Industry observers theorised after the financial downturn that aircraft retirement age was reducing. Analysis of fleet data in 2012 and 2015 has actually shown this not to be the case, revealing that early retirement was only temporary.

Is the average aircraft retirement age progressively reducing?

During the four years following the global financial shock of 2008, circumstantial evidence suggested that the average retirement age of commercial aircraft had begun to decline after several decades of relative stability. The parting-out of airframes as young as six years old provoked both debate and concern. By 2012 it was widely asserted that the retirement age profile was changing. Narrowbody commercial life expectancy had reduced from 30 years to 26, and widebody from 27 to 25 years. A reduction of average life of one year for every passing five-year period was predicted.

While the downturn in demand was seen as the trigger for a change in average retirement ages, it was apparent that there were multiple and complex contributory factors underlying this phenomenon. Some were transient, but the assumption was that many could continue to have a detrimental impact on the economic life of aircraft long after an economic recovery had taken effect.

The principal factors in 2011/2012 driving a trend for earlier retirements can be summarised as follows:

1. The impending introduction of new-technology aircraft.
2. A 'permanent' transition to higher fuel prices.
3. Readily available export agency financial guarantees for the financing of new aircraft.
4. The slow recovery of the air cargo market.
5. The widespread enforcement of 'non-addition' age limitation rules.
6. The inexorable rise in the proportion of the global fleet controlled by lessors.

This last point is added to by a proportionate increase in the global fleet. When these aircraft have reached key life-cycle challenges and milestones, they will be subjected to lessors' decision-making criteria which may result in premature retirement.

Later in this article each of these factors will be reviewed in the context of the conditions prevailing in 2018.

This 'early retirement thesis' raised significant concerns for the lessor community, aircraft manufacturers and operators. There was a general acceptance that shorter economic lives for aircraft would raise financing costs, lower aircraft valuations and increase requisite depreciation. This would invalidate the current practice of depreciating to a 15% residual value over the 25-year period.

As a result, in September 2012, Avolon, an aircraft lessor that has an owned, managed and committed fleet of some 890 aircraft valued at over $40 billion, published an analysis of commercial aircraft retirement patterns. Authored by Dick Forsberg, head of strategy at Avolon, the analysis was considered as definitive for properly understanding and analysing aircraft storage and retirement trends. In the following two years, parting-out activity in relatively young fleets was observed. In March 2015 Forsberg revisited the exercise in even greater depth with the publication of 'Aircraft Retirement and Storage Trends – Economic Life Analysis Reprised and Expanded'. The conclusion of this later analysis was that, contrary to prevailing belief, the retirement picture for all main categories of commercial jets remained fundamentally as had been reported in the original paper.

"In 2012 I concluded that there was no shift in overall behaviour. And when that exercise was updated three years ago, the updated data did not move the needle on the aggregate," says Forsberg.

The average retirement age for all commercial jet aircraft was found to be 25.7 years (down from 25.9 years in 2012). The same portion, 60%, of delivered aircraft were still in service after 25 years of age. The split between the average age of narrowbody and widebody retirements was 26.6 years and 24.6 years respectively, with 65% and 59% remaining in service after 25 years.

Boeing followed Avolon's original lead in seeking to analyse the underlying reality of the anomalous retirement behaviour. In March 2013 Boeing published research in a report entitled 'Key Findings on Airplane Economic Life,' authored by Boeing Associate Technical Fellow Helen Jiang. The conclusion was a clear endorsement of

While some aircraft types have a low average retirement age, this is for specific economic reasons. In contrast to this, other types have operated to an age that is higher than the overall fleet average. This is again due to economic issues specific to those types. The overall average retirement age has changed little from about 25 years.

Forsberg's findings.

"Further, our study revealed that whichever surrogate one chooses to measure airplane economic life, the evidence suggests that the measure has remained stable for more than 15 years. Moreover, fleet evolutions of the current-generation of airplanes, such as the Next Generation 737 and A320, are following the same trend as previous generations. Boeing has found no evidence of a meaningful change in airplane economic life either over the last two decades, or going forward," says Jiang.

The Avolon analysis of 2015

Forsberg's paper grouped retirements into three 'waves.'

The 'first wave' of retirements comprised the 727, DC-9, F.28, 737-100/200, L-1011, 747-100/-200/-300 and DC-10.

