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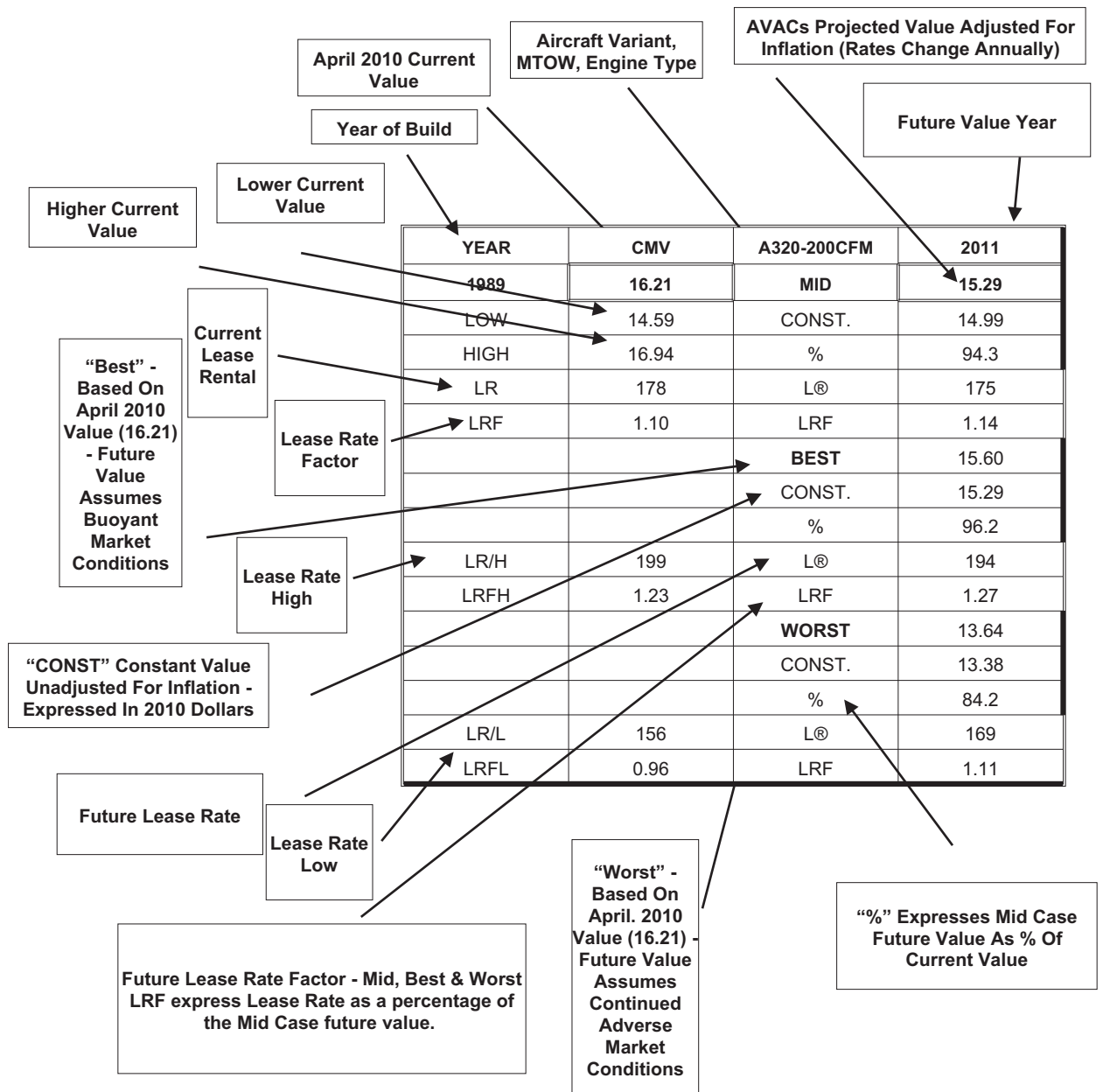
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Subscