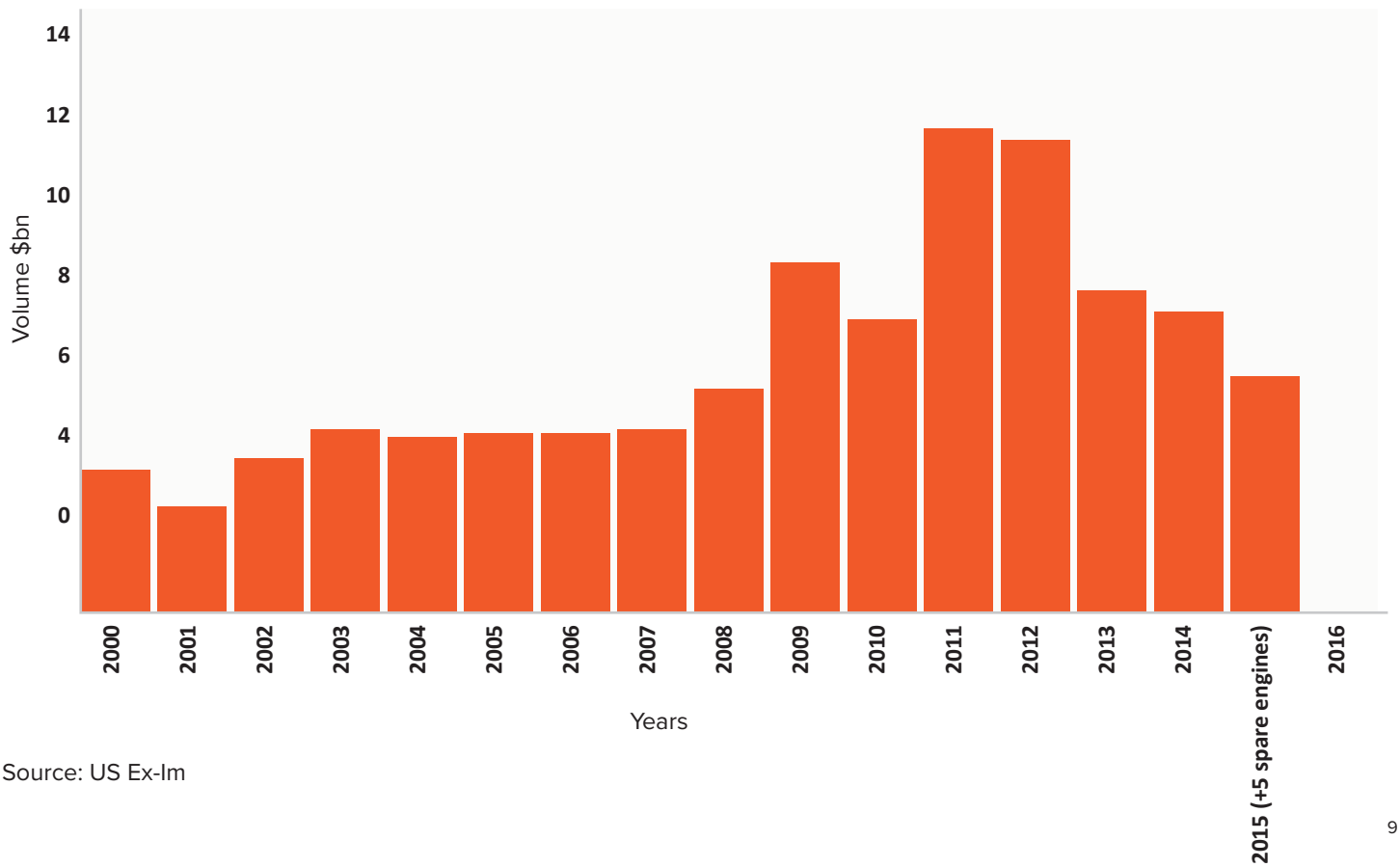
In 2016, for example, GE announced its plans to build a new turboprop development in the Czech Republic. The company also agreed up to $12 billion from UK Export Finance, Britain's own export credit agency.

If Ex-Im was to fail, or if the appointment of a third board member is postponed indefinitely, Boeing and the US federal government may find an alternative means of supporting the manufacturer's exports.

A US financier with extensive knowledge of Ex-Im's inner workings suggested that the loss of orders to Airbus (and the jobs lost because of lost orders) would be unacceptable to the new administration. Having based an election campaign on protecting American jobs, Donald Trump and his team will surely take steps to avoid job losses in US manufacturing. If so, perhaps the administration will step in to ensure that aircraft orders are supported for the airlines that need it.

Ex-Im financing support for aircraft (2000-2016)

US Ex-Im support has been a mainstay of financial support since the foundation of its aircraft finance division in 1994. Its support for Boeing export increased heavily in the years following the financial crisis, but had begun to return to typical levels in 2013. Ex-Im Bank authorized the support of no Boeing aircraft in 2016 due to the deadlock in Washington.



Source: US Ex-Im

Acasta buys Stellwagen for $270m

Canadian investment f rm Acasta has big plans for its latest purchase, Stellwagen, which is using the investment to fund the launch of two new platforms.

With a price tag of $270 million, Acasta's purchase of Stellwagen is a major bet on the future of commercial aviation finance.

The Canadian investor, a boutique merchant bank, is scheduled to close the acquisition in January, having received shareholder approval for the deal in December. The Stellwagen deal is its first foray into commercial aviation, although it has aviation veterans on its advisory team in the form of Calin Rovinescu, president and chief executive officer of Air Canada, and Michael Neal, chief executive officer of GE Capital between 2007 and 2013.

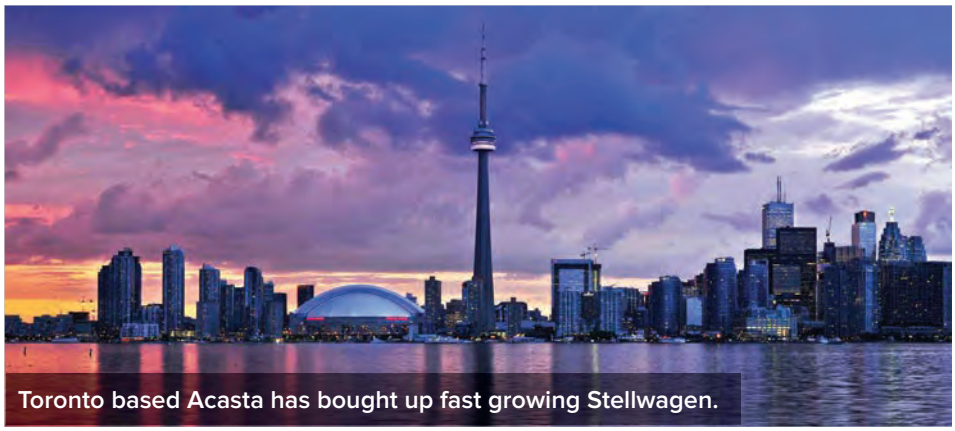
Acasta is convinced by what it sees as strong airline industry fundamentals: it notes, for example, that Boeing's Financing Outlook predicts that the world's airlines will need almost 40,000 new aircraft over the next 20 years.

It also argues that a decline in capital from traditional banks and export credit agencies means that alternative providers of capital, such as Stellwagen, will be needed to plug the gap.

Founded in 2013 by Doug Brennan, Stellwagen has expanded quickly as a financial arranger and services provider. With the acquisition by Acasta, it has now laid the groundwork for the next phase of its expansion.

"The reason we did the deal with Acasta was, first of all, because it gives us much more access to capital," says Brennan, Stellwagen's chief executive officer.

The funds from the takeover will be used to boost the pace of the company's growth, and will fund the launch of new branches of its business. One is the already announced term loan business, through which Stellwagen will lend directly to airlines, while the other is a new technology platform, which aims to bring commercial aviation finance up to speed with other areas of finance.


Toronto based Acasta has bought up fast growing Stellwagen.

Stellwagen is one of three companies that the special-purpose investor plans to buy next year. The other two are manufacturers of domestic products, with headquarters in Canada: Apollo Health & Beauty Care and JemPak Corporation.

Acasta plans to be a hands-on investor. It says it will "play a significant role in the growth of the platforms" and states that its own growth will be similar to that of major private equity managers such as Brookfield Asset Management or the Blackstone Group. It plans to launch a private equity fund in early 2017.

The $270 million purchase price represents 4.2 times Stellwagen's estimated net income for 2017. It also includes an earn-out, or deferred contributions based on Stellwagen's growth targets, which Acasta estimates at $34 million. Up to 70% of the purchase price will consist of shares in Acasta.

Both parties have welcomed the involvement of the other. Acasta's Neal describes aircraft financing as "an extremely attractive industry, with strong returns and much less volatility than the airline sector as a whole", while Stellwagen's Brennan notes that Acasta's board includes "some of the most highly respected individuals in the global aviation and finance industries".

Term loan and technology platform

As part of the deal, Acasta is contributing $100 million to Stellwagen's new senior loan investment vehicle, which is expected to close in the first quarter of 2017.

Stellwagen plans to raise an initial total of $1 billion, for what will be a 10-year fund. At the time that the Acasta investment was announced, Stellwagen had already received $270 million in soft commitments, in addition to the $100 million promised by Acasta.

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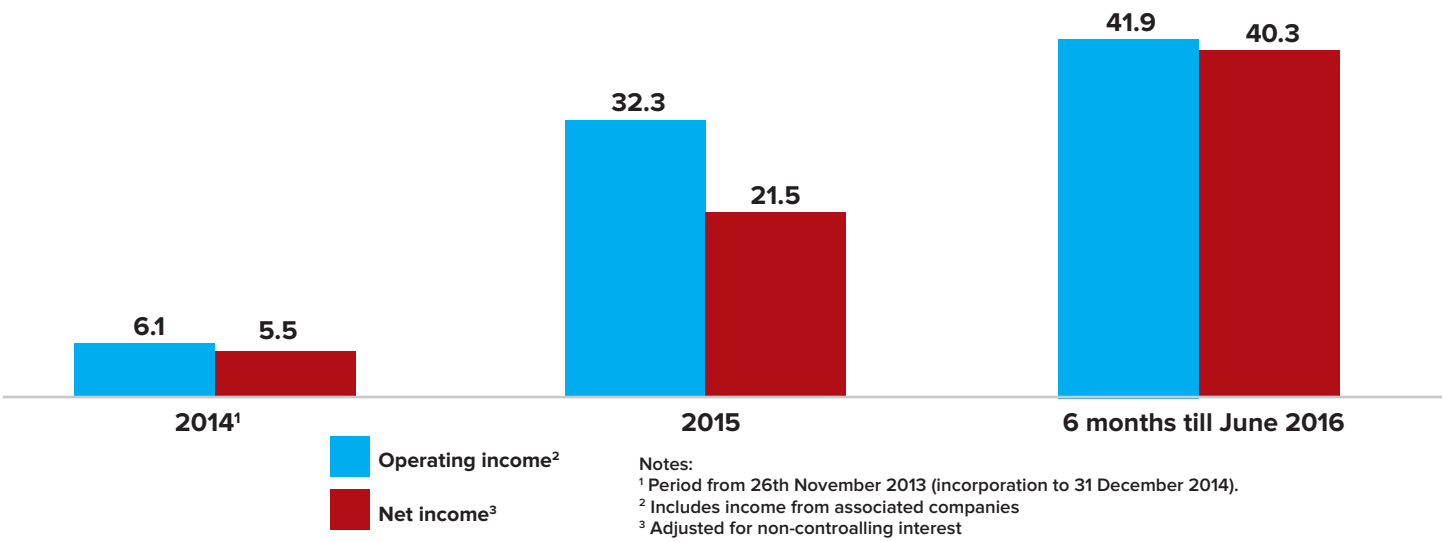
Stellwagen's financial performance (in US$ millions)



Notes:
[1] Period from 26th November 2013 (incorporation to 31 December 2014).
[2] Includes income from associated companies
[3] Adjusted for non-controalling interest

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METHODOLOGIES

Global Passenger Airline Rating Methodology

EETC & Secured Aircraft Debt Rating Methodology

Aviation ABS Rating Methodology

Stellwagen's history

Established in 2013, Stellwagen's founding goal was to fill the void left by banks as they retreated from commercial aviation in the wake of the financial crisis.

It is a collection of businesses, all of which are in early stages of growth. Stellwagen Finance, Stellwagen Capital, Seraph Aviation and Stellwagen Technology (the technology platform that Acasta's investment is helping to fund) all come under the parent company.

Stellwagen has grown rapidly since its inception: between November 2013 and December 2014, its revenue totalled $6.1 million, winth $5.5 million of profit. The full-year 2015 led to $32.3 million in revenue and $21.5 million in profit. During the first six months of 2016, the company's revenues grew to $41.9 million, with $40.3 million of profit.

It also has steep growth targets, with a chunky pipeline of future financing opportunities. It says that C$2.5 billion ($1.9 billion), or 35 aircraft, are in the late stage of completion, while a further C$3.8 billion, 10 aircraft, have a more than 50% chance of being completed.

Its management is in discussion with various customers for the financing of a further 24 aircraft.

This platform will offer loans to airlines as an alternative to operating leases, which Brennan says are not as attractive to airlines in the current environment.

By 2020, Stellwagen plans to have raised $5 billion of capital for the platform. The fund will offer loan-to-values of 80% to 85%, with a targeted annual return of 8% to 9%, Howard Millar, Stellwagen Capital's chief executive officer, told *Airfinance Journal* in May.

Brennan says the investors are mainly comprised of large pension funds, but that Stellwagen is also talking to banks in Europe and China. Some of the targeted investors are those which already invest in airline enhanced equipment trust certificate (EETC) products, and which have more appetite for debt secured against airline leases. The airline EETC market is relatively niche, with recent annual issuance volumes at about the $10 billion mark.

"They're usually sitting there with their hands outstretched, saying 'we want more'," adds Brennan.

Stellwagen expects to receive an investment-grade rating for the platform at some stage, he says.

Brennan is keen to speak about Stellwagen's new-technology platform, StellTec, which he says will overhaul some of the outdated practices in aviation finance. Acasta's founder Neal mentioned the technology platform when the deal was announced. He said it gave the Canadian investor a "high level of confidence that the Stellwagen team can deliver".

Brennan argues that aviation finance is behind other industries, and the resulting inefficiencies leaving the space a long way behind financial services in other industries.

"The industry is largely built on email and Excel," he laments.

In particular, he mentions residual value predictions, which he says are too often different from the values predicted by appraisers. For commercial reasons, Brennan does not say much more about the new platform, but admits that a more sophisticated approach to financial modelling will help players in this space to conduct business better.

The software will be targeted at aircraft investors, operators and owners. Dan Evison, who has developed software for Morgan Stanley and specialty finance company Ares Capital, leads the platform.

A regulatory filing by Acasta says the company will provide: "...data visualisations, sophisticated data analysis (including use of machine learning), detailed domain modelling (the world of aircraft and associated financial structures) and complex financial mathematical models."

TransAsia: an uncertain revival

The Taiwanese carrier recently announced plans to close down operations. Michael Allen explains the impact of the closure on the airline's creditors, and discusses what is likely to happen next.

TransAsia Airways announced its closure in November last year. Since then, lessors have been working to get their aircraft out of Taiwan.

Taiwan's TransAsia Airways goes by the name "Revival Airlines" in its native Chinese, but it is uncertain whether the airline can be brought back to life from the financial peril and reputational damage it has fallen into, despite Far Eastern Air Transport (FAT) claiming at the time of writing that it is "80% certain" it will take over the carrier.

Hemorrhaging about NT$10 million (about $90,000) each day, TransAsia has undergone a steady decline after two accidents, just seven months apart in 2014 and 2015, which killed 91 people and damaged the airline's reputation in the eyes of passengers.

Announcing the liquidation of the carrier in November, chairman Vincent Lin said that he chose to dissolve the airline while it still has more assets than liability.

"So we're capable of providing necessary protection to the interests of passengers, employees and partners," he said, adding: "Before exiting Taiwan's civil aviation industry, the 65-year-old airline will do everything we could to shoulder our last responsibilities."

This seems a noble statement, but leasing partners will still be waiting on tenterhooks for information about the fate of their aircraft.

Next steps

The next step for TransAsia Airways from an aircraft financing and leasing perspective is to liaise with its creditors to negotiate the return of aircraft.

"Lessors with aircraft at TransAsia will have to wait for the shareholder vote on the voluntary company liquidation as supported by the board of directors. In the meantime, lessors will have to prepare for their aircraft to be returned. This includes assessing the technical condition of the aircraft and any maintenance or retrofit works needing to be done to find a new home with another lessee," says David Yu, head of Asia for IBA Group.