75% of all retirements to end-2014 were found to be concentrated within these 10 aircraft fleets/sub-fleets. Of a total of 5,474 of these 'first wave' types built, 4,247, or 86%, had been retired by 2015, at an average age of 29 years. Those remaining in service (both as passenger and freighter aircraft) had an average age of 36 years.

The 'second wave' of retirements comprises the BAe 146, MD-80, 737-300/-400/-500, Fokker 70/100, MD-90, BAe Avro RJ, 757, A300, A310, 747-400, 767-200/-300 and MD-11.

Of a total of 7,960 of these 'second wave' types produced, 1,944, or 27%, had been retired by 2015. Average age at retirement was 29 years. Those remaining in service had an average age of just under 20 years.

Of the types within the second wave for which retirements have been tracked since January 2015 *(see table, page 8)*, a further 169 737 Classics, 126 757s, 78 767s, 88 747-400s, and 29 MD-11s were permanently retired from commercial use by May 2018.

The 'third wave' of retirements comprises the A320, 737-600/-700/-800, A330-200/-300, A340-300/-500/-600, and 777-200.

The third wave of aircraft retirements comprises aircraft types in production, with the exception of the A340. Only a small fraction of delivered aircraft in these fleets had been retired by 2015, with 97% of the 14,000 aircraft manufactured still in service at an average age of 7.6 years. The 374 aircraft that had left the fleet did so at an average age of almost 18 years.

Of the selected types within the third wave for which retirements have been tracked since January 2015 *(see table, page 8)*, a further 56 737 NGs, 22 A330s, 61 A340s, and 33 777-200s and -300s (non 'ER') were permanently retired from commercial use by May 2018.

This table draws on data provided by IBA iQ and FlightGlobal for selected second- and third-generation sub-types.

Disparities between different data sources have prevented compilation of an exhaustive list of recent retirements. The numbers tabulated against each type must be treated as 'indicative' rather than 'definitive'. With this caveat, the stand-out trends in the data shown for the past three years are:

- A reduction in the rate of 737-400 retirements, largely a function of the demand for freighter conversions. Some 36.8% of 737-400s produced have now been retired *(see table, page 8)*, compared to 68.5% of 737-300s and 56.3% of all -500s *(see table, page 8)*.
- 737 NG retirements have stabilised at a low level, with only 7.7% of the -700 fleet and 1.2% of the -800 fleet retired or in storage *(see table, page 8)*. In contrast, 40.6% of the much smaller -600 fleet has been retired or are stored.
- Relatively few 757s and 767s have been retired relative to the fleet size and average age, again reflecting the level of demand for freighter feedstock by the integrator and e-commerce operators. Only 21.6% of the 767-300 fleet has been retired or are stored *(see table, page 8)*.
- 747-400 retirements have slowed, with 52.7% of this ageing fleet remains in service. This includes 194 freighter-configured aircraft.
- Of the A320 family, the small A318 fleet has suffered a high rate of attrition, and 23 of 80 aircraft produced are in storage or retired. The average age of

AIRCRAFT RETIREMENT DETAILS 2008 TO 2018

Aircraft type	Aircraft with data available	Stored aircraft	Retired aircraft	Average age at retire	Before 2008	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018 to date	Percentage of fleet stored/retired
737-300	1,113	206	556	24.13	27	34	59	55	55	105	66	41	31	36	26	21	68.5%
737-400	486	86	93	23.00	7	2	4	3	6	6	20	21	13	5	1	5	36.8%
737-500	389	69	150	21.18	5	9	2	4	18	34	24	23	11	13	5	2	56.3%
737-600	69	2	26	14.80				1	3	5	2		3	5	6	1	40.6%
737-700	1,282	41	58	14.25					2	7	13	8	7	12	6	3	7.7%
737-800	4,905	40	17	15.91							1	3	2	1	7	3	1.2%
757-200	989	139	208	26.75	9	6	10	14	10	6	7	20	27	41	43	15	35.1%
767-200	244	35	109	27.09	24	4	6	7	9	15	5	11	10	7	5	6	59.0%
767-300	841	73	109	24.53			4	5	1	11	11	27	12	13	17	8	21.6%
777-200	709	68	40	18.52		1			1	1	1	6	6	7	14	3	15.2%
777-300	841	10	5	15.75								2		2	1		1.8%
747-400	694	126	202	22.14		2	3	10	10	20	26	43	29	23	19	17	47.3%
MD-88	158	4	39	23.99			2	4	6	3	6	1	2	2	12	1	27.2%
MD-90	117		59	16.28	6					4	7	20	12	1	8	1	50.4%
MD-11	200	13	56	20.64					1	4	9	13	13	8	8		34.5%
A318	80	8	15	7.35			2	2	3	1	2	1		2	2		28.8%
A319	1,463	29	55	14.41						4	3	7	10	13	11	7	5.7%
A320	4,612	101	332	20.38	20	9	24	29	30	52	49	25	22	26	39	7	9.4%
A321	1,688	41	35	19.27					1	1	1	6	11	7	6	2	4.5%
A330-200	661	47	10	16.14						1			4	5			8.6%
A330-300	742	15	31	18.51					1	2	8	7	7		5	1	6.2%
A340-200	28	5	14	20.37					2	2		5	4		1		67.9%
A340-300	218	27	83	18.56			2	2	5	5	8	14	19	10	12	6	50.5%
A340-500	34	17	6	9.55						3	1		1	1			67.6%
A340-600	98	26	8	12.75								1		2	3	2	34.7%
A380-800	230	4	1	11.37											1		2.2%

airframes retired so far is only 7.35 years, the lowest of all fleets surveyed, and 28.8% have been retired or are stored *(see table, this page)*.

● Some 9.4% of the large A320 fleet are retired at an average age of 20.38 years *(see table, this page)*. Most retirements relate to first generation, pre-1996 variants with CFM56-5A or V2500-A1 engines.

The percentage of each type retired versus their average retirement age is show *(see first chart, page 10)*. This chart only takes account of aircraft shown as 'retired', and does include stored aircraft. For example, the A340-600 has eight retirements, but 26 airframes in storage. The inclusion of stored aircraft, which will not ultimately return to commercial service, will inevitably move fleet data points to the right. The 'best fit' trendline will then plateau to an extent as fleet retirement percentages increase, and an overall average retirement age for all fleets of 25 years is implied.

Aircraft types with an average age of more than 25 years are in the 'protracted longevity zone'. These include the 757-200 and 767-200.

Aircraft types with an average retirement age less than 15 years are in the 'premature retirement zone'. In particular, these include the 737-700, A319, the few retired A380s, A340-600, A340-500, and the A318; which has the youngest retirement age of just over seven years *(see first chart, page 10)*.

The weighted average age of retirement for the fleets tabulated is just under 22 years *(see table, this page)*. This average does not contradict a global average of around 25 years. The data includes young retirements within fleets which are still largely in service, and excludes ageing fleets (such as the A300 family) which would raise the average materially.

Early retirement drivers

Although the vast majority of commercial aircraft can be expected to remain in commercial service beyond 20 years, and in some cases beyond 25 years, clearly some or all of the six factors central to the 'early retirement' thesis remain pertinent.

1. The impending introduction of new-technology aircraft offering improvement in fuel efficiency of 10-20% per ASK.

The 'economic inflection point' at which replacement of a given type may be viable will obviously be reached sooner if a new, more efficient alternative is introduced. Launched as a programme in 2010 with first deliveries originally scheduled for 2015, the A320neo and the 737 MAX, launched in 2011 with initial deliveries in 2017, epitomise these platforms. Deliveries of new aircraft types, however, can only be made over an often-protracted period of time, lessening the impact of generational changes in technology. Fundamental design issues and the new technology in such aircraft, have served to prolong, not shorten, the operational life of many older types that might otherwise have been retired through part-out or freighter conversion.