"Careful monitoring is needed as there will be many different pressures on the company, including customers, creditors and regulators, among others," he adds.

> "Careful monitoring is needed as there will be different pressures on the company, including customers, creditors and regulators, among others."

A banking source tells *Airfinance Journal* that the impact on the aircraft finance and leasing market is not likely to be too big and will not create "overcapacity", because TransAsia's fleet size is relatively small when compared with Malaysia Airlines - another carrier that suffered financial difficulties.

Airfinance Journal Fleets indicates that TransAsia Airways leases aircraft from Awas, Aircastle, Aviation Capital Group (ACG), BOC Aviation, DVB Bank, MC Aviation Partners and Nordic Aviation Capital (NAC).

It leases MSN 2914, an Airbus A320 from Awas; MSNs 7206 and 7375, both A321s on lease from Aircastle; MSNs 6693 and 6734, both A321s on lease from ACG; and MSN 2376, an A320 on lease from BOC Aviation.

DVB Bank leases MSN 1146, an A330-300, to TransAsia; MC Aviation Partners has MSNs 3577 and 3581, both A320s on lease; and NAC has MSNs 567 and 749, both ATR72-600s.

Airfinance Journal Fleets states that the carrier's fleet also includes six A320s, five A321-200s, two A321-100s, four A330-300s, two ATR72-500s and seven ATR72-600s.

Local bank exposure

TransAsia Airways' situation will impact many of the major Taiwanese lenders active in the aircraft finance sector.

While the majority of TransAsia's fleet is leased, about one-third is financed by banks, which will be just as concerned as lessors about minimising the damage to their businesses from the airline's failure. "Most of the bigger players in the Taiwanese banking market actually have exposure with TransAsia, either with secured or unsecured loans," a source in the Taiwanese banking market said, adding that banks were willing to extend credit to the airline because of its strong parent company support.

TransAsia is part of the conglomerate Goldsun Group.

As of 31 December 2015, the carrier said it had secured debts with Taiwan Cooperative Bank (and other banks) of NT$4.24 billion, Mega Bank (NT$1.26 billion), Hua Nan Bank (NT$1.37 billion, spread across three different loans), International Bills Finance Corp (NT$450 million), Chang Hwa Bank (NT$435.4 million), a separate loan from Taiwan Cooperative Bank (NT$390,150), and Hua Nan Bank (NT$48,911).

The airline's unsecured debts were held by Tai Shin Bank (NT$200 million), Bank of Kaohsiung (NT$200 million), Hua Nan Bank (NT$190 million), An Tai Bank (NT$150 million), Agriculture Bank of Taiwan (NT$100 million), Hua Tai Bank (NT$100 million), Far Eastern Bank (NT$100 million) and Union Bank of Taiwan (NT$100 million).

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The sub-total of the secured and unsecured debts amounts to NT$10.14 million, with interest rates ranging from 1.55% to 2.25%.

TransAsia could not be reached for confirmation of whether these comprise all of its debts.

If the airline's liquidation goes ahead as planned, its aircraft will likely be sold off in an auction process. *Airfinance Journal* understands that some international lessors are eyeing the airline's fleet with the hope of buying the aircraft with a substantial discount.

Airfinance Journal Fleets indicates that two A320s, two A321-100s, one A321-200, two A330-300s and four ATR72-600s are on the carrier's books. The total current market value amounts to $310.9 million, while the base value is $315.9 million, according to Avitas.

The most valuable aircraft, a 2014-vintage A321-200 (MSN 6294) has a $44.8 million current market value.

The least valuable aircraft are the two A321-100s, bearing MSNs 731 and 746, which were manufactured in 1997. Their base value is $9.7 million, while current market value is $7.8 million per aircraft.t

"They [TransAsia] are already talking with some buyers, so once the aviation authorities give the approval I think the aircraft can be sold quite quickly," says the Taiwanese banking source.

The source adds that the outstanding loan repayments are "almost equal" or slightly lower to the market value of the aircraft.

"At this moment, all the accounts payable are quite clear, so if the book value of the asset is really the amount they can sell to the lessor it's likely the unsecured creditors will be safe," says the source.

"For the secured creditors, because their aircraft are also quite new – the ATRs are just a couple of years old and the A330s might be a little bit older, but it's still below five years – it might be ok to sell at a good price."

However, one source who has had business dealings with TransAsia argues that the airline initially bought its aircraft for a "relatively high price".

"They had bad knowledge and they had bad negotiating leverage," says the source. "If the aircraft are sold in an auction process, people are not going to be willing to pay as high a price, unless it's high demand for the aircraft types, and I don't think it is in this situation."

Another source from a leasing company with exposure to TransAsia says that some of the aircraft may be easier to sell than others.

"Certainly, the A330s will be a problem, and I think they should have probably sold them earlier, but that would have been a massive book loss," says the source. "For the rest of the fleet it should be a little less problematic."

Uncertainty surrounds the timeline of the process, because it is difficult to know how long the CAA will keep TransAsia's aircraft grounded in Taiwan. The person said that the upcoming Chinese New Year holiday, starting on 28 January, could slow things down and that the Taiwanese banks hope the government can take action quickly to avoid unnecessary damage to Taiwanese reputation with international lessors.

At the time of writing, at least seven aircraft have left Taiwan, including two MCAP A320s (MSNs 3577 and 3581), three BOC Aviation A320s (MSNs 2376, 5055 and 7356) and two Aircastle A321s (MSNs 7206 and 7375).

Convertible bonds

TransAsia Airways is unlikely to be able to honour two convertible bonds due 29 November. Dealogic indicates that this bond is worth $75 million and due 29 November 2018. It was originally priced on 21 November 2013.

The airline also has another bond outstanding that is due 9 October 2017 and matures on 9 October 2019.

It was originally priced in June 2014 for $33.5 million. KGI Securities acted as lead manager and bookrunner and Wu Huang & Partners as issuer attorney.

How Taiwan is similar to Western Sahara

Michael Allen, discusses how cross-Strait relations encroach on the aircraft f nance industry, and shares some insight on an unexpected market move at a Chinese lessor.

I was fascinated to discover that the decades-old dispute between the rival Chinas* extends into aircraft finance. After TransAsia Airways announced its closure in November, lessors swooped in to reclaim their aircraft. Although the process appears to have been going relatively smoothly, we at *Airfinance Journal* wondered why Taiwan has not ratified the Cape Town Convention (CTC).

"I suspect that Taiwan would love to sign the CTC but it can't as it does not officially exist," says one law firm partner with experience of aircraft repossessions.

A partner from another firm notes that Taiwan is also not a party to the Chicago Convention, which established the International Civil Aviation Organization (ICAO), a United Nations agency. Despite being a founding member of ICAO, Taiwan lost its membership in 1971. In September 2016, ICAO did not invite Taiwan to its annual conference in Montreal, saying it follows its parent's "one-China policy" – although Taiwan had been invited in previous years.

"Taiwan is not recognised as a sovereign state by all countries and so therefore cannot be a party to a convention where one or more other parties do not recognise its sovereignty. It's the same for Western Sahara," another lawyer tells me.

If Taiwan ratified Cape Town it would reduce the cost of funding for the country's local airlines, though Taiwan does not seem to be a particularly problematic jurisdiction from which to repossess aircraft compared to other parts of the region.

"There is no attempt by the local authority to try to prevent people from taking [TransAsia's] aircraft out. For the time being, Cape Town is not a big concern for financiers and lessors doing business in Taiwan," a third law firm partner tells me.

One lawyer said the process for TransAsia's repossessions has been going on for – at the time of writing – nearly a month.

"If you are advising somebody on the process you are going to tell them it takes at least a month to get your aircraft back with a cooperative airline," says the lawyer.

With an uncooperative airline there is no quick and efficient way to get your aircraft back using the Taiwanese courts.

"There clearly are defects in the system. It's just we have not had to deal with the defects yet. Far Eastern Air Transport [when it went bankrupt] had a lot fewer aircraft and very few that were on lease," says the lawyer, adding that the TransAsia situation is unpreceded in Taiwan.

Michael Allen, at Airfinance Events' Shanghai conference in June 2016.

So the Taiwan issue is a hot potato not just for politicians but also aircraft finance practitioners. Even to be seen publicly offering me advice on this subject is apparently something to worry about, presumably for fear of angering the People's Republic of China (PRC) and losing business opportunities.

"Taiwan is obviously a sensitive subject in China and so we should not be quoted in this regard," one of the partners warns me.

What CDB Leasing and Mongolian restaurants have in common

In August, we spoke to Donal Boylan, the chief executive officer of CDB Leasing's new aviation department, CDB Aviation Lease Finance. In a two-hour phone call, he spoke at length about the circumstances surrounding his departure from HKAC and his plans to internationalise CDBL's aviation business.

Just a few months later we found ourselves calling the same man to confirm that he would be leaving the Chinese lessor.

Airfinance Journal's exclusive story on this and the appointment of Boylan's successor, Peter Chang, was published the day before the most recent Community of Hong Kong Aviation Professionals (Chaps) networking reception here in Hong Kong, and was consequently one of the hot topics of discussion.

But few seemed to have concrete information on Boylan's departure or Chang's plans, and speculation and gossip prevailed.

From what *Airfinance Journal* can determine, Chang, a Taiwanese-American, appears to have a good deal of experience in the aviation sector, boasting stints at McDonnell Douglas, along with well-known lessors Guinness Peat Aviation, Boullion Aviation, ACG, Aircastle and ILFC.

His business interests also lie outside of the aviation sector, with one source describing him as "entrepreneurial".

One member of Chaps said that Chang has an interest in a chain of Mongolian barbeque restaurants in the northwestern United States. Some post-event research tells me that, indeed, Chang is involved with Chang's Mongolian Grill, a restaurant chain with nine locations throughout Oregon and Washington, according to its Facebook page.

A review posted in December proclaims: "We love Chang's and dine there at least once a month!"

Let's hope Chang can cook up a similar recipe for success in his new role at CDB Leasing.

* The Chinese Civil War (1927-1950) saw the Communist Party of China – the current rulers of mainland China, Hong Kong and Macau – drive their rivals, the Kuomintang, into exile in Taiwan. This led to the creation of two states both claiming to be the sole legitimate governing authorities of China: the People's Republic of China (PRC) and the Republic of China (ROC). The dispute continues to this day.

RRPF's latest instalment

Bobby Janagan, vice-president and general manager of Rolls-Royce Partners & Finance, speaks to Jack Dutton about a new financial structure that maximises asset value for both airframe and engine investors.

Although most airframes last only about 100,000 cycles, engines have the potential to last through several hundred thousand lifecycles if maintained properly.

"After 12 years, the engine takes up a higher proportion of the cost of the aircraft than the airframe does," says Bobby Janagan, vice-president and general manager at Rolls-Royce Partners & Finance (RRPF). "The airframe loses value over time, while engines are homogenous and can last forever if they are maintained properly."

To take advantage of the declining value of the airframe and the more steady value of the engine through the leasing cycle, Rolls-Royce & Partners Finance has been closing deals using a new structure called installed engine leasing (IEL). The UK engine lessor closed an IEL deal with Israeli lessor Global Knafaim Leasing (GKL).

"We entered this deal at a stage when an engine lessor could add value to the transaction and were able to enhance the value of the airframe with our expertise in engines," says Janagan.

GKL and RRPF purchased a 16-year-old Airbus A330-200 from BBAM in July 2016. The aircraft is on a lease to Thomas Cook Airlines. Both the airframe and the engines will be 25 years old when the lease is due to end in 2025.

"After looking for investors, we found GKL were the right fit, given their interest in A330s and our expertise in the Trent 700 engines," says Janagan. "It worked well for both of us to partner and split the revenue and risk of this transaction."

Thomas Cook paid the lease rentals for the aircraft to a special purpose vehicle based in Ireland. According to Janagan, once the payments have been received, they are split in a way that reflects the residual value of the airframe and the engine.

Although GKL has a background in remarketing aircraft, it was the first time it had bought an airframe in a structure like this. The Israeli leasing company has a fleet of 13 aircraft, comprising four A320s, three Boeing 737-800s, two 767-300ERs, one A319, one A321-200, one A340-300 and one 757-200, according to *Airfinance Journal*'s Fleets.

GKL Leasing paid $12 million for the airframe and RRPF paid the balance of the amount due to the seller by purchasing the engines. GKL's investment was funded from its own cash, although the structure is flexible enough to enable GKL to leverage its investment sometime in the future. To increase liquidity, the company drew the balance of its standby credit facility – $7 million – out of a total facility of $12 million granted to it by an Israeli bank in December 2015.

RRPF closed a similar transaction with DVB Bank in January 2015, when it completed a sale and leaseback to finance V2500-A5 engines installed on five A320s. The aircraft were subject to existing leases purchased from Mitsui & Co US and are all on lease to an airline in the Americas region.

The transaction marked the first installed engine leasing deal but it had a shorter lease term than the GKL deal, with terms ranging between four and five years.

The deal helped aircraft investors realise the full value of assets approaching the later stages of their economic lifecycle.

Component leasing vs IEL

"People have done less complicated structures, when they have simply formed a joint venture (JV) vehicle to own the aircraft together or split the ownership of the airframe and engines after stepping into an existing lease by re-structuring the single aircraft lease into separate leases – I would call this component leasing," says Janagan. "However, in our transaction, the ownership of the airframe and engines is split, but the airline sees one lessor manager, GKL. In component leasing, they see two different parties. This structure is less complicated and the lease remains intact."

Although installed engine leasing involves the same amount of parties as a component lease, it is simpler for the airline, which instead of working directly with two different companies in component leasing, is working with only the aircraft manager.

Despite being an efficient structure that is less complicated for the lessee, like any aircraft investment there are risks involved for both the airframe and the engine investors.

"There is the residual value risk for the airframe investors," says Janagan. "At the end of the lease they need to liquidate the airframe; however, by entering the transaction they don't need to worry about the engine residual values. Engines are much more complex. We are expert in that field, thus the interests are aligned. The second risk is what happens if the lessee goes into default, and you have to repossess the aircraft?" he adds.

In such a case, GKL, being the manager of the aircraft, will be leading the repossession of the aircraft and finding a new lessee for it with support from RRPF.

Janagan says: "Aircraft lessors and investors of older aircraft will find that this kind of transaction managed by RRPF provides them with an alternative way to profitably exit from their investment. Engine lessors can help investors realise the value of older aircraft."

DVB's search for volatility

David Goring-Thomas, the new member of the board of managing directors responsible for the German bank's aviation business, speaks to Jack Dutton and Olivier Bonnassies about his plans for the department and the bank's recovery after declaring its first-ever loss in 2016.

Although the aviation industry is enjoying strong profits, the same cannot be said for the shipping industry, which has seen its profits go overboard since the 2008 financial crash.

German lenders, which provide about a quarter of the world's $400 billion in shipping loans, were hit hardest by the global shipping crisis, caused by slowing trade and poorly timed investments in larger assets.

Frankfurt-based DVB Bank, bearing the weight of €11 billion ($11.5 billion) (as of 30 September 2016) in shipping loans, had been feeling the effects of the crisis for several years but these effects were particularly pronounced in 2016, when the bank posted a consolidated net loss of €27.3 million before taxes for the first nine months of the year.

This was the first time the company had recorded a loss since it became a transportation-specialised bank in 1998. Along with the persistent shipping crisis, the European Central Bank's low-interest rate policy and the high costs spurred by banking regulation led to a poorer financial performance from DVB in 2016.

Continuation of good work

The year 2016 also saw changes in the bank's board. David Goring-Thomas took the helm of its aviation division in early December after Bertrand Grabowski, the former bank director at DVB responsible for aviation, left to pursue other projects. Grabowski had been the face of the board of directors for aviation business at DVB Bank for a decade, and would be a tough act to follow.

Speaking to *Airfinance Journal* from DVB's offices in the City of London just two weeks into his new role, Goring-Thomas plays down the impact of the bank's overall results on the aviation business. He says his leadership style is different to Grabowski's, but having worked closely with him for more than 11 years and worked at DVB for over 17 years, he looks to "continue his good work".

"2015 was a disappointing profit, while 2016 will, as we have reported, be a low triple-digit loss," says Goring-Thomas. "This significant loss has been mainly caused by the deep, long crisis in the shipping sector."

He adds: "The majority of exposures in the shipping business causing impairments and losses at the bank were booked more than five years ago. If you look back with hindsight, there appears to have been an over-enthusiastic approach which has come back to haunt us."