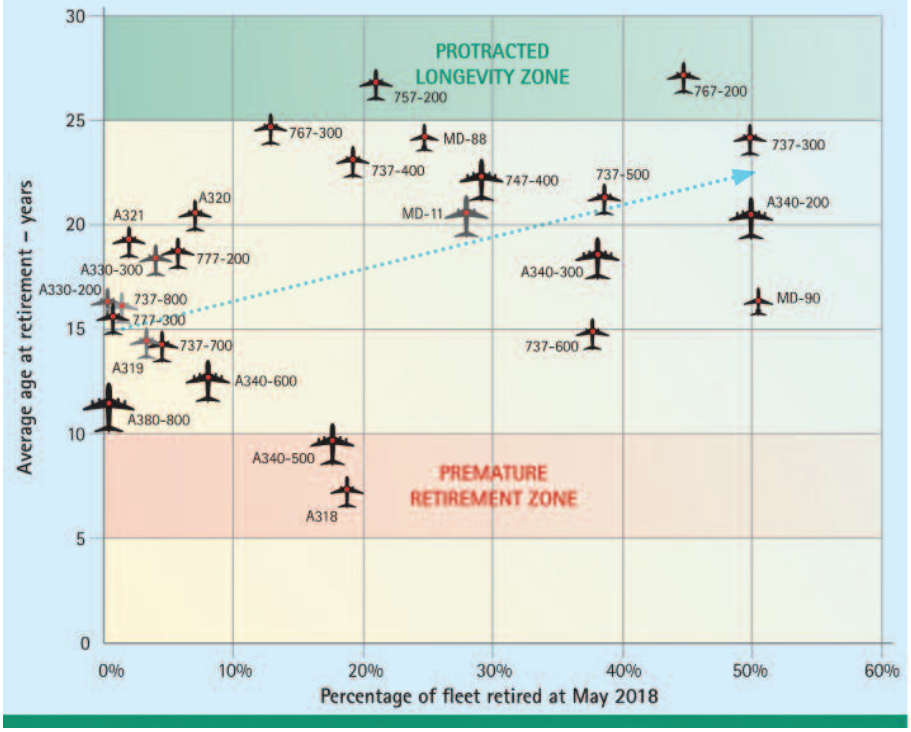
The operational problems afflicting the PW GTF and Trent 1000 engines will continue to impact retirements for some time; the 787's issues in 2013 had the same effect.

New technology's effect on retirement age in 2018 is therefore concluded as being neutral.

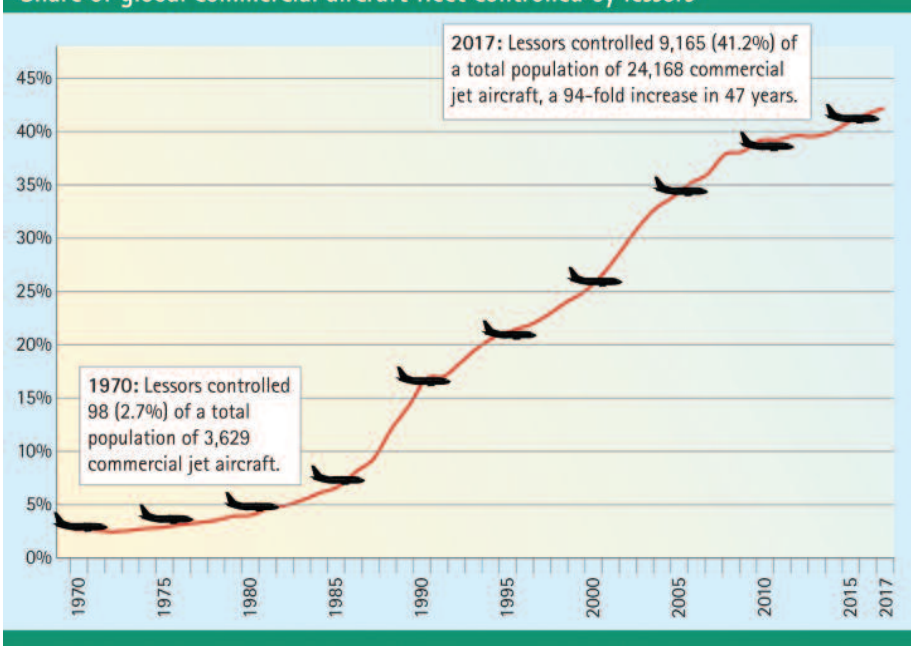
2. A permanent transition to higher fuel prices, rendering many previous generation aircraft irretrievably uneconomic to operate.

The transition to higher fuel prices

Average age at retirement vs retirals as a percentage of total fleet production



Share of global commercial aircraft fleet controlled by lessors



foreseen in 2011-2014 has not yet proved to be 'permanent'. Although jet fuel prices have risen fairly steadily from a low of just under $40 per barrel in late 2015 to the current $90 range, there has been no such permanent transition to prices in the range of $120-140 per barrel experienced for some years before July 2014.

As a result, larger numbers of older aircraft remain more economically viable than was generally anticipated in 2012.

The effect of high fuel prices on retirement age is, therefore, still regarded as negative, but not dramatically so.

3. Available export credit agency guarantees, enabling less creditworthy purchasers to finance aircraft at low interest rates, was previously only accessible to first-tier credits.

While the US Eximbank was denied the ability to offer such financial guarantees for aircraft financing in 2015, "financing for new and used aircraft is as robust as it's ever been," according to Tim Myers, president of Boeing Capital Corporation, speaking in March 2018. Although current aircraft production rates are at record levels for some programmes, new sources of financing and innovative structures are seen to be more than adequate to support such record levels of aircraft deliveries.

The effect of high finance capacity on retirement age is, therefore, seen as negative, especially in the context of a major downturn in demand when scope for mitigation of oversupply through the price mechanism may be insufficient.

4. The slow recovery of the air cargo market and the lack of supplemental type certificates (STCs) for passenger-to-freighter (P-to-F) conversions for a number of aircraft types that are most impacted by the economic factors listed above.

Contrary to expectations, the cargo market has recovered dramatically in some sectors since 2012. The dramatic rise of demand for e-commerce traffic, combined with continued steady growth of express services offered by integrators, has resulted in strong demand for freighter conversions of 737-300 and -400, 757-200, and 767-200 and -300.

In addition, A330-200 and -300 P-to-F conversions are now being undertaken, together with 737-700 and -800 airframes, and several programmes are now moving towards grant of a P-to-F STC for the A321.

The effect of availability of P-to-F conversions on the retirement age of aircraft is positive. Some 737-400 and 767-200 converted aircraft may now remain in service until they are 40 years old.

5. There is widespread introduction by some countries of 'non-addition' age limitation rules for aircraft. These are used to compensate for the lack of a robust maintenance and airworthiness oversight regime.

Aircraft Commerce has obtained information for the age-limitation rules imposed in 30 different national regulatory jurisdictions, of which 14 are in the Asia Pacific and nine in Africa. The average age limit stipulated is just under 17 years for passenger-configured aircraft, and just under 20 years from freighter aircraft.

The effect of age limitation rules on fleet retirement age is therefore negative; there has been no change in that perception since 2012.

6. There is an increase in the portion of the global fleet controlled by leasing companies that aim to keep only recently manufactured aircraft in their portfolios.

Targeting a young fleet may cause lessors to retire aircraft prematurely.

The first and second points listed above hold the potential to disrupt the pattern of aircraft retirement profiles, while points 3 to 5 will have second-order effects. But understanding of the implications of the increase in the number of aircraft controlled by lessors is central to understanding any short- to medium-term change that may bring about early retirement of certain types of aircraft.

As the chart indicates *(see second chart, this page)*, the progressive increase in the share of commercial aircraft owned or controlled by lessors has increased

from 17% in 1990 to over 41% in 2016.

One primary effect of this trend is the ability of airlines to dispose of aircraft with relative impunity at expiry of a lease term. Recent examples of this phenomenon are Virgin Atlantic with respect to A340-600s, and Singapore International Airlines with respect to early-built A380-800s. Less noticeable are retirements of 777-200ERs, which have also proved difficult to place at reasonable lease rentals, and have taken place under the same conditions.

Lessor policy is a driver in decisions concerning early aircraft retirement, part-out versus heavy check, re-lease versus heavy check, P-to-F and re-lease as a freighter.

There is another side to the decision process that involves a lessee opting to extend a lease term or return the aircraft to the lessor

Parting-out is a potentially attractive option, depending upon aircraft sub-type, maintenance status and age profile. Used aircraft generally fall faster in value than the used components that can be harvested from them, and this is especially true of engines. No understanding of the likely trajectory of average aircraft retirement ages by type is possible without assigning weight to the decision drivers applied by lessors that may impact the commercial life of assets.