It is a case of continuing to manage those legacy exposures and, while some impact will be reflected in the bank's budgeted numbers next year, Goring-Thomas expects a recovery in the 2017 financial year.

For the first nine months of 2016, DVB closed a total of 102 transactions generating €4.2 billion in new business volume compared with 137 transactions with a volume of €5 billion in the previous year's corresponding period. Much of its aviation business is lessor-centric, with the bank closing a majority of more than 50 transactions a year with leasing companies. Overall, the bank expects to book more than $3 billion of new loan business for its own account in aviation finance in 2016.

"At operating levels, excluding impairments, aviation, shipping and land transportation continue to produce healthy numbers," says Goring-Thomas.

"We are able to demonstrate a robust performance across our divisions, and in new shipping cases the risk-reward is certainly accretive to the business. A bit tongue in cheek, but I would like to see more of this on the aviation side, which is currently under greater margin pressure."

It is a good time to be underwriting new shipping business because the industry is at a low point.

The aviation-lending portfolio represents 34% of DVB Bank's total credit volume, compared to shipping's 47% share. Goring-Thomas says there has always been a desire at the bank to see the aviation proportion grow.

> "In hindsight there appears to [have been] an overly-enthusiastic approach that has come back to haunt us."

Opportunities during volatility

"We will see a tendency to a more balanced exposure in the future, but we tend to grow the aviation book more aggressively in times of greater volatility or uncertainty," says Goring-Thomas.

He adds that current market conditions are very competitive in the aviation sector. "We remain prudent and disciplined and will not over-lend in terms of loan advance payments or balloon profiles and resist covenant deteriorations.

"What we have seen over the past two years is an erosion of our net margin. That reflects where we are in the industry, and indeed liquidity cycle, and we would expect a turn in net margins and overall better opportunities as the cycles turn."

Despite heading for a loss in 2016 at bank level, DVB retains the confidence of investors. DVB Bank's parent, DZ Bank, announced a capital injection in November, and Standard & Poor's and Moody's (the latter ratings are unsolicited and unsponsored) have each recently endorsed DVB Bank ratings, and as such Goring-Thomas does not see any changes in the cost of liquidity as a result of recent announcements.

As a lender, the bank has a close eye on the capital requirements.

Banks have until 2019 to meet Basel III, but it is clear that regulators are moving beyond the Basel III requirements and asking banks to meet even higher standards.

"There is a lot of speculation [on Basel IV] and its outcome. The reality is great opposition to the current proposals across the board, not only in our industry," says Goring-Thomas.

"In the current proposal, for example, there is hardly any differentiation in terms of loss given default, between aircraft-backed secured lending and unsecured lending. This would take us back to the Basel I environment we were in. In fact, Basel I ratios continue to be ratios we need to observe," he adds.

DVB is actively lobbying with its own regulator, also providing data together with other members of the Aviation Working Group.

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David Goring-Thomas, the new member of the board of managing directors responsible for the German bank's aviation business.

"The data we and the other banks provide clearly demonstrate that some of the current proposals are flawed. Nevertheless, the final outcome remains uncertain, and new regulations would only take effect from 2021-2025," he adds.

Banking on pensions

Although the industry is seeing an increasing amount of new financing sources, notably from pension and insurance funds, Goring-Thomas does not see a link between the insurgence of non-bank financing and current and upcoming bank regulation such as Basel III and Basel IV.

"Personally, I don't think that there's necessarily a link here. It's just a trend, and I think that trend will continue for insurance and pension fund interest in aviation, more specifically aircraft assets, because of the nature of the assets, and the long-term and stable cash flows that they generate."

Goring-Thomas believes the trend is here to stay but also recognises that Basel IV could shift the balance of sources of aircraft financing. He adds that this shift is "an assumed development" and his bank has been working to "embrace that development".

DVB Bank also has been entering new markets to keep up with changes in the aviation finance landscape. In the fourth quarter of 2016, the bank closed its first debt fund initiative, raising $400 million. The deal was with a German asset manager and German pension provider where DVB is sourcing aircraft finance senior loans. The senior loans can be for airlines or lessors.

"This development is strategic for us and we expect the activity in our debt fund business to grow because it is very complementary to what we do today. We're not the largest bank, so unlike some of our competitors, we can't write a billion-dollar cheque for a big leasing company."

Goring-Thomas adds that future debt fund initiatives implemented by the bank will most likely not cover predelivery payments financing or end-of-life transactions, but instead "anything in the middle". He adds that Investec Bank has also been active in this area. DVB looks to double, at least, the scale of this activity in 2017.

Goring-Thomas adds that the model could be replicated in other jurisdictions.

"This particular initiative is with German partners," he says, "but we see a lot of inward interest and this is based upon the reputation we have. There may well be opportunities to grow the activity with our current partners, but we fully expect there will also be opportunities for other initiatives with other investors."

New players

Those investors could potentially come from Asia. "There's strong interest from China and Japan," he says. "There's increasing interest from Japanese regional banks, and we'll try and embrace that. That's more on the senior debt initially but we are also seeing interest in the equity business as well."

Goring-Thomas notes that the Korean market seems to be maturing. "There still seems to be plenty of appetite but it seems more informed, and with a more disciplined approach, compared to some of the transactions that have been written in the past."

He adds that his colleagues in Singapore speak about new Chinese leasing companies coming to DVB interested in buying aircraft "almost every week".

Goring-Thomas says: "I assume the investor money backing the likes of Accipiter and Goshawk is fairly long-term and here to stay. The US private equity firms and hedge funds have typically been less predictable and have generally followed where they can get the best yield."

Historically, DVB has benefited from periods of volatility, attracting more business when other competitors have left the market. The bank also finds financing opportunities with some of the newer entrants, as they will initially require a better understanding of assets than the more established names.

The DVB Bank aviation platform has four main commercial pillars: structured lending, investment management, asset management and advisory, each supported by a specialised research group.

DVB's asset management team has grown steadily, from three employees in 2007 to more than 20 in 2016. It has more than 170 aircraft under management.

The bank's aviation investment management team, Deucalion Aviation Funds, manages more than 130 aircraft. DVB is the asset manager for the majority of the aircraft under investment management by Deucalion, which is a fund management business with the majority of the equity provided by institutional investors but with DVB having a minority investment in every transaction.

With a team of only four, DVB's other commercial pillar, its advisory business, is much smaller than its asset management business or Deucalion, but that has not stopped it from being one of the most active DVB teams in recent months. The team has worked with the likes of

DVB's offices in London.

> "The US private equity firms and hedge funds, have typically been less predictable and have generally followed where they can get the best yield."

LOT Polish Airlines, Royal Jordanian and Air Cote D'Ivoire on commercial transactions.

Goring-Thomas says: "The situations where we are typically pretty strong are when the airline is considering which way to go – whether it's into the commercial market, the export credit market, if available, or sale and leaseback, and we'll help them with that assessment. Then, once they complete that assessment, we'll help them execute the relevant fund raising."

To return to profit in 2017, Goring-Thomas says the bank will need to continue to manage proactively the work out cases, especially on the shipping side of the business.

"The work out cases won't solely be in shipping and offshore; we'll have the odd transaction pop up every now and then on the aviation side, or elsewhere," he says.

"I think the interesting thing at the moment is that, as aviation board member and also board member responsible for land transport, I can complain about margins right now. That's a reflection of the current state of those industries – more competition, more liquidity available – but I think we're definitely going to see some good opportunities in the shipping space."

Goring-Thomas says that the prospects in 2017 still look positive for airlines, but perhaps not to the level of 2016. He adds that there are always markets or airlines that can pose individual challenges.

"In general, we wish for a bit more volatility. Bertrand described the situation at the moment as 'the perfect reverse storm', but there are some signs that that storm will change."

Goring-Thomas on Deucalion and DVB's airline investments

Deucalion Aviation Funds, DVB Bank's aviation investment management business, was established in 2001. It now manages more than 130 aircraft.

A major milestone was in February 2015, when Deucalion closed its debut asset-backed securities (ABS) transaction, raising $667 million. The ABS supported a portfolio sale of 20 mostly Airbus aircraft, on lease to 13 operators. DVB remained the servicer of the aircraft. The deal supported the equity sale of 90% of the portfolio to an undisclosed private equity fund.

Asked whether Deucalion is likely to return to the ABS market, David Goring-Thomas says the focus of the Deucalion business is not volume.

"We're not a lessor or interested in coming high up in a league table," he says. "The focus of the business is to be an investment management business, managing institutional investors, including DVB, for target financial returns, which in turn is closely aligned and cooperating with our asset management team, in order to provide an overall [aircraft] servicer solution for investors wanting to take physical asset risk.

"It's a different focus to that of a more traditional operating lessor – we're not making any speculative orders. It's not volume for the sake of volume; it's very much driven by the expected return and investment criteria of our investors. We will have a keen eye on when the right exit and/or refinancing opportunities are available and the ABS that Deucalion sponsored in 2015 was a good option at that time for a refinancing."

He adds that the team will continue to follow – aided by regular approaches by the investment banking community – potential refinancing or portfolio sale opportunities in the ABS market.

"I would certainly see opportunities to repeat that as the market develops and obviously in 2016 we've seen a number of ABS transactions. At DVB, we've been involved in some of those transactions, either as right lead or co-manager or as liquidity facility provider."

DVB Bank also has previously invested on a minority basis in two airlines: AirAsia and Wizz Air. The bank raised €43 million in February 2015 for selling 80% of its stake in Wizz Air. The bank's strategy, according to Goring-Thomas, is to invest in a carrier pre-initial public offering, but not as venture capital at absolute start-up stage.

"I guess the outcome of both of those was pretty positive and tough to follow," he says. "With a bit of patience, particularly with Wizz Air, those investments were a great success. We would certainly allocate a certain portion of our DVB equity available for investments to that type of situation in the future, although it's by far not the main focus of our business."

an Airfinance Journal
special supplement

AIR INVESTOR 2017

Appraisers' views on 2017

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

What was the most important event in 2016?

Stuart Hatcher, chief intelligence officer, IBA:

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

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

David Tokoph, chief operating officer, MBA:

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

Rob Morris, global head of consultancy, Ascend:

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

Angus Mackay, principal, ICF International:

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

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

"The US presidential election."

Olga Razzhivina, senior Istat appraiser, Oriel:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Do you expect interest rates to rise in 2017?

Hatcher:

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

Tokoph:

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

Morris:

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

Mackay:

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

Razzhivina:

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

Views on values

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

THE APPRAISERS

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

Avitas
Martin O'Hanrahan, director, asset valuation

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

MBA
Lindsey Webster, director asset valuations

Oriel
Olga Razzhivina, senior Istat appraiser

IBA
Jonathan Bautista-Trimming, aviation analyst

Youcef Berour Minarro, aviation analyst

Jonathan McDonald, senior aviation analyst

ICF International
Angus Mackay, principal

THE ASSUMPTIONS

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

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

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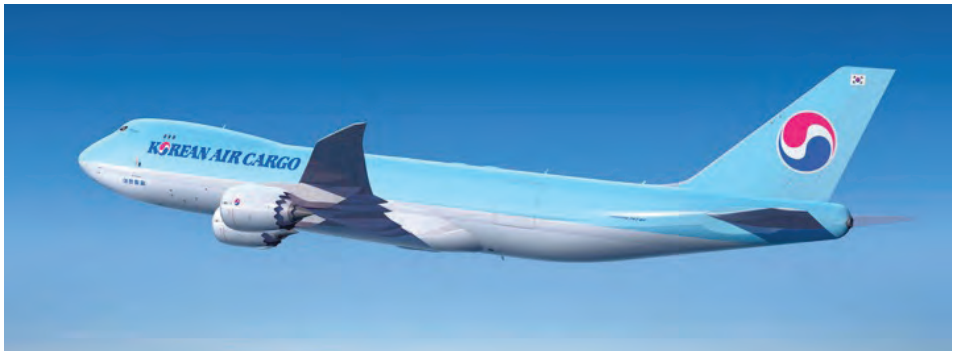
Boeing 747-8

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

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



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

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

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

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

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

Future developments

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

Airbus A380

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

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

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

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

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

Assuming standard Istat criteria.

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

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

Future developments

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

Boeing 787-9

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

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

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

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

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

Assuming standard Istat criteria.

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

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

Future developments

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

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

Airbus A350-900

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

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

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

Assuming standard Istat criteria.

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

* Build year 2014 / delivery 2015

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

Future developments

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

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Boeing 737-800

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

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

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

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

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

Assuming standard Istat criteria.

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

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

Future developments

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

Airbus A320-200

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

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

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

Assuming standard Istat criteria.

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

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

Future developments

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

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

Embraer E190

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

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

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

Future developments

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

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

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

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

Assuming standard Istat criteria.

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

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

Bombardier Q400

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

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

Assuming standard Istat criteria.

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

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

Future developments

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

Boeing's 737-800 reaches summit

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

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

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

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

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

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

Single-aisle aircraft – still on top

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

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

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

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

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

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

SINGLE AISLE

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

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

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

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

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

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

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

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

CSeries

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

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

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

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

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

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

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

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

Widebodies – remarketing concerns

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

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

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

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

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

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

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

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

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

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

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

Regional aircraft – deals to be found?

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

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

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

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

TWIN AISLE

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

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

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

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

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

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

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

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

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

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

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

METHODOLOGY

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

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

ENGINE CHOICE

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

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

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

REGIONAL

Aircraft Type	Residual value	Value for Money	Operational success	Remarketing Potential	Overall score	Last year's score	Difference from last year
ATR72-600	3.54	3.70	4.18	3.67	3.77	4.04	-0.27
E175-E2	3.42	3.20	5.00	3.10	3.68	3.53	0.15
ATR72-500	3.29	3.58	4.08	3.15	3.53	4.00	-0.47
E190-E2	3.73	3.44	n/a	3.30	3.49	3.71	-0.22
Q400	3.47	3.38	3.54	3.57	3.49	3.30	0.19
ATR42-500	3.45	3.50	3.50	3.15	3.40	3.67	-0.27
E190	3.12	3.40	3.86	2.93	3.33	3.31	0.02
E195-E2	3.45	3.33	n/a	3.00	3.26	3.66	-0.40
ATR42-600	3.18	3.50	3.36	2.91	3.24	3.81	-0.57
E175	2.93	3.15	3.71	3.13	3.23	3.43	-0.20
E195	2.69	3.07	3.29	2.79	2.96	3.07	-0.11
CRJ900	2.64	2.75	3.46	2.71	2.89	2.99	-0.10
E170	2.53	3.17	3.00	2.67	2.84	2.90	-0.06
CRJ705	2.30	2.67	2.70	2.40	2.52	2.33	0.19
CRJ700	2.14	2.58	3.08	2.00	2.45	2.38	0.07
MRJ	2.63	2.57	n/a	2.13	2.44	n/a	n/a
ERJ-145	1.67	2.21	3.04	1.71	2.16	1.72	0.44
CRJ200	1.44	2.50	2.92	1.73	2.15	1.39	0.76
CRJ1000	2.07	2.69	2.00	1.79	2.14	2.47	-0.33
C919	1.71	2.67	n/a	1.29	1.89	n/a	n/a
SSJ-100	1.67	2.38	2.00	1.50	1.89	1.94	-0.05
ERJ-140	1.14	2.00	2.21	1.36	1.68	1.56	0.12
MC-21	1.57	2.17	n/a	1.29	1.67	n/a	n/a
ARJ21	1.33	1.80	1.60	1.33	1.52	n/a	n/a

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

The numbers

Aircraft data index

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

Technical characteristics

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

Fuels and times

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

Indicative maintenance costs

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

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

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

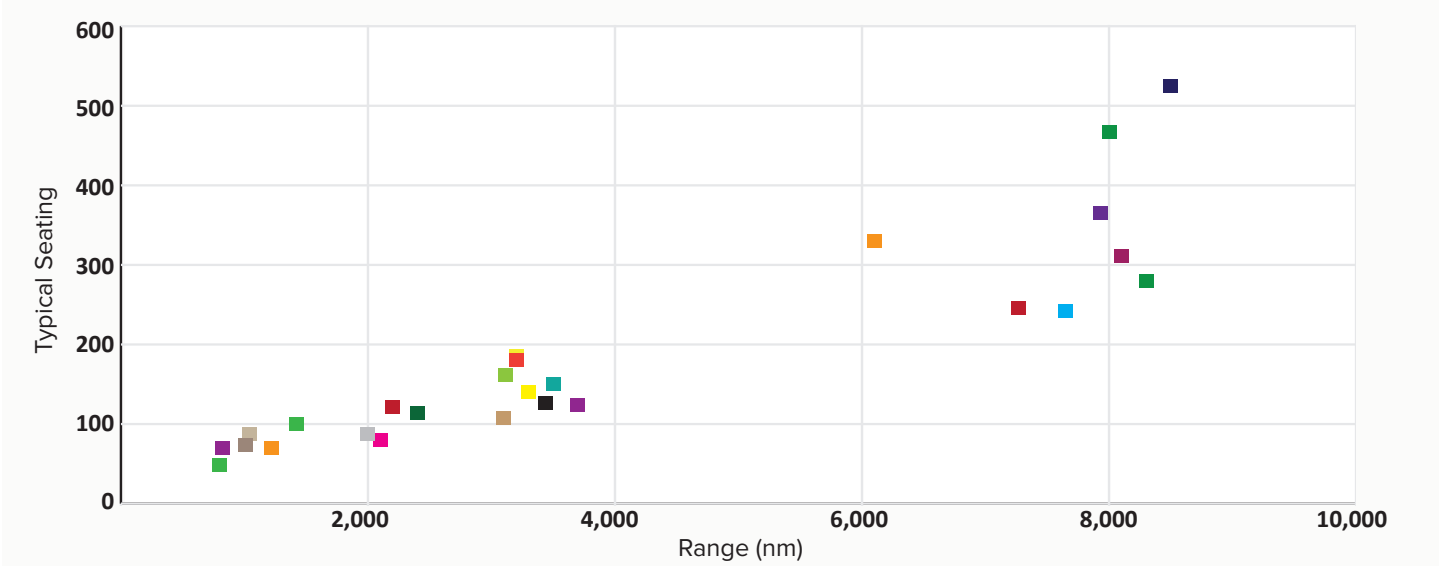
The information used to estimate the indicative maintenance reserves has been collected from a wide variety of sources. While *Airfinance Journal* has made every effort to normalise the data, direct comparisons between aircraft types may be misleading.