"We were emerging from the financial crisis of 2008, demand for the more niche narrowbodies was weak, and a number of lessors concluded that it was difficult to find any interest for A319s, 737-600s and 737-700s," says Forsberg. "So when the lessors did the maths for these models, they figured out that they would get a better financial return on 13- to 14-year-old aircraft by parting them out and selling the spares. So there are two pieces to that analysis. One is 'we have an aircraft coming back to us, what are we likely to get as a market lease rate for three years, which is the shortest term which you can practically consider leasing out for', and 'what do we have to spend on the aircraft's maintenance restoration to make it viable for any lessee to pick up?"

Assuming remaining engine life was adequate to meet delivery conditions, a typical airframe would still require expenditure of over $1 million to get it into a better than mid-life condition, yet lease rates were very weak at the time.

So an appraisal of the realisable value of the high value components relative to the book value of the asset and its earning potential going forward would be undertaken. This analysis focused on the smaller variants, whose engines are worth disproportionately more as a percentage of the value of the aircraft than they are for the bigger variants, Forsberg explains.

"The A318 and 737-600s are great part-out aircraft, because you are not paying very much for exactly the same engines, and you are getting the least amount of wastage," says Stuart Hatcher, chief operating officer at IBA Group.

"Apart from using the A318 on niche routes, like London City to New York, and the 737-600s operating some small Scandinavian routes, what is the point of these aircraft in today's market? They are both small with low seat numbers, and a lot of weight because they have the same wing and other structures as other larger members of the same family. This is the same problem as the 777-200LR."

This principle is illustrated in Chart A, where the A318 and A340-500 sit well below the average trend line with respect to average age at retirement, in contrast to the 767-200 and -300, the on-going demand for which is buoyed by the continued value of the aircraft in passenger configuration in the case of the -300, and as a freighter conversion in the case of the 767-200.

"So there was a point in time when lessors felt they were better off breaking up A319s and 737-600s because there was a shortage of CFM56 and V2500 engines," says Forsberg. "Once six aircraft have been parted out, however, that provides 12 engines, which saturates

The premature retirement of some A318s has distorted the average retirement age to an extent. This is one example of particular economic characteristics of an aircraft type leading to early retirements.

the market. It can, therefore, be a short-term phenomenon."

It is estimated that 70-90% of such an aircraft's value is realised by remarketing the engines. In addition to the engines, parting out a 737NG has been found to generate 1,500-2,000 parts for sale, as opposed to only 300-400 saleable parts for a 737 Classic. This is because the value of Classic 737 used parts has been depreciating due to oversupply.

Early-build A320 family aircraft offer the same challenge, with the residual value of an airframe stripped of its engines being as low as $50,000-100,000 in some cases, although a later-model aircraft may yield up to 1,000 saleable parts that are worth significantly more.

As the profile of A320 retirements as shown suggests *(see table, page 8)*, this self-limiting process of too many retirements flooding the market with spare engines and components, coupled with strong demand for the aircraft to meet rising passenger demand, appears to have suppressed the part-out rate over the past five years. The same effect is seen with respect to 737 NGs.

"Back in 2008/09/10 everyone was saying that aircraft would be parted out in 15-20 years," says Hatcher. "But as we said at the time, the dynamic between the parts industry and airlines means you can over-flood those markets quite quickly, and that kills the drive towards early retirement. We have now seen a reversal of that. There have been a number of narrowbody retirements and scrappings over the past five to seven years, followed by a bit of a peak in 2013-2014, and it has been collapsing ever since. If the aircraft are in good condition the owners have been desperately trying to get them flying again. The A320 is still the type with the highest number that are parted out due to age distribution, but that is an age issue. The average age of the asset is higher on A320s."

Storage

Storage facilities are frequently used by airlines and owners facing asset value issues. Stored aircraft maintained in good condition provide a valuable reservoir of capacity reserve. In reality relatively few aircraft emerge from long-term storage to fly again, and it is widely held that only 20% of all aircraft stored for more than three years have been returned to active service. Of these, fewer than 10% were passenger aircraft over 15 years old.

Lessor behaviour

Often, where an extraneous shock forces re-examination of basic business behaviour, lessors apply the series of tests outlined above to all lease returns as a matter of routine, according to Forsberg.

"Lessors will always do the maths when they have an aircraft coming back off lease at 13-15 years old. They will always ask 'what else could I do with this?' And that will lead inevitably to higher levels of part-outs than would have been the case when the owners were basically airlines, because airlines will be able to do the technical work relatively cheaply, assuming they have got an in-house facility."