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

Seating/range

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

Seating and range for current production aircraft



A319

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

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

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

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

Source: *Airfinance Journal* Fleets December 2016

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

A320ceo

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

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

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

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

Source: *Airfinance Journal* Fleets December 2016

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

A320neo

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

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES

Insufficient data available

A321-200

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

Source: *Airfinance Journal* Fleets December 2016

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

A330-200

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

Source: *Airfinance Journal* Fleets December 2016

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

A330-300

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

Source: *Airfinance Journal* Fleets December 2016

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

A350-900

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

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

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

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

Source: *Airfinance Journal* Fleets December 2016

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

A380

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

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

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

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

Source: *Airfinance Journal* Fleets December 2016

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

ATR42-600

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

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

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

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

Source: *Airfinance Journal* Fleets December 2016

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

ATR72-600

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

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

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

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

Source: *Airfinance Journal* Fleets December 2016

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

Boeing 737-700

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

Source: *Airfinance Journal* Fleets December 2016

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

Boeing 737-800

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

Source: *Airfinance Journal* Fleets December 2016

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

Boeing 737-900ER

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

Source: *Airfinance Journal* Fleets December 2016

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

Boeing 747-8I

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

Source: *Airfinance Journal* Fleets December 2016

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

Boeing 777-200LR

SEATING/RANGE		
Max seating	440	
Typical seating	301	three class
Maximum range	9,395	nm (17,395 km)

TECHNICAL CHARACTERISTICS		
MTOW	347.5	tonnes (766,000lbs)
OEW	137	tonnes
MZFW	191	tonnes
Fuel capacity	181,280	litres/202,570 litres
Engines	GE90-110B1	/GE90-115BL
Thrust	110,000	lbs - 115,300lbs (489 -512 kN)

FUELS AND TIMES		
Block fuel 1,000 Nm	14,140	kg
Block fuel 2,000 Nm	26,350	kg
Block fuel 4,000 Nm	50,780	kg
Block time 1,000 Nm	152	minutes
Block time 2,000 Nm	277	minutes
Block time 4,000 Nm	525	minutes

FLEET		
Entry into service	2005	
In service:	57	
Operators (current and planned)	14	
In storage	2	
On order	none	
Built peak year (2009)	16	
Estimated production 2017	none	
Average age	7.6	years

Source: *Airfinance Journal* Fleets December 2016

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

Boeing 777-300ER

SEATING/RANGE		
Max seating	550	
Typical seating	365	three class
Maximum range	7,930	nm (14,685 km)

TECHNICAL CHARACTERISTICS		
MTOW	351.5	tonnes (775,000lbs)
OEW	168	tonnes
MZFW	238	tonnes
Fuel capacity	181,280	litres
Engines	GE90-115BL	
Thrust	115,300	lbs

FUELS AND TIMES		
Block fuel 1,000 Nm	15,610	kg
Block fuel 2,000 Nm	29,840	kg
Block fuel 4,000 Nm	60,900	kg
Block time 1,000 Nm	152	minutes
Block time 2,000 Nm	277	minutes
Block time 4,000 Nm	525	minutes

FLEET		
Entry into service	2003	for ER (1997 for original -300)
In service:	701	plus 60 non ER models
Operators (current and planned)	46	
In storage	1	
On order	125	
Built peak year (2013)	80	
Estimated production 2017	65	
Average age	5.0	years

Source: *Airfinance Journal* Fleets December 2016

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

Boeing 787-8

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

Source: *Airfinance Journal* Fleets December 2016

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

Boeing 787-9

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

Source: *Airfinance Journal* Fleets December 2016

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

BOMBARDIER CRJ700

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

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

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

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

Source: *Airfinance Journal* Fleets December 2016

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

BOMBARDIER CRJ900

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

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

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

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

Source: *Airfinance Journal* Fleets December 2016

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

CRJ1000

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

Source: *Airfinance Journal* Fleets December 2016

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

Q400

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

Source: *Airfinance Journal* Fleets December 2016

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

CS100

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

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES
Insufficient data available

CS300

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

Source: *Airfinance Journal* Fleets December 2016

INDICATIVE MAINTENANCE RESERVES
Insufficient data available

E170

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

Source: *Airfinance Journal* Fleets December 2016

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

E175

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

Source: *Airfinance Journal* Fleets December 2016

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

E190

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

Source: *Airfinance Journal* Fleets December 2016

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

E195

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

Source: *Airfinance Journal* Fleets December 2016

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

NEW AIRCRAFT MARKET VALUES ($ MILLIONS)

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

LEASE RATES ($000S)

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

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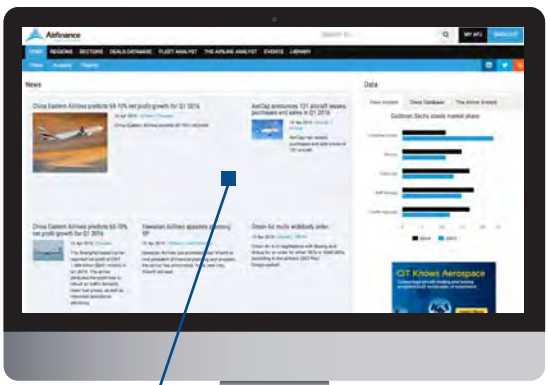

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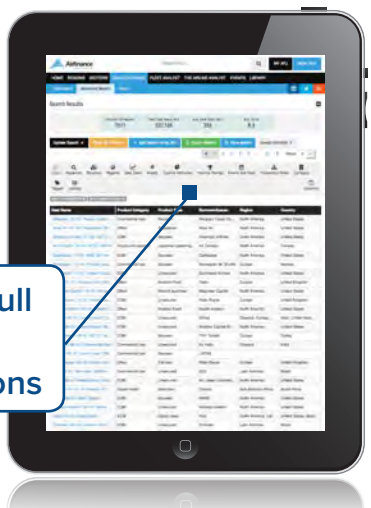

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Plueger: higher share prices here to stay

In early December, ALC's shares were trading at a 52-week high. After months of trading below book value, this is welcome news for the leasing company. Joe Kavanagh speaks with the lessor's chief executive o˜ cer, John Plueger.

"Over the last three or four months, I have seen a renewed interest in looking at our sector. We've spoken to many, many new investors that are now looking at the space," says John Plueger, chief executive officer of Air Lease (ALC).

In December, ALC's share price was trading above $37 a share, up more than 30% from October's price of about $28 a share. But in recent months, few leasing executives have spoken positively about share prices. Fears of a widebody glut and concerns about the impact of cheap fuel on demand for new aircraft leases have put pressure on the share prices of public aircraft lessors.

Speaking about the recent improvement in ALC's valuation, Plueger states his belief that this is a "new norm" for the company.

Whether ALC's high valuation holds in 2017 depends on how much of the improvement is down to the post-election rally in US stock, and how much is down to increased investor confidence in the aircraft-leasing sector.

Plueger argues that higher prices are here to stay. He attributes ALC's stock improvement to a handful of factors. Because investment firms think of aircraft lessors as speciality finance companies, he says, there is more optimism about their prospects in a higher interest rate environment. A likely cut in corporate tax under the new US administration is also helping. Finally, Plueger says, ALC's "consistently strong results" have also convinced investors about the company's health.

He notes that the whole sector has been undervalued of late, which he says was "grossly incorrect and unfair", and adds: "Even back in the ILFC days and [during the years following] 9/11, our business performance was very stable, producing good returns for the shareholders and good business results. Trading below book value was just an untenable long-term outcome. But I think now we're all trading above book value again, which we should."

The new administration

Plueger is optimistic about the effects of President Trump's administration on ALC's business, particularly his promise to slash corporation tax to 15%, from its top marginal rate of 25%.

"For us, a lowering of the US corporate tax rate would be huge, especially against our peers, who are Dublin-based," he says.

Although the change would have little material effect on ALC's cash flow, it would help to satisfy the perennial Wall Street question of how well ALC could compete with its rivals which are based in Dublin, where the trading rate for corporations is 12.5%.

"We have always had to explain why we want to be a US company that has to provide for a higher tax rate on our profit and loss account," says Plueger.

"However, because of the benefits of the US tax code, we don't actually pay US income taxes, simply because we have accelerated depreciation under the US tax code which puts us in a tax-loss position. As long as we continue to buy a modest amount of aircraft every year and depreciate them pursuant to the tax rules, we actually are cash tax free."

He adds: "If there is a reduction in corporate taxes, that will mitigate much more of the questions that we get from investors on that point."

> "For us, a lowering of the US corporate tax rate would be huge, especially against our Dublin based peers."

John Plueger, Air Lease's CEO.

Order deferrals

There has been a flurry of order deferrals from major carriers in recent months, which may cause concerns for leasing companies with orderbooks from the manufacturers.

On its last earnings call, ALC revealed it had placed 82% of its aircraft orderbook through 2019 with leasing customers. But although its near-term future looks secure, large deferrals like the ones seen by United Airlines, Southwest and Turkish Airlines may cause lessors to struggle to place aircraft in the longer term.

However, speaking about the deferrals, Plueger says he is "delighted to see it", because it will allow ALC to buy more aircraft opportunistically.

He sees the moves as evidence that airlines are treading carefully around potential capacity problems, and exercising more discipline than they have historically.

"What we've been saying is that there actually is rationality both on the supply side and the airline side," he says.

Plueger adds: "For us at ALC, it's great because we always find ourselves short of aircraft. To the extent that those deferrals free up positions that I might need incrementally to place with airlines. We've been very successful placing our orderbook over the next two or three years, and we need aircraft because we have demand. So for me it represents opportunity and part of our growth plans." ^

Cheung Kong puts aviation under one roof

Michael Allen discusses how the Hong Kong property company's ownership realignment of its aviation businesses will give it more cash for aircraft investment.

Hong Kong conglomerate Cheung Kong's realignment of its aviation businesses did not attract a great deal of media attention. The reason for the restructuring is not easy to discern on a first reading of the company's filing with the Hong Kong Stock Exchange, but nevertheless the quiet move is a strategic realignment of the company's business that will help it grow its fleet.

The stock exchange filing rather confusingly named multiple offshore entities – CKP Sub (Accipiter Investments), CKHH Sub (CK Capital Investment), CK Capital, LKSOF (Li Ka-Shing Overseas Foundation), Harrier Global – as well as Japan-incorporated MCAP and joint venture company Vermillion Aviation Holdings (Vermillion) as being involved in the deal.

According to a senior executive at Cheung Kong Property, the deal is a straightforward reorganisation of Cheung Kong's aviation businesses to bring them under one roof.

Stripping away the complexities of the offshore entities, the reorganisation moves Accipiter and Vermillion to Cheung Kong Property.

"We had two CK-listed entities that had invested in aircraft assets. We are just tidying things up with one entity deciding to be the sole investor in the space," Gerald Ma, executive committee member and general manager, CBD, tells *Airfinance Journal*.

Dublin-based Accipiter, which is wholly owned by CK Hutchison, has a portfolio of 43 aircraft, comprising 20 Airbus A320s, one A321, an A330-300, a Boeing 737-700, 14 737-800s, five 737-900ERs and one 777-300ER.

Vermillion is a joint venture, with Li Ka-shing controlling a majority stake via Cheung Kong (Holdings) (50%) – now merged into CK Hutchison – and Li Ka-shing Overseas Foundation (10%), with Japanese lessor MC Aviation Partners (MCAP) holding the remaining 40%.

After the deal, instead of Accipiter being fully owned and Vermillion being 40% owned by CK Hutchison, both companies will be owned by Cheung Kong Property, via its subsidiary Accipiter Investments.

Previously, the companies were owned by separate offshore entities, albeit ultimately owned by the same parent. Now the companies are both owned by the same offshore entity and the same parent.

What is more interesting about the deal is what it says about Cheung Kong's growth ambitions. Sources tell *Airfinance Journal* that transferring the aviation businesses to CK Property will give them more access to cash, because the company is in a better cash position than CK Hutchison. CK Property was spun off from CK Hutchison in 2015 as part of a restructure of the conglomerate and began trading independently on 3 June 2015.

Cheung Kong's business realignment will not affect its A2 Moody's rating.

A source at MCAP, which is involved in the Vermillion joint venture, says MCAP is happy with the transfer because it should put the joint venture in a better cash position as CK Property has been benefiting from the sale of property.

"Having available cash is a key criteria in terms of what we are looking for in terms of a financial partner," says the source.

In the stock exchange filing, CK Property hinted at its ambitious plan for growth for the aviation businesses, saying that during the second half of 2016 it has acquired, or is committed to acquire, a total of 36 aircraft, including 30 Airbus narrowbodies and six Boeing narrowbodies.

It adds that "such acquisition and the present sale and purchase transactions" mark the beginning of the plan to build the business into a "meaningful size and are consistent with its current strategy to broaden its income growth prospects through diversification and globalisation based on its stringent investment criteria", though it does not state what those criteria are.

Cheung Kong's Ma declines to give forecasts on growth, saying only: "If the returns makes sense, we will continue to grow."

Moody's: CKP stays stable

Cheung Kong Property Holding's acquisition of aircraft leasing businesses from another Cheung Kong company will not affect its A2 stable credit rating, says US ratings agency Moody's.

"The transaction is in line with CKP's strategy to acquire quality assets with good recurring cash flow, and will only marginally increase its debt leverage to levels that remain appropriate for its A2 rating," says Franco Leung, a Moody's vice-president and senior credit officer, in a statement.

Moody's expects the property business will remain CKP's core focus and that its net debt/net total capitalisation will rise to 10%-12% over the next one to two years from 2.6% at end-June 2016, including the debt of CK Capital that will be consolidated into CKP's balance sheet.

Moody's says it will continue to monitor the expansion plans and capital requirements of the aircraft leasing business, as well as the overall impact on CKP's risk profile. The transaction will likely increase CKP's capital expenditure and funding needs as the business enlarges its aircraft portfolio.

The impact of international tax reform on aviation finance

Pieter Burger, tax partner at Deloitte, looks into the recent global tax developments and how they may a˜ ect lessors and airlines.

Last year was extraordinary in many, many respects. Apart from significant unexpected political developments, unprecedented sporting achievements, the hottest year on record, to name but a few, it was also a year marked by incredible leaps forward in international tax reform.

Following on from the issue of the final deliverables of the OECD's Base Erosion and Profit Shifting (BEPS) plan in October 2015, the EU Anti-Tax Avoidance Directive (ATAD) was unanimously approved in June 2016 – a consensus that seemed a long shot when the draft proposal was first published in January 2016.

In addition, of significant importance to aircraft lessors and airlines is that on 24 November 2016 the agreed text of the Multilateral Convention to Implement Tax Treaty-Related Measures was released. More than 100 countries participated in its negotiation with countries expected to sign this convention on 5 June 2017. More than 2,000 double tax treaties (about two-thirds of the worldwide total) could be amended through this new convention, with the first changes likely to have effect from as early as 1 January 2018.

The question naturally arises what the impact of these recent developments are on the aviation finance and broader aviation industry. In light of all of the above, Deloitte has been working with Euromoney Institutional Investor Thought Leadership in the background to conduct a comprehensive survey. This survey of more than 400 senior executives from the aviation finance industry, as well as in-depth interviews conducted with senior industry executives and independent experts, was recently completed. The full survey and accompanying report extends to over 35 pages and four chapters and is aimed at shedding further light on questions such as, among others:

- will BEPS and related tax reforms change the current geographic footprint of aircraft lessor operations?
- who will ultimately bear additional compliance and tax cost as a result of international tax changes – lessors or airlines?
- in light of ongoing uncertainty, what action can and should be taken now and what are others in the industry doing?
- which jurisdiction will show the fastest growth over the next five years as a location of choice for basing aircraft leasing operations?
- will tax reforms impact how and where leases are originated, negotiated and executed? and,
- is Brexit a concern?

One of the main messages that came out of the survey was that while there was a general consensus that BEPS and the EU ATAD will have a widespread effect on aviation finance, the majority of respondents felt the impact would be largely moderate. Results suggest a perception that the changes will have more of an impact on aircraft lessors as opposed to airlines.

> "Some 50% of respondants agree that proposed tax treaty changes will have an impact on the negotiation of aircraft lease agreements"

So why is it that the changes are perceived to have a moderate impact? A possible explanation could be the fact that airlines and aircraft lessors tend to have significant substance already in their headquarter jurisdictions.

A simplistic way of describing the aim of global tax reform is that it seeks to realign the taxation of profits with real economic substance – ie, tax profits in the jurisdictions in which they are earned. For real, substance-based operations the overall impact of BEPS and ATAD should generally not, in principle, be a concern. As Bertrand Grabowski, the former managing director, aviation finance, at DVB Bank, puts it in the report: he is "not aware of any aviation leasing company established in a tax jurisdiction where it doesn't have its own business operation".

Aircraft leasing operations engage in substantial business activity that in the vast majority of cases is already taxed where such operations are performed. In such cases, the

Pieter Burger, tax partner, Deloitte.

impact is likely to be more in areas such as managing inadvertently creating permanent establishments in customer locations under new rules, assessing the possible impact of interest deductibility restriction rules, managing country-by-country reporting and other new transfer pricing rules and requirements, and the possibility of new EU controlled foreign company (CFC) rules applying to any subsidiaries owned in tax-free/very low tax jurisdictions. Also, additional tax reporting requirements and associated administrative costs may consume time and be burdensome but should not be calamitous.

Double tax treaty abuse

As mentioned above, a key outcome of the BEPS project is the finalisation of the Multilateral Convention to Implement Tax Treaty-Related Measures. This is the end result of a major aim of the BEPS Action Plan – namely to put an end to perceived double tax treaty abuse. A key objective of the changes is to put an end to situations where a company is interposed in a certain jurisdiction purely to avail of the benefits afforded by a double tax treaty that has been concluded by that jurisdiction with another.

A further important measure is that the circumstances giving rise to a permanent establishment (eg, a taxable presence in the form of a foreign branch) in a foreign country will be greatly expanded by the multilateral convention. In particular, certain sales and marketing activities by lessors in the country of the airline customer may potentially now

give rise to a taxable presence where under previous international tax rules this would not have been the case.

Some 50% of respondents agree that proposed double tax treaty changes will have an impact on the negotiation of aircraft lease agreements – in particular, the provisions of tax gross-up clauses. This is compared to only 12% who disagree or strongly disagree. Among respondents, airlines appear to feel stronger that aircraft lease agreements and tax gross-up clauses will be impacted by double tax treaty changes (46% agree or strongly agree) compared to lessors (39% agree or strongly agree).

Whether in the form of increased withholding taxes on lease payments, increased corporate income taxes on lessors, or increased compliance costs, international tax reform does give rise to the possibility of an increase in financing costs for the aviation industry.

Which jurisdiction will experience the fastest growth over the next 5 years as a location of choice for the establishment of aircraft leasing operations?

Source: Euromoney Thought Leadership/ Deloitte.

> "International tax reform gives rise to the possiblity of an increase in financing costs for the aviation industry."

About 72% of respondents believe that the tax reforms will drive up financing costs for the aviation industry, driven by higher taxation or compliance costs, or both. Of all categories of respondents, however, airlines were the largest group to disagree with this statement – in particular, 24% of airline respondents felt that costs would not increase.

And who will bear the burden of any increased costs? About 32% of lessors believe that net profits of lessors will ultimately decline compared to 40% of airline respondents who believe the same thing. However, both lessors and airlines are in equal agreement (close to 40% agree or strongly agree) that airlines' aircraft leasing costs will increase in light of international tax reform.

It is fair to say that overall there is still a lot of uncertainty as to where any additional costs arising from tax changes will be absorbed. Ultimately, however, a great majority (54% of airlines and 66% of lessors) agree that new business models and structures will emerge to deal with challenges posed by international tax reform.

International regulatory and legal changes to curb tax avoidance will have a *significant or moderate impact on...*

Source: Euromoney Thought Leadership/ Deloitte.

Jurisdictions

Another key finding is that BEPS is not expected dramatically to shift the geography of aviation finance. As mentioned above, BEPS is unlikely to force the major restructuring of companies into different jurisdictions because, unlike allegations about other industries, aircraft lessors conduct most of their operations in the countries in which they are taxed.

However, the geography of aviation finance may diversify. In response to the question "which jurisdiction will experience the fastest growth over the next five years as a location of choice for the establishment of aircraft leasing operations?" the answer was the Chinese free-trade zones would grow the fastest, followed by Singapore and Ireland close behind. In the case of the Chinese free-trade zones, though, this is likely to be high percentage growth relative to the current small base rather than a surge making the free-trade zones a world player. Instead, experts expect that the latter will service the growing Chinese domestic market. For international leasing operations, however, the leading players are likely to remain so for some time.

Other interesting findings include that, among aircraft lessors, non-tax attributes are more important than tax aspects in picking a location in which to establish aircraft leasing operations. In other words, more important than the country's double tax treaty network, its effective corporate tax rate, or even personal income tax rates.

As alluded to, by Irish Aviation Authority chieft executive officer Eammon Brennon, in the report, these non-tax advantages are not easy to build up and, in the case of Ireland, includes attributes such as a strong skill set from more than four decades of experience in aircraft leasing, an effective legal system and a high-quality regulatory agency capable of overseeing aircraft worldwide, among others.

It is clear from the survey that there is still a great deal of uncertainty surrounding international tax changes, particularly for aircraft lessor respondents, 31% of which consider the uncertainty to be considerable. Although the OECD BEPS project is essentially complete, the EU ATAD agreed and the Multilateral Convention published for signing, there is still much uncertainty surrounding the implementation and future interpretation of the revised tax rules in different countries. Also, the Common Consolidated Corporate Tax Base was relaunched in the EU for consideration in October 2016 and we have to wait and see whether it may become a reality (significant doubts remain).

Given the speed with which international tax rules have changed and lingering international tax uncertainty, it is becoming increasingly challenging for businesses to see around the corner and make informed pro-active decisions. But even with uncertainty remaining, there are a number of areas where pro-active action can be taken by aircraft lessors and others in the wider aviation industry to prepare for international tax reform impact. These include early consideration of what activities are currently undertaken in foreign jurisdictions and how that will impact on foreign tax compliance obligations under the new rules; close examination of existing cross-border leasing structures used (in particular lease-in-lease-out structures) and consideration of possible restructuring options if needed; analysis of the possible impact that the ATAD interest-deduction restriction rules may have on a group, as well as certain other areas that have emerged from the report.

According to the survey, close to 60% of airlines and lessors are already implementing action to prepare for tax reforms or are planning to make changes, which is encouraging. I hope that professionals in the aviation industry will find the survey and report useful as they continue to plot a course through the ever-changing global tax landscape. ^

Banks can learn from lessors when financing engines

Several factors can influence engine investment – asset age, exit strategy or a track record working with lessors. Jack Dutton reports.

Towards the end of last year, *Airfinance Journal* and CFM hosted an Investing in Engines Roundtable at the Waldorf Hilton in central London. Engine investment is an increasingly hot topic in the industry, with a rising demand for spare engine financing – up to 10% of the total installed engine base.

The day-long event attracted about 40 delegates made up of lawyers, lessors, bankers and appraisers to hear speakers discuss issues relating to engine investment.

CFM holds a strong position in the narrowbody engine market, powering nearly 60% of all of the A320 aircraft ordered and producing the CFM56-7B, the exclusive engine for Boeing 737 NGs. The CFM Leap engines will also be used on the newer technology narrowbodies, including the 737 Max and the A320neo.

Although the engine manufacturer has no involvement on the widebody side, one of its parents, GE Aviation, is behind engines such as the GE90, GEnx and the GE9X, which power the likes of the 777, 787 Dreamliner and 777X.

Nadia Vanhove, the product-marketing director of the CFM 56, started the event with a presentation about aviation market demand. She cited China, along with emerging markets in south-east Asia and North Africa, as some of the fastest growing in aviation, with China forecasted to account for 25% of the world economy in purchasing power parity.

Simon Finn, senior vice-president at DVB Bank, gave a presentation on engine financing, stressing the importance for banks to have lessors as counterparties when financing spare engines. When it comes to engines, lessors often have more knowledge of the asset than the banks and a hands-on ability to manage engines through their lifecycles. Finn also highlighted the growing share of leased engines as a proportion of spare engines, and the ability of lessors to handle reporting and tracking duties on the lenders' behalf.

Assume that you are a bank, in a situation where the lessee has defaulted, and you have an asset that is not performing – you have an alignment of interest with the lessor, which is to restore the revenue stream to get that asset working again.

"Not only do they have the alignment of interest," said Finn, "but they also tend to have a range of resources that enable them to place that asset back into the performance situation again quite quickly." Getting an asset back into performance again could be anything from placing the aircraft elsewhere or repositioning an engine.

> "Lessors are used to being at the sharp end and moving assets around."

"Lessors are used to being at the sharp end and moving assets around. So that's quite an advantage because it saves you as a bank having to deal with that problem if a leasing company can deal with it for you," adds Finn.

Bob James, chief executive officer of end-of-life specialist AerFin, spoke on managing engine investment. He discussed planning the best time for exit strategies and how it influences engine investment strategy. James stressed that looking at engines from an investor's perspective is different to that of an airline operator and that investors in engines should constantly assess exit strategies throughout the ownership cycle.

"This is an industry where things change very rapidly," he says. "So what you plan on buying day one and how you plan on getting out of it might be quite different even two years into your 10-year ownership. I would constantly assess the exit strategies, look at the market conditions as they vary. Investors who've failed to understand the assets, particularly where Asia is concerned, are inevitably exposed to increased risk profiles."

Les Weal, director and co-founder of aircraft appraiser Oriel, noted that the demand for engines in the sunset years is different to the demand for engines in the beginning of their life. "If you look at lessors at the beginning of the lifecycle of the engine, they are supporting the airline industry at this time. In economic terms, this is called derived demand," he says.

Weal compared engine investment to the gold rush when breaking down the definition of derived demand.

"There is an investment theory that says that those providing the picks and shovels make better returns than the individual miners do," he adds. "You could say the same about operating lessors, supplying the aircraft and engines to the airline industry. The practice of derived demand is that, if the engine prices go up or down, it probably does not have an impact on the fundamental demand for air travel."

Conversely, people investing in engines at the other end of the lifecycle – in the asset's sunset years – have a much shorter time horizon and are supplying other engines already in the market. Weal said that investing in engines near the end of their lifecycles runs on complementary demand.

"The obvious analogy is cars and tyres," he says. "With engines, you have the components, the LLPs [life-limited parts], the green time and some of the other things... it's actually linked to the demand of the engine. If the price of the individual components goes up and down, it affects the engine values immediately."

Pressure mounts on regional banks and Jolcos

The regional banking sector is struggling to find suitable aircraft deals, while the Japanese operating lease with call option market is becoming increasingly competitive.

Emirates 777 – an aircraft that can be financed with jolco.

At 46.5 years, Japan has the second highest median age of any country, equal with Germany and behind Monaco's 51.7 years, according to the CIA World Factbook. An older population often means lower productivity, because older people tend to work for shorter hours or not at all. Also, the older generation save more and spend less, slowing economic growth. With the most recent official census showing Japan's population in decline, younger people are often moving to cities, where they are being sought for their employability, to find work.

The negative effects of the younger generation moving to the cities are being particularly being felt by Japan's regional banks. The sector faces an uphill challenge, because there are too many banks and not enough demand for their lending services domestically. Each of the country's 47 prefectures tends to have at least two regional banks, which in some places is too many considering the country's overall population decline and the population transfers from the more rural prefectures to the big cities as young people move around to find jobs. Aircraft finance continues to provide a good solution to their woes, though suitable deals are becoming more difficult to find.

"If the younger people come to a big city like Tokyo to live [and then] they inherit the estates from their parents, those assets go from the rural places to the big cities," explains a senior banking source in Tokyo.

Until about the turn of the millennium, most of the regional banks took the same strategies – getting deposits from those who live in their prefectures and lending money to corporations in the prefecture, which had been profitable. However, after then, Japan's regional economies became weaker. As a result, Japanese regional banks decided to do more business in Tokyo, where they were able to find more profitable business. Some of them even wanted to diversify their businesses internationally, and aircraft financing is attractive for them.

"Compared with something like infrastructure financing, whose rules and regulations could vary between each state, aircraft finance is a relatively standardised industry, so once banks have been educated about the industry they can look to participate in a wide range of deals globally," says the source.

Secured vs unsecured

Despite secured transactions being more common in aircraft finance, Japanese regional banks are working on unsecured transactions. Aircraft values are generally very stable, which makes secured transactions a secure investment opportunity for lenders, but for regional banks with little to no experience of aviation, getting their heads around aircraft values might seem daunting.

"If they want to participate in secured transactions, clearly they need to understand the aircraft values, including methodology of evaluating the aircraft," says the source.

"What the majority of them are doing is that they are financing lessors or airlines without having collateral aircraft, which is the very core of the market."

> "If regional banks want to participate in secured transactions they need to understand aircraft values"

However, a regional banks' preference for secured or unsecured transactions would really differ from bank to bank, says Tatsuhiko Moriyoshi, head of loan syndicate and sales Japan for BNP Paribas.

Moriyoshi adds that banks may prefer to give loans to leasing companies, and lessors are often comfortable with this kind of deal. This is because it is easier to do unsecured deals with lessors.

"It depends on the bank's preference," he says, adding that some regional banks have started to take asset risk, but that the number of those banks is still limited.

The regional banks are still relying on larger banks, particularly Development Bank of Japan (DBJ), to get their deals.

For example, in April 2016 DBJ acted as deal arranger and lender on a $120 million senior unsecured three-year term loan for lessor Aircastle. Seven regional banks were involved on the deal.

A source at a major Japanese equity arranger says: "In general, regional banks are very interested to enter the aircraft finance market but the capacity of a regional bank is not so big. They can only participate in the syndication and they are not so quick to underwrite the loan portion, so they buy the loan asset from the big mega bank or DBJ."

Jolco players seek new names

Another major source of Japanese funding is through the Japanese operating lease with call option (Jolco) market. Increased competition is being felt in this market as financiers chase a smaller pool of financing opportunities, market participants tell *Airfinance Journal*. This is prompting Jolco financiers to widen their investment scope in the search for potential deals.

Two traditional Jolco markets have come under pressure with Chinese carriers increasingly opting for yuan-denominated financings and political uncertainty surrounding Turkey-based carriers.

However, Jolco participants continue to target Chinese lessors for business as they accept US dollar transactions.

"The potential transactions are fewer than last year, so as you can imagine from the big name airlines there are some RFP [request for proposal] transactions, but the competition is very keen and there are not so many opportunities – that's why some underwriters are accepting new names," says one equity underwriter.

Arrangers are looking as far afield as South America and as close to home as south-east Asia for new airline names to introduce to their investors.

The most recent new airline Jolco transaction to be made public involved an Airbus A321 for Philippine Airlines (PAL).

NTT Finance was the equity arranger on the transaction, while BNP Paribas was the overall arranger.

"PAL is not an easy name in this market, but we have done it," a source close to the deal tells *Airfinance Journal*, adding that fellow Philippine carrier Cebu Pacific could also be a potential future candidate because of its "pretty good" financials.

Some other arrangers, however, question how suitable the PAL name is for Jolco investors.

"I'm very surprised to see that one; in general, PAL is not our candidate," says one equity arranger.