For an airline, it is always better to keep an aircraft in the fleet than to swap it out for another one. This avoids modification, transition, return and redelivery condition costs. So for an airline, the analysis is different, and it is more difficult for them to conclude that part-out is appropriate.

"Going forward it is likely we will see more younger, sub-20-year aircraft going for part-out, but not massively so," adds Forsberg. "So whereas historically the average age of single-aisle/narrowbody retirement is about 25 years, that will notch down on average by maybe one year to 24 years. It is unlikely to drop to 23, and certainly will not go to 20. And within those average ages we are not just talking about the primary use in passenger service, we are talking about all uses, including freighter."

The role of pricing

In their respective research exercises, Avolon and Boeing focused on the physical movements of aircraft fleets. "The analysis did not set out to investigate the related changes in aircraft values through their economic lives. The focus was on the movement of the physical aircraft itself," says Forsberg.

The extent to which lessors have sought to mitigate early retirement drivers, in addition to effects of a supply and demand imbalance by using the price mechanism, should be examined.

Concern about value impairment of certain aircraft types, and the growing differential between values of new and relatively young aircraft in general, is found throughout the industry. While the outlook for the physical life expectancy of the assets may remain relatively encouraging, this stability is perhaps only being maintained by a complex interplay of creative and aggressive strategies. These are intended to ensure that an adverse supply/demand balance does not crystallise in the form of premature retirement at a book loss, once high-margin part-out opportunities have been exhausted.

Focus has primarily been on narrowbodies, but what about threats to the economic life of widebodies which may prompt part-out, P-to-F conversion or the adoption of jeopardy pricing strategies? Looking at the A340 family, where half the fleet is either stored or parted out, the average age for retirement was only 9.55 years for the A340-500,

The 767-200 is prime example of an aircraft with a high average retirement age. The 767-200 has the highest retirement age of all jetliner types, and is closely followed by the 757-200.

and 12.75 years for the A340-600.

What is in prospect for high book-value aircraft types, such as the 777-200ER? And is it possible that the 777-300ER might become a candidate for premature part-out?

"Boeing has managed to push all its 777-200ERs out, but the OEM has the flexibility to offer incentives to ease that process through," says Hatcher. "As for the 777-300ER, it is difficult to decide how much of an aftermarket there is. You have those two big engines, and you have to make sure you can cover that cost if you take on the -300ER."

Forsberg agrees. "One of the big issues when you are offering this 12-year old 777-200ER to a new operator is that is too much kit for them. The cash requirement to get on the Rolls-Royce Total Care package is also high. It is a big aircraft and very expensive to induct into a fleet if you have not done it before. So there are few new operators, and the lessors have moved heaven and earth, mainly through revised pricing, to keep aircraft with current operators by extending the leases."

In respect to the existing and new operator base, Hatcher expects US majors to take several, while the Europeans will hold onto their aircraft until they get to 18-20 years old.

"Many Asia Pacific carriers will also dump when they get to a reasonable age, but the real question is what happens in the Middle East?" says Hatcher.

"Emirates has been extending a few of its leases on the -300ER, but some will be handed back relatively soon. Emirates has a large number, and we are probably going to see about 80 aircraft coming out over the next four to five years. The rumour is that they will go to the US."

Across the 777-300ER fleet, Hatcher points to the expectation that following 38 lease returns this year, a further 43 are anticipated in 2019. Although the present estimate is for only 15 returns in 2020, the respite may be short-lived, with many members of this 793-strong model scheduled to come back from operators into the early years of the next decade.

"We keep on seeing people push 777-300ERs to the right, one for cash reasons but also because there is no replacement yet," says Hatcher. "I can see Boeing Capital taking tranches of 777-300ERs to use strategically to keep customers that might resort to other widebodies happy, but with such a large fleet size this is still a tall order. Realistically there is going to be some price reduction. Back in the late 2000s there was still a premium on the -200ER, but that quickly changed. It was a disaster waiting to happen."

Hatcher also observes that selling a 777-300ER with a lease attached is still relatively easy, despite the emerging aftermarket risk profile. The appetite for such asset risk exposure now comes more from investors in the Middle East and the Asia Pacific, rather than Europe.