Another adds: "We are not keen on that name, but probably they found a particular investor who was interested in this particular name, and probably did a back-to-back transaction where you get hold of an investor first, and then you match the investor to the deal."

Other parts of south-east Asia are on the wish lists of Jolco participants, though exact names of airlines can only be speculated on at this stage.

"In south-east Asia, the appetite from the airlines is quite huge. They want to have access to the Japanese equity market but at this moment nothing has happened," says one source, cautioning that Jolco participants need to be mindful of issues such as the repossession of aircraft from these countries.

Simon Collins, a partner at White & Case's Tokyo office, says: "We continue to see new names coming to the Jolco market. We've acted for AeroMexico in 2016 and Copa in 2015, for example, and the Chinese lessors continue to come to the market. They have not been coming with massive numbers of deliveries, but there remains strong demand from Japanese equity for deals, and so both narrowbody and widebody aircraft are getting financed.

"Several of the US airlines have looked closely at the Jolco product and it will be interesting to see if any of them complete Jolcos in 2017. We have been discussing some innovative new structures in order to structure deals into the US."

One equity provider is sceptical about US airlines' entry into the Jolco market.

"We are still not sure about the withholding tax issues and we did some studies, but we don't have much confidence," says the equity provider.

> "There remains strong demand from Japanese equity for deals, and so both narrowbody and widebody aircraft are getting financed."

The Chinese market has been of interest to some Jolco participants recently, with Jolcos closed for ICBC Financial Leasing, China Eastern and (Hong Kong-based) China Aircraft Leasing Group Holdings, to name a few.

But sources say that Jolcos for Chinese airlines are not really viable now, because their strong preference for yuan-denominated financing coupled with the aggressiveness of the local Chinese banks makes it hard for even a well-priced product such as the Jolco to compete in the market. However, Chinese leasing companies could still be targets, and *Airfinance Journal* understands that Bocomm Leasing is in the market for a Jolco.

"Chinese leasing companies can accept the US dollar equity and loan portions, so the leasing company is our primary target right now," says one equity arranger.

However, for Jolco participants whose companies also have a lessor business – such as SMBC, which has SMBC Aviation Capital – it may not be acceptable to fund Chinese lessors because this could be viewed as funding the competition.

As *Airfinance Journal* reported in September, Turkey – which has in the past been a popular destination for Jolcos, mainly via flag carrier Turkish Airlines (THY) – has recently fallen into political turmoil as the result of an attempted coup, making Jolco investors wary about going into this market. While the problems with Turkey remain, they do not affect all Jolco participants because only some companies work with THY. For those which do not, there is no significant change to their business.

However, political and economic trends with a more macro effect, such as the uncertainty surrounding US president-elect Donald Trump and the volatility of the yen-dollar exchange rate, has an impact on all Jolco players.

No doubt the Jolco market will likely face some bumps in 2017, but sources assure *Airfinance Journal* that there is still a reasonably steady stream of deals and no immediate cause for alarm.

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Lessors will dominate again

Capital markets f nancing looks likely to remain essential for airlines and lessors in 2017, writes Joe Kavanagh.

In its Current Aircraft Finance Market Outlook 2017, Boeing Capital Corporation expects the capital markets to finance 31% of new aircraft deliveries in 2017, up from 30% in 2016.

This means that sources of funding such as unsecured bonds, enhanced equipment trust certificates (EETCs) and asset-backed securities are expected to account for $39.1 billion of new aircraft in 2017, up from an estimated $36.6 billion in 2016.

Boeing also expects more deliveries this year: it anticipates $126 billion-worth of deliveries of new aircraft with more than 90 seats, from Boeing, Airbus, Embraer and Bombardier. In 2016, there was about $122 million-worth of deliveries.

As well as a higher volume of deals, the market can expect a greater range of investors to buy up commercial aviation paper this year. The trend over the past couple of years has been for a greater diversification of issuers and of investors, and it looks set to continue in 2017.

As more investors become comfortable with mid-life and older aircraft, there may also be more activity financing older aircraft in 2017.

The aircraft asset-backed securities (ABS) market, which saw seven deals in 2016, included several issuances secured against older single-aisle and regional aircraft.

Almost 30% of the collateral in Apollo Aviation's first 2016 deal consisted of widebody aircraft, for example. Meanwhile, Castlelake's own deal, in August, featured single-aisle, twin-aisle and regional aircraft.

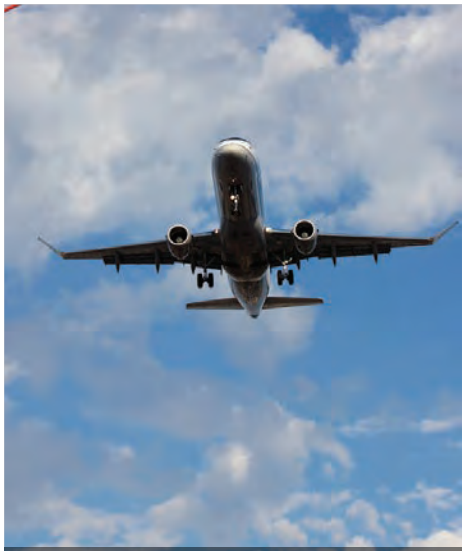
New investors, new issuers

In 2017, market sources expect to see similar trends as in 2016: namely, an increasing volume of deals, and a rising number of investors happy to buy paper issued by airlines and lessors.

In its forecast, Boeing notes a number of new funding sources that have appeared in recent years, and predicts that new investors will continue to enter the market. New investors which entered the market in 2016 include Korean institutional investors, regional banks from Taiwan, Japan and Australia and an increasing number of non-US investors in EETCs.

Between 2014 and 2016, investors from nine countries bought public EETC paper for the first time. Over the same period, overall allocation to non-US investors rose from 5.8% to 8.3%.

Mark Streeter, managing director at JP Morgan, says that traditional EETC issuers will bring more deals to market in 2017.

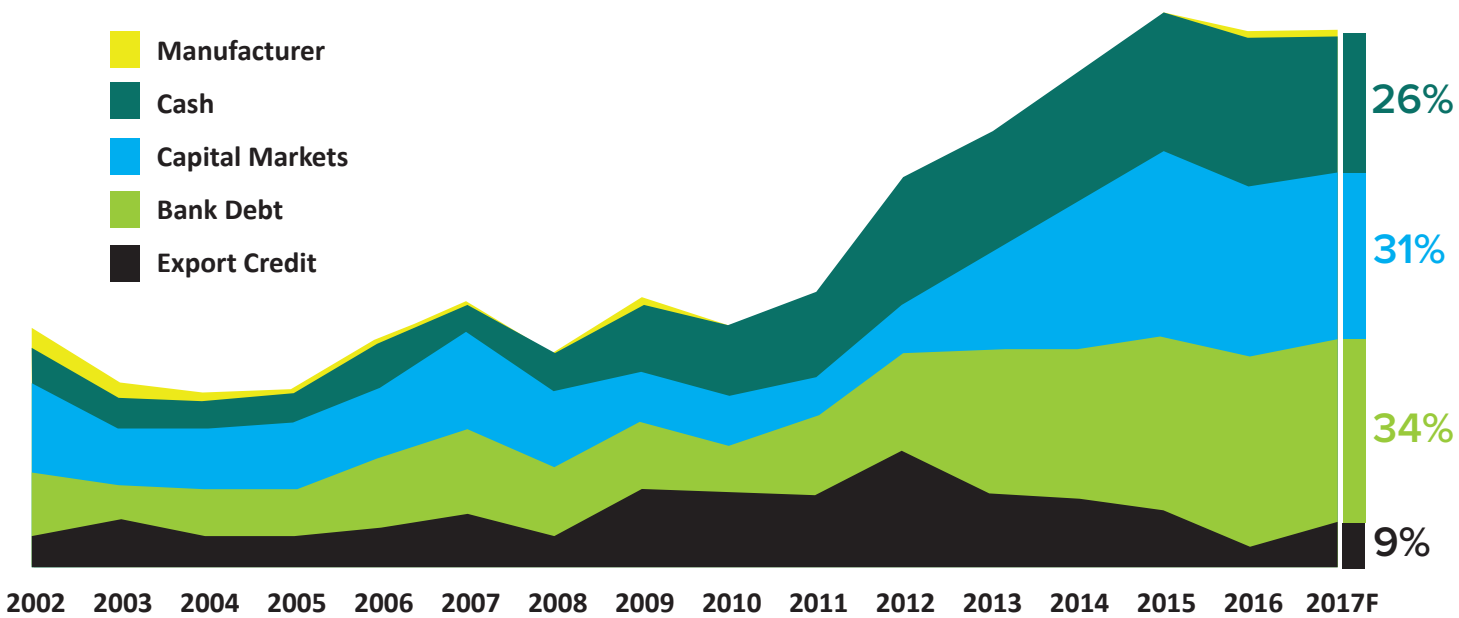


Traditional EETC issuers such as united airlines are expected to tap this market again in 2017s

"In airlines, the regular EETC issuers such as American will likely be back given still significant near-term deliveries to fund despite some orderbook deferrals. United is in a state of flux as it reviews its orderbook but we all know that this management team loves the EETC product," he says.

"Other former debut EETC issuers like Spirit and British Airways/IAG chose bank debt rather than EETCs for their subsequent deliveries, so it will be interesting to see who returns next. The bottom line is that we need a more robust EETC supply to add liquidity, further price transparency and even tighter spreads relative to the AA/A/BBB alternatives in the capital markets," adds Streeter.

Funding Sources (% of New Aircraft Deliveries)



Source: BCC

EasyJet issued a €500 million ($551 million) bond in October,pricing with a low coupon of 1.125%

> "The leasing companies will continue to dominate the capital markets deal flow, especially in the US dollar market."

Mark Streeter, managing director, JP Morgan

"My concern is that EETC volumes will again fall short of the $10 billion total in 2017 against the backdrop of a high-grade US dollar market that is projected to see more than $1 trillion in deal volume. If you look up 'niche' in the capital markets dictionary, you might see a copy of an EETC prospectus."

ABS deals

The capital markets will be the single largest source of financing for aircraft lessors, accounting for 37%, Boeing states in its outlook (see pie chart). Investor appetite in the capital markets was also seen this year by a string of aircraft-backed ABS deals.

Issuers included Apollo (two deals – one in March and one in November), Aergen, Castlelake, Blackbird Capital 1, GECAS, ACG and Bocom Financial Leasing.

GECAS' offering was a return to the ABS market. Its $709 million dual-tranche offering in November was the first issuance by the lessor since 2014.

Meanwhile, the ABS issued by Blackbird Capital 1, the joint venture between Air Lease and Napier Park Global Capital, received the highest number of bids ever this year for an ABS deal. It was also allocated to the highest number of investors, demonstrating the level of investor appetite.

"Based on what we know, just talking with issuers and bankers, we would project probably about the same volumes overall in 2017. We've seen a similar level of interest to last year," says Anthony Nocera, head of ABS at Kroll Bond Rating Agency (KBRA).

KBRA has rated three private aircraft ABS deals in 2016 in addition to seven public deals, he adds.

In terms of the types of transactions the market can expect, Nocera believes that activity with older aircraft will remain strong in 2017.

"This year there was a leaning toward the mid-life and older assets, so I would predict that you'll see more of that. We've had some enquiries around those types of assets, from not just existing issuers but also some new ones," he adds.

JP Morgan's Streeter agrees that lessors will be the most active players in the capital markets.

"The leasing companies will continue to dominate the capital markets deal flow, especially in the US dollar market. Lessors such as AerCap, Air Lease, BOCA and SMBC Aviation, to name a few, are recurring issuers given their orderbook and refinancing needs. And while bank debt is still readily available for the lessors, unsecured bonds (especially the investment-grade market) remain a more efficient, more liquid option," he adds.

"The high-yield market will also be active for the lessors given established recurring issuers such as Aircastle (high yield for now but heading to high grade soon) and some likely M&A-related funding from others."

On the unsecured side, airlines successfully tapped the European capital markets last year and should continue to do so. EasyJet issued a €500 million ($551 million) bond in October, pricing with a low coupon of 1.125%, while Norwegian priced its Nkr175 million ($20.7 million) senior unsecured bonds in July.

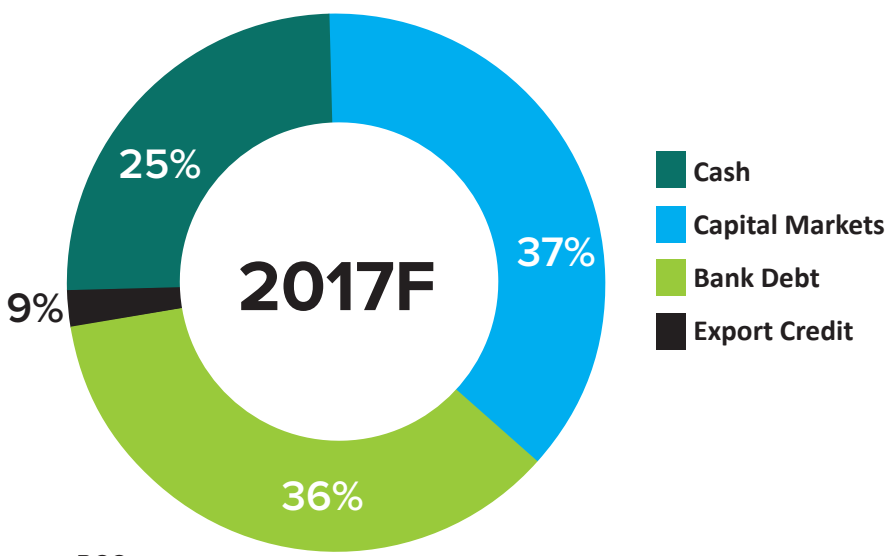
The German Schuldschein market may also see more issuances this year. Goshawk closed its debut $95 million deal in November, in what was the first such deal to be issued by an aircraft lessor.

A source said the deal priced tighter than the lessor's debut unsecured bond, a $231 million issuance in August, and was also increased from its planned issuance size of $75 million because of high demand. Both facts might encourage more companies to tap this market in 2017.

"The unsecured Schuldschein market is gaining more attraction internationally, both from the issuer and the investor side," says Christian Wolff, director of transport finance at Helaba, which acted as an arranger for Goshawk's deal. He adds that 2016 has seen more than €20 billion in Schuldschein issuances, of which about €8 billion is from international issuers.

He says: "We do expect to see especially more leasing companies tapping this market in 2017 and 2018 as an efficient alternative to an unsecured bond."

Lessor Funding Sources (% of New Aircraft Deliveries)



Source: BCC

CS300 – a new challenger

The entry into service of Bombardier's CS300 model in December 2016 is a landmark for the Canadian manufacturer's commercial aircraft programme, but there is still much to prove.

The CSeries family is Bombardier's attempt to break into the single-aisle (narrowbody) market, which has historically been dominated by Boeing and Airbus. The CS100 and the larger CS300 are new designs specifically aimed at the 100- to 150-seat segment.

Both aircraft incorporate significant use of composite materials in the fuselage and wing primary structure. Bombardier says the clean-sheet design allows the CSeries models to offer a fuel saving of 20% and a cash operating-cost advantage of 20% over current generation competitors. These figures have been eroded by the latest re-engined versions of the Airbus A320 and Boeing 737 families. However, the CSeries still has an edge given the A320neo and 737 Max are not all-new designs.

The CSeries models are equipped with Pratt & Whitney PW1500G engines, similar to the geared turbofan (GTF) powerplant offered on the A320neo family.

AIRCRAFT CHARACTERISTICS

Seating/range	
Max seating	160
Typical seating	140 at 32-inch pitch
Maximum range	3,300 nautical miles (6,110km)
Technical characteristics	
MTOW	59.9 tonnes (option 67.6)
OEW	33.3 tonnes
MZFW	50.3 tonnes
Fuel capacity	22,040 litres
Engines	PW1521G/1524G/1525G
Thrust	21,000lbs to 23,300lbs
Fuels and times	
Block fuel 1,000 nautical miles (nm)	1,340kg
Block fuel 2,000nm	2,510kg
Block fuel 4,000nm	4,500kg
Block time 1,00nm	54 minutes
Block time 2,000nm	94 minutes
Block time 4,000nm	160 minutes

Fuels and times are *Airfinance Journal* estimates based on manufacturer claims.

Fleet data	
Entry into service	2016
In service	2
Operators (current and planned)	11 (17, including CS100 operators)
In storage	0
On order	235

Source: *Airfinance Journal* Fleets

APPRAISERS' VIEWS

Avitas
Martin O'Hanrahan, director asset valuations

The CS300 model from Bombardier entered commercial service with Air Baltic in December 2016 [see box]. Bombardier's customer base is respectable for an aircraft just coming into use and is complemented by the orders (and options) in place for its smaller sibling, the CS100, which began flying commercially in summer 2016.

The CS100/300 programme encountered delays during the development phase and this undoubtedly had an impact on sales. While the manufacturer has a long-established market presence in the 50- to 90-seat market sector, the larger jets are a new direction for the company, and they face very strong competition for orders from Embaer's E2 range of jets and the smaller members of the Boeing 737 and Airbus A320 families.

Bombardier has recently enjoyed some much needed sales success with the CS300, and it will have to build on that momentum to secure the future of the programme.

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

Given the orders and customer base it has at entry into service, the CS300 should become a successful aircraft over the long term. Unfortunately for the type, a combination of programme delays, low fuel prices and aggressive sales campaigns from competing manufacturers have made it difficult for the aircraft to gain traction.

CV believes the clean-sheet design is well suited to replacing ageing 100- to 150-seat aircraft such as the Boeing 737-300, 737-700, Airbus A319, Fokker 100 and McDonnell Douglas MD-80. However, the current low fuel-price environment has made it tough for operators to justify taking the risk of introducing a new aircraft type when they can extend leases or purchase used aircraft at much lower costs.

The entry into service of the CS100 and now the CS300 will undoubtedly help the programme, especially if the aircraft meets or exceeds performance expectations. A continued long-term upward trend in oil prices, will help the aircraft, by justifying the increased capital costs to acquire more fuel-efficient aircraft.

Overall, CV feels the programme has great potential, but the jury is still out. This will remain the case until more aircraft enter service and operators, along with investors, see what the aircraft is really capable of.

> “Further orders and widening of the operator base will be crucial to instil investor confidence in the aircraft.”
>
> Mike Yeomans, head analyst, commercial aircraft and leasing

APPRAISERS’ VIEWS CONTINUED

IBA
Mike Yeomans, head analyst, commercial aircraft and leasing

The Bombardier CS300 has achieved more than 230 firm orders, about twice the number for its smaller CS100 stablemate. However, scrutiny of the orderbook raises some concerns. There is a strong chance that the 40-aircraft order from US carrier Republic [which has filed for Chapter 11 protection] will not be delivered. Although the order remains in Bombardier’s official backlog, the company has reportedly removed the aircraft from its production schedule.

The volume of lessor orders within the Bombardier CS300’s backlog is also a concern. About two-thirds of the backlog is with lessors, which could rise to almost 40% in the event that the Republic order is cancelled.

With an operator base of about 10 carriers, and three lessors potentially competing to place 77 aircraft, we could see some resulting pressure on values and lease rates. It appears that Bombardier has offered significant discounts to secure orders and, with a limited operator base, it will be a challenge for the manufacturer to attract new customers while firming up sales pricing. Further orders and a widening of the operator base will be crucial to instil investor confidence in the aircraft.

ICF
Angus Mackay, principal

While the CS300 has close to 250 firm orders and a substantial number of options, momentum for the programme has been lacking, not least because of aggressive price discounting by Airbus and Boeing for their established A319 and 737-700 models. Embraer, with its E2 new-generation GTF-powered aircraft, also poses a threat, albeit a lesser one. Nonetheless, the CS300 has some advantages. The CSeries model can carry up to 160 passengers and is a clean-sheet design optimised for the 125- to 150-seat sector. Thanks to its use of the latest tecnnology systems, aerostructures and powerplants it provides real competition to the sub-optimal shrink of older-technology models, which are its prime competitors.

Some encouragement can be taken from Air Canada’s order for 75 aircraft, lessor Macquarie’s order for 40 units and from launch customer Air Baltic’s recent increase of its firm orderbook to 20 aircraft. Manufacturing issues at Pratt & Whitney have more than halved the number of deliveries in 2016, from the planned 15 to seven units [see box], but Bombardier hopes to ramp up production to a combined total for the two CSeries models of 90 to 120 aircraft by 2020.

Oriel
Olga Razzhivina, senior Istat appraiser

The CSeries has been slow to accumulate orders despite its good economics, cabin comfort and reduced environmental impact. It appears that Bombardier’s traditional regional jet market was not the right audience. The change of tactics to approaching mainline airlines has yielded better results, with orders from Air Canada in 2015 and Delta in 2016. However, particularly with the Republic order now uncertain, the CSeries needs another significant sales campaign win. Bombardier may be helped by the orderbooks of Airbus and Boeing being sold out into the early 2020s and by the CS300 being better suited to replacing A319s and 737-700s than the new Neo and Max versions of these models, which have sold relatively poorly.

Oriel considers a minimum of 500 sales is necessary for a successful aircraft type with healthy value retention. It is possible that entry into service and positive feedback from the existing operators will spur on additional orders. A development of a larger CS500 version could be a positive for the family offering operators a greater choice of sizes. Given its economic and environmental advantage, the CS300 is likely to become a successful aircraft type in the long term.

MBA
Lindsey Webster, director asset valuations

The CS300, which has just entered service, is Bombardier’s largest aircraft. While delayed by two years because of issues with suppliers, system integration and engine setbacks, the aircraft has overcome obstacles and managed to provide better than estimated performance metrics. The CS300 boasts 20% reduction in fuel burn and carbon dioxide emissions, significantly lower noise levels and 15% lower cash operating cost compared to current-generation aircraft. In addition, the aircraft is slated to have a 12% lower cash operating cost over its closest competitors, the re-engined Airbus A319neo and Boeing 737 Max 7.

The main advantage of the CS300 is the clean sheet design, allowing Bombardier to optimise the aircraft for its size of 130 to 160 passengers with a range of more than 3,000 nautical miles. However, while a better aircraft than the A319neo and 737 Max 7, the CS300 lacks a larger variant in the family to round out an operator’s fleet.

Though the CS300 has earned Bombardier more than 230 firm orders compared to 60 for the Max 7 and 58 for the A319neo, the aircraft is unable to compete with the Max 8 and A320neo, which have amassed more than 8,000 orders combined. In addition, the CSeries’ $5.4 billion development costs have put strains on the manufacturer, worrying some on the survivability of the programme.

Overall, MBA has a positive view of the capability and performance of the CS300; however, the long-term values prospect will be dependent on the market’s acceptance of the aircraft as seen through additional orders for the type, beyond the recent order from Delta Air Lines.

APRAISER VIEWS OF NEW-BUILD CS300 MARKET VALUES AND LEASE RATES

	Avitas	CV	IBA	ICF	MBA	Oriel
Current market value*	38.5	34.0	38.0	36.5	37.1	40.5
Indicative lease rate ($’000s/	260-300	255	250	280-310	285-315	280

*Standard Istat criteria.

AirBaltic receives the first CS300

AirBaltic receives the first CS30

AirBaltic has taken delivery of the first CS300, MSN 55003, as part of the Latvian airline's order for 20 of the aircraft type.

AirBaltic's CS300s will replace the carrier's ageing Boeing 737-300s and -400s. The airline has a fleet of 45 aircraft, according to *Airfinance Journal* Fleets.

AirBaltic's rationale for its decision to go with the Canadian manufacturer rather than with Boeing or Airbus models was clarified by its chief executive officer, Martin Gauss.

"You can take a 737-700, A319 (and later on, the Max and the Neo) and the CS300. You put all three next to each other and you take the weight. You take the weight of the aircraft and you put the engines on, not for the Boeings, [where] it's the Leap engine or something similar, but on the others it's exactly the same engine. You put that on the aircraft and then you take off. You have the same passengers on board and the same engine. What will happen? You will burn more fuel on the Airbus [or the Boeing] because it's heavier."

"Forget the price you pay for the aircraft because it's irrelevant when you look at the costs to operate the aircraft. Even if you pay five or 10 million more for the aircraft you will easily offset this in the lifetime of the operating cost.

"You take off now with this aircraft – and now we have the second thing coming: the noise levels, which are lower on the CSeries. While you are lighter, you have to pay less money for flying, landing charges, overflying charges.

"Regardless of what you pay for CS300, if you [are] only comparing it to an A319 or a 737-700, you have the more economic aircraft.

The handover to AirBaltic comes just five months after the entry into service of the 110-seat CS100 variant.

Finance in place

Air Baltic secured financing from Export Development Canada (EDC) for seven of its 20 Bombardier CS300s. The deal will also involve lending from several different banks, with EDC providing a "standard industry amount of the overall loan", in the region of 85%, Gauss told *Airfinance Journal* at an event in Riga marking the delivery of the first CS300 to the Latvian carrier.

Although Gauss would not be drawn on which banks are involved, he confirmed the airline has appointed one European bank so far for the financing of certain aircraft.

He said that AirBaltic is looking to put all the new Bombardier jets on its balance sheet and is in discussions about financing options for the other 13 aircraft. Gauss said it was "too early" to test the sale and leaseback appetite for the aircraft with only one of the type in operation.

The loan from EDC will have a 12-year tenor for each of the seven aircraft.

Clyde & Co is representing the airline on the deal, while Norton Rose Fulbright is acting for EDC.

AirBaltic took delivery of its first CS300 on 30 November and the second in early January. Six more aircraft are due to deliver in 2017, eight more in 2018 and four more in 2019.

Gauss confirmed that by 2021, he wants AirBaltic to operate an all-Bombardier fleet of 12 Q400s and 20 CS300s, having phased out the Boeing aircraft.

Bombardier cuts CSeries 2016 delivery forecast

Manufacturer remains confident in plan for production ramp-u .

Bombardier has reduced its CSeries 2016 delivery forecast to seven aircraft from 15 because of engine delivery delays.

"The CSeries engine is performing very well in service. We are working very closely with Pratt & Whitney to quickly address this supplier ramp-up issue and to ensure we have a strong supplier base to support our long-term growth objectives," says Fred Cromer, president of Bombardier Commercial Aircraft.

He adds: "We are very confident in our production ramp-up plan, including our ability to meet our production goal of 90 to 120 aircraft per year by 2020."

The delivery adjustment will result in lower revenues for Bombardier Commercial Aircraft in 2016, adds the manufacturer.

It states: "As a result of the delay, the company now expects to be close to the lower end of the $16.5 billion to $17.5 billion revenue guidance range, and free cash flow usage is expected to be in the range of $1.15 billion to $1.45 billion. Ebit [earnings before interest and taxes] is expected to be at the upper end of the $200 million to $400 million range. The company expects to end the year with a strong liquidity position and remains on track to achieve both its 2018 cash flow neutral goal and its 2020 turn-around plan objectives."

787-8 versus A330-200/-800neo

t he competition between Boeing and a irbus in the small twin-aisle market is as fierce as any of the battles between the two main aircraft manufacturers' products, with the smallest 787 and a 330 models pitted against each other.

The market for small widebody aircraft appears to be an increasingly difficult one for the manufacturers to sell significant numbers of aircraft into. The 767-size market looks to have been abandoned by both Airbus and Boeing, and even the aircraft in the next size category, which includes the 787-8, the A300-200 and the in-development A330-800neo, seem to be struggling for orders.

The A330-200 and subsequently the 787-8 have enjoyed previous periods of success resulting in significant order totals, with the Airbus aircraft having garnered about 630 and the smallest Dreamliner model amassing around 450. However, the market now seems to be dormant, with larger models such as the 787-9 and the A330-900neo of more interest to the airlines.

The replacement of the A330-200 by the A330-800neo does not appear to have revived interest in the size category, perhaps unsurprisingly given that the larger A330-300 has been outselling the A330-200 for many years. The only A330-800neos that have been sold are conversions from A350-800 orders – a model that looks increasingly unlikely to be built.

The 787-8 has been relatively successful in terms of orders but sales have dried up over the past three years, with many customers preferring the 787-9 or even larger 787-10, which is yet to enter service.

Competition

Despite these signs from the market, both manufacturers continue to push their respective products and claim that their model is superior to the competition. In some markets, particularly the single-aisle one, the non-stop war of words between Boeing and Airbus seems unnecessary, as neither manufacturer can fulfill the market demand single-handed.

In the small twin-aisle sector, the manufacturers may need to win the arguments about the relative merits of the competing aircraft, because the size of the market suggests there may not be room for two models.

Cutting through the claim and counter claim of the Boeing and Airbus products in this market segment is not straightforward and is complicated by the aircraft being from different eras. The original A330-300 entered service in 1993, with the -200 model following in 1998. This meant that the aircraft were significantly more advanced than the 767 models they were aimed at replacing. Boeing, however, continued to rely on the 767 to fight its corner and the 767-300ER continued to be delivered in significant numbers until the early 2000s.

Boeing launched the 787 as a replacement of the 767 although, perhaps in recognition of a change in the market, the smallest model of the new family was significantly larger than the models it was to replace. The 787 was scheduled to enter service in the late 2000s, but problems with the programme delayed first deliveries of the initial 787-8 model until 2011.

Although the delayed entry-into-service date perhaps gives a false impression of the aircraft's modernity, the 787's technology undoubtedly offered significant efficiencies compared to the original A330 models. Airbus initially suggested it did not need to respond to Boeing's move because the A330 remained competitive.

Nonetheless, the European manufacturer launched the A350 family with the -800 variant intended as a competitor to the smaller 787 models. The smaller A350 model has, however, not matched the sales success of the larger -900 variant. The subsequent launch of the A330-800neo and -900neo models has as yet not altered this situation because the larger A330neo model has outsold the -800 variant.

Cost comparison

Although Airbus has introduced a number of aerodynamic improvements on the A330-800neo and -900neo models (see box), the major gain in efficiency comes from engine technology improvements. The newer engine technology of the A330neo makes it

SMALL TWIN-AISLE AIRCRAFT LEADING CHARACTERISTICS

Model	787-8	A330-200	A330-800neo
Maximum seats	350	380	390
Typical seats	242	246	252
Typical range (nm)	7,650	7,500	7,900
(Target) entry into service	2011	1998	(Q4 2017)
Built	323	601*	0
Orders backlog	129	33*	12
List price ($m)	224.6	231.5	252.3

*including freighters.

competitive with the 787 in terms of efficiency, but the decision to re-engine rather than going to an all-new design means that the Airbus model may not offer the savings that would be expected of an aircraft that is due to enter service nearly a decade after the planned introduction of its rival.

Airfinance Journal's analysis (see table) suggests that the A330-800neo has a cash operating cost (COC) per trip advantage over the A330-200 of about 4%, which translates to a cost per seat advantage of around 6%, assuming the A330-800neo is credited with six additional seats compared to the baseline A330-200. This implies that the A330-800neo has a marginal advantage in cash cost per seat over the 787-8, but remains more costly on a per trip basis.

If capital costs (based on list prices) are included in the operating cost comparison, *Airfinance Journal* calculations indicate that the A330-800neo's advantage over its predecessor is eroded. The total direct operating cost (DOC) per trip of the Neo model is marginally higher than its predecessor, although the additional seats it can accommodate mean it still provides savings on a per seat basis.

Prospects

As the preceding analysis implies, it is difficult to separate the aircraft in terms of cost; so other factors may determine which model is the most successful.

The 787-8 enjoys a distinct advantage in terms of established customer base, but its success is as much dependent on how it fares against other members of its family as it does on its competitive position vis-a-vis its Airbus rival. Orders for the 787-9 have dwarfed those for the 787-8 since the stretched aircraft became available.

Boeing has stated publicly that it always envisaged the -9 being the most popular model in the 787 family, but the company insists there is a continuing market for the initial member of the family. A major assumption behind this thinking is that airlines will see the 787-8 variant, with its lower trip costs, as the best size for opening up new routes and for replacing older smaller aircraft, such as the 767.

The 787-9's better seat-mile costs are, of course, only beneficial when there is sufficient demand to justify the use of a larger aircraft. Airlines will have to make a judgment on a case-by-case basis as to whether the trip cost savings offered by the 787-8 are sufficient to forego the potential additional revenues offered by the larger model. However, given the existing customer base and number of aircraft in service, it represents a low risk for Boeing to keep the aircraft in production.

While the same argument about trip cost versus seat cost apply to the A330-800neo and how it fits into Airbus's A330/A350 family, the fact that orders are scarce and that the aircraft is yet to enter production suggests a more difficult decision for Airbus. However, one or two significant orders to add to the 12 aircraft that Hawaiian has on order would put a very different perspective on the prospects for the model.

INDICATIVE RELATIVE CASH OPERATING COSTS (COC)

Model	787-8	A330-200	A330-800neo
COC per trip	-7.1%	base	-4.2%
COC per seat	-5.6%	base	-6.4%

Assumptions: figures are based on *Airfinance Journal*'s interpretation of manufacturer claims and published data. Additional assumptions: 4,000 nautical-mile sector, typical seating layouts, fuel price $1.4 per US gallon.