Hatcher reiterates that once the fleets of A350s and 777X become established on a large scale, more solutions will be needed to place 777-300ERs. He cautions that the 777-200LR is Boeing's problem, which makes it fortunate that there are not many of the aircraft. It is uneconomic, with a smaller seat capacity than the -300ER. Moreover, there are few operators that need an aircraft capable of flying half-way around the world.

Early-build -200LRs are now receiving offers well below $50 million, while an aircraft of that age and capability should be priced into the $70 millions. But people do not want the aircraft as they are 20-30 seats too small. These are niche aircraft, designed for a specific purpose, and they have been usurped in that role by the 787 and A350.

"The A380 might become an aircraft that does endure, if it stays where it is as a programme," asserts Hatcher. "The values of the old A380 would plummet if a new version were developed."

Three ex-SIA airframes have been handed back by the operator so far, one of which has been taken-up by wet-lease specialist Hi Fly of Portugal.

"A basic A380 does have its place, because it is the biggest. The A380 will be like the 747-400. It will have a fairly long life, eventually, so it will stick where it stays, but it will not go any further."

Widebody reconfiguration

One of the major barriers lessors and new operators face in acquiring used heavy widebody aircraft is the cost of reconfiguration.

Hatcher suggests this might be one area in which Boeing, in particular, might take an initiative.

"Boeing seems to be more focused on aftermarket services. This would suggest to me that one of its lower-hanging fruit targets within the new business model would be to try to amortise the cost of reconfiguring the 777 inside a nice services package that gives the customer some refurbished cabin materials."

Hatcher speculates that such an initiative might even result in reconfiguration of the entire aircraft being undertaken for just several million

dollars. By contrast, there are reports that a three-class A340-600 refurbishment to the standard of a first-tier European operator may be priced at about $15 million.

"The approach would have its limitations," continues Hatcher, "and could not be expected to result in a first-class product that would stand comparison with the best in the industry."

Hatcher suggests that such aircraft may find favour with carriers in Africa and Asia that only need several aircraft. He does not see such low-cost reconfigurations finding favour among European or US carriers. "If they come out of the first lease at 12-14 years, and are refurbished to an international standard at the right price, they will go into the US majors and we will then see them fly until they are 22-plus years old, or until they hit their final heavy checks."

As for the A330, lessors that offer low pricing to keep the aircraft from indeterminate storage may be on the wrong side of the supply and demand curve.

"The A330 is a pretty liquid, easy-to move aircraft at a low rent," says Hatcher. "People have been less keen to go gung-ho on the interior of the A330s; it is a very different beast to the 777-300ERs in that respect. The A330 has proved that at the right price people will lap it up. It will be like the 767. Airlines will be running them for way over 20 years. But the A330 has longer legs than the 767, and the A330 is a natural successor to it for airlines that cannot justify new aircraft. So I am very bullish about the A330s, although not so bullish about the A330neo.

"For brand new A330-300s we have seen rents like $600,000 per month in the sale and leaseback market. This is because the operator had been pushed into cheap aircraft, while the baseline market rate was 850,000," says Hatcher. "At that time, a few years ago, $600,000 was the re-lease rate for a 5-6 year-old aircraft."

Since then, Hatcher has seen monthly lease rates for A330-300s a few years older diminish rapidly towards the $200,000-$300,000 level.

"Some will be for short terms for sure, but some are on slightly longer terms. With oil being relatively cheap for so long, operators have seen no benefit to paying more than mature pricing for newer kit," he adds.

The future

The increase in capability of yield maximisation software has led to a change in operator attitudes towards the smaller members of most major fleets, the A319 and A318 being classic examples.

It is widely recognised that the relatively small incremental operating costs incurred by the standard body or stretched model (in respect to weight-related charges and fuel burn) can be easily offset by filling some or all of the larger variant's additional seats.

Consequently there is no 737 MAX 6, nor is there an A318neo. The choice of smaller family members of next generation aircraft is likely to take full account of the hard and expensive lessons learned from previous sub-types.

It is also hard to envisage a repeat of the situation that arose with the A340 in the context of a new design, where the reliability of the engines of the big twins rendered the A340 economically obsolete in just a few years.

The current outlook for average retirement age is underpinned by rising demand. Passenger traffic is forecast to increase by an average of 4.5-5.0% per year for the next 20 years. Conversely, an economic shock could raise interest rates, with the consequence that low-cost used aircraft would become attractive once again. AC