A330neo – the family's newest member

The new engine option (Neo) version of the A330 will be built in two variants, the A330-800 and the A330-900, and is scheduled to begin delivery in the fourth quarter of 2017.

Both the A330neo models are powered by latest generation Rolls-Royce Trent 7000 engines, and incorporate aerodynamic improvements – including new sharklet wingtip devices that effectively increase the wingspan by nearly four metres, providing increased lift and reduced drag.

Airbus says as a result of these upgrades, the A330neo delivers fuel savings of 14% per seat compared to in-production A330s. According to the manufacturer, the aircraft also offer a range increase of about 400 miles, additional payload capability and decreased maintenance costs.

The A330-800neo retains the current-production A330-200's fuselage length, while the A330-900neo uses the A330-300's longer fuselage. However, the manufacturer says that, because of cabin design enhancements, the new models will offer additional seats at an equivalent comfort level.

The A330neos will incorporate an A350-style cabin, which is more than a cosmetic change because it allows the incorporation of additional seats. Airbus's press releases cite "up to 10 additional 18 inch wide seats", but *Airfinance Journal* believes typical configurations are more likely to accommodate five or six more passengers. This additional capacity is already factored into Airbus's headline claim of a 14% fuel improvement.

Airfinance Journal understands that once the impact of the additional weight associated with the new engines and aerodynamic modifications is taken into account, the improvement in fuel per trip will be about 10% on a 4,000-nautical mile sector. However, the improvement could be significantly less on shorter sectors of about 2,000 nautical miles.

AIRLINE FINANCIAL RATINGS

Airline	Fitch	Moody's	S&P
Aeroflot	B+(stable)	-	-
Air Canada	B+(pos)	B1(pos)	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	B(neg)	-	B(stable)
British Airways	BB+(pos)	Baa3(stable)	BB(pos)
Delta Air Lines	BBB-(stable)	Baa3(stable)	BB+(pos)
easyJet	-	Baa1(stable)	BBB+(stable)
Etihad Airways	A(stable)	-	-
GOL	CC	Caa3(neg)	CCC(neg)
Hawaiian Airlines	B+(stable)	B1(stable)	BB-(stable)
jetBlue	BB-(stable)	Ba3(stable)	BB-(stable)
LATAM Airlines Group	B+(neg)	B1(stable)	BB-(neg)
Lufthansa Group	-	Ba1(stable)	BBB-(neg)
Qantas Airways	-	Baa3(stable)	BBB-(stable)
Ryanair	BBB+(stable)	-	BBB+(stable)
SAS	-	B2(stable)	B(stable)
Southwest Airlines	BBB+(stable)	Baa1(pos)	BBB(stable)
Spirit Airlines	BB+(stable)	-	BB-(stable)
Turkish Airlines	-	Ba3(neg)	BB-(neg)
United Continental Holdings	BB(stable)	Ba3(pos)	BB-(pos)
US Airways Group	-	B1	-
Virgin Australia	-	B2(neg)	B+(neg)
WestJet	-	Baa2(stable)	BBB-(stable)
Virgin Australia	-	B2(Stable)	B+(neg)

Source: Ratings Agencies - 5th January 2017

AVIATION COMPANY RATINGS

	Fitch	Moody's	S&P
Airbus Group	A-(stable)	A2(stable)	A+(stable)
Boeing	A(stable)	A2(stable)	A(stable)
Bombardier	B(neg)	B2(stable)	B-(stable)
Embraer	BBB-(stable)	Ba1(neg)	BBB(neg)
Rolls-Royce	A(neg)	A3(stable)	A-(neg)
United Technologies	A-(stable)	A3(stable)	A-(stable)

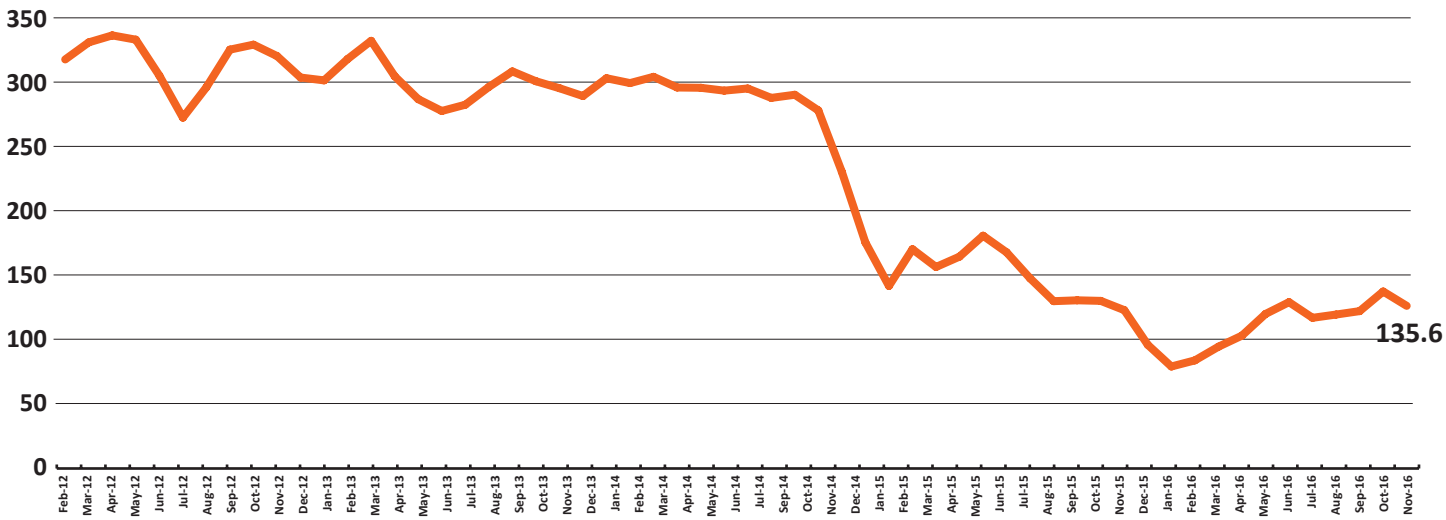
Source: Ratings Agencies - 5th January 2017

LESSOR CREDIT RATINGS

	Fitch	Moody's	S&P
AerCap	BBB-(stable)	Ba1(stable)	BBB-(stable)
Air Lease Corp	-	-	BBB(stable)
Aircastle	-	Ba1(stable)	BB+(stable)
Avation PLC	B+(stable)	-	B+(stable)
Aviation Capital Group	BBB(stable)	-	A-(stable)
AWAS Aviation Capital Limited	-	Ba3(stable)	BB(stable)
BOC Aviation	A-(stable)	-	A-(stable)
CIT Group Inc	BB+(stable)	Ba3(stable)	BB+(stable)
DAE Aviation Holdings	-	-	B-(stable)
Fly Leasing	-	B1(pos)	BB-(stable)
ILFC (Part of AerCap)	-	Ba1(stable)	-
SMBC Aviation Capital	BBB+(neg)	-	BBB+(stable)

Source: Ratings Agencies - 5th January 2017

US GULF COAST KEROSENE-TYPE JET FUEL (CENTS PER US GALLON)



Source: US Energy Information Administration

COMMERCIAL AIRCRAFT ORDERS BY MANUFACTURER

	Gross orders 2016	Cancellations 2016	Net orders 2016	Net orders 2015
Airbus	600	190	410	117
Boeing	570	100	470	183
Bombardier	249	12	237	136
Embraer	47	0	47	30
ATR	45	0	45	40

Based on Airfinance Journal research and manufacturer announcements as of 5th J nuary

COMMERCIAL AIRCRAFT ORDERS BY CUSTOMER

Customer	Country	Quantity/Type
August 2016 to 5 January 2017		
Mauritania Airlines	Mauritus	1x737-800
Cebu Pacific	Phillipines	2xA330
Qatar Airways	Qatar	30x787-9, 10x777-300ER
Atlas Air	USA	9x767-300F
Binter	Spain	6xAt R72-600
Iran Air	Iran	80xBoeing aircraft
Iran Air	Iran	17xAirbus aircraft
BOC Aviation	Singapore	5xA321
Colorful Guizhou	China	2xE190
Vietjet	Vietnam	2xA321
Jetstar Pacific	Vietnam	10xA320
Aerolease Aviation	USA	10xMRJ90
Hong Kong Airlines	Hong Kong	9xA330-300
Intrepid	USA	2x747-8F
Swiss	Switzerland	1x777-300ER
UPS Airlines	USA	14x747-8
Donghai Airlines	China	5x787-9
PNG Air	Papua New g uinea	5xAt R72-600
Peach Aviation	Japan	10xA320neo, 3xA320
Fiji Airways	Fiji	5x737 Max 8
United Republic of	t anzania	2xCS300s, 1xQ400
Philippine Airlines	Phillipines	5xQ400s
United Republic of	t anzania	1x787-8
BOC Aviation	Singapore	5xA320
GECAS	USA	75x737 Max 8

Based on *Airfinance Journal* research and manufacturer announcements as of 5th Jan 2017

Reasons for why lightning may strike same place again

Warren Buffett could be on the verge of making the same mistake again, writes a dam pilarski, senior vice-president at a vitas.

There is a saying that lightning never strikes the same place twice. This means that very rare events happen only once, because they are low probability occurrences. The significant downturns in airline profitability and traffic and aircraft values in the early 1990s were tied to a once-in-a-lifetime combination of circumstances, including worldwide economic slow-down, oil price increases, threat of terrorism and the Gulf War, together with substantial over-ordering of aircraft in the late 1980s.

That period of problems, which saw some of the best-known airlines and leasing companies disappear, was believed to be one that would never be repeated again. But barely a decade later, another perfect storm happened. This time it was the combination of worldwide economic slow-down with a terrible act of terrorism which affected the world of aviation. Other elements that happened at the same time influenced our industry. These include the Sars epidemic and the newly introduced policies to make flying safer, which were an extra burden of the flying public and hampered traffic growth.

Warren Buffett is universally acclaimed as the best investor of our times. He made all his money by investing wisely and amassed a fortune of more than $60 billion. His investments were in a vast variety of fields and he is known as the Oracle (or Wizard or Sage) of Omaha. One blemish on his otherwise astounding record is his 1989 investment in USAir. The downturn of the early 1990s caused him to lose money, but if he waited another two years he could have done relatively fine.

Buffett took his losses as a personal affront and continued to bad mouth the aviation industry. In a humorous way, he attacked both of the people who brought aviation to fruition – the Wright brothers. One brother got this remark: “If there had been a capitalist down there [at Kitty Hawk], the guy should have shot down Wilbur!” The other got this one: “Karl Marx couldn’t have done as much damage to capitalists as Orville did.”

While Buffett could not have predicted the Kuwait invasion by Iraq and all the ensuing problems with serious ramifications to aviation, he could have consulted some economists dealing with the bubble in aircraft orders at that time and avoided his unfortunate investment. That includes the writer of this column, who voiced serious concerns at that time about the forthcoming crash. Instead of getting more information, Buffett became known by aviation professionals for his disdain of our industry and his assumption that it is unnatural and irrational and a permanent drain on assets.

With the above in mind, it is interesting to note that Buffett recently made substantial investments in the four largest US airlines to the tune of more than $2 billion. This is huge news, because a very knowledgeable person who for decades showed great disdain for the industry suddenly changed his mind. The question is, why this investment happened. Obviously, Buffett must believe that circumstances changed and that the industry he maligned as totally irrational finally learned some lessons and from now on will change its stripes and reward him for his investment.

In that he is not alone because Doug Parker, chairman and chief executive officer of American Airlines, also believes that from now on there will be a different reality for airlines with guaranteed significant profits in the long run. But could this be a déjà vu moment? While betting against Buffett historically has not been a smart decision, could it be that the Oracle sees only what he wants to see and is in the path of a similar blunder as in 1989?

The view of many analysts is that we are moving towards a situation where the down chances are beginning to outweigh the upside. Airlines are still profitable, especially in the US where it may be a reflection of diminished competition, but even that trend seems to be slowing down. Labour demands, and increasingly is granted, higher wages, fuel costs are up or at least will not go down further stimulating traffic and international tension is increasing, potentially hampering traffic growth. New lessors are emerging, some of which have little experience in handling a possible downturn. The situation is uncomfortably reminiscent of the early 1990s.

A comprehensive analysis recently published by Konrad Blocher of Goshawk reveals potentially troubling realities. A cyclical uptick in productivity of aircraft did not happen in recent years. When it does, we will not need all the aircraft ordered because a smaller number will do the job. For the market to absorb all the aircraft being planned for production would necessitate unreasonably optimistic scenarios at a time when more pessimistic ones are emerging. So, maybe Buffett will have the distinction of being the most successful investor in history but failing twice in our unique industry.

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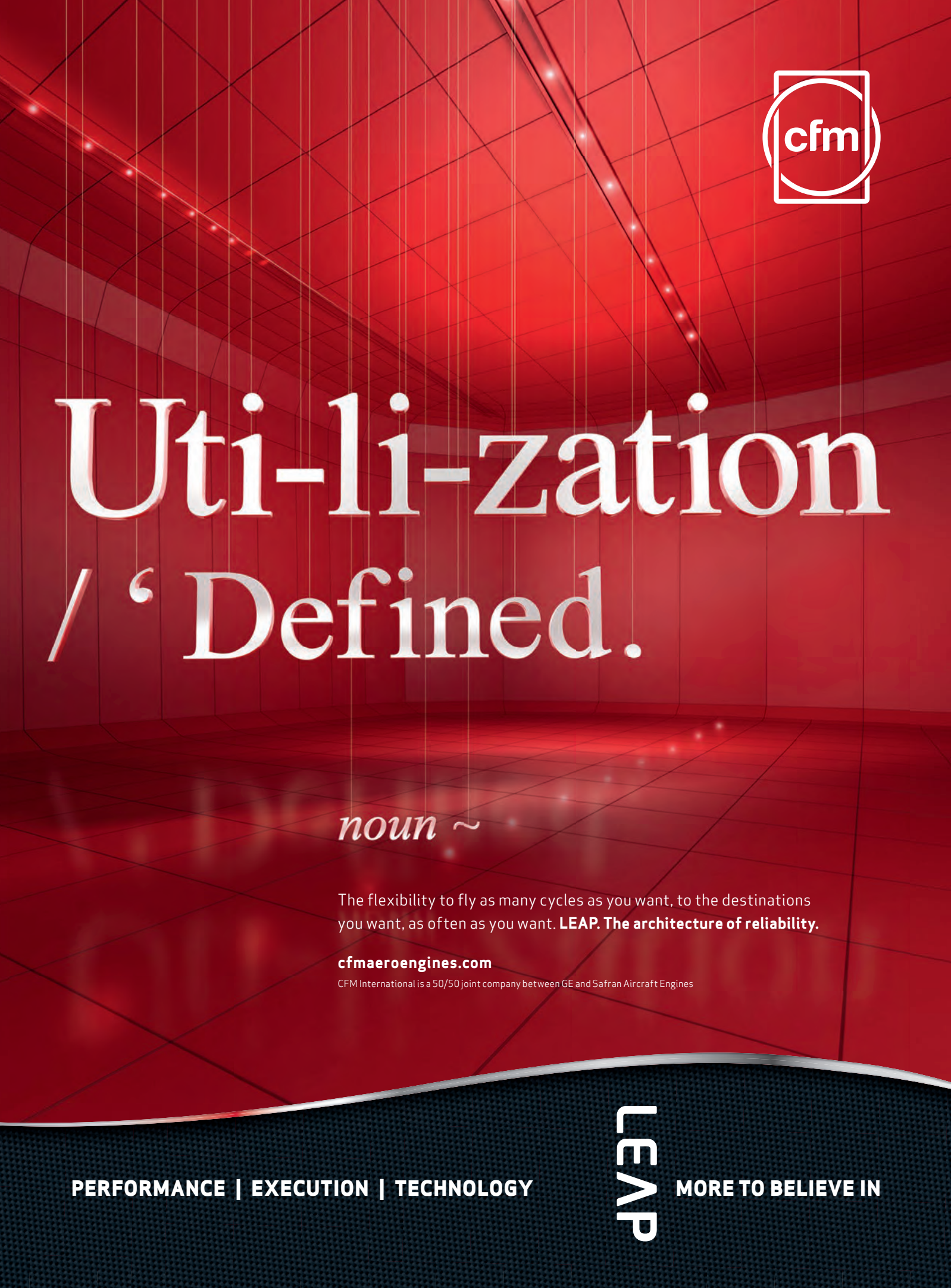
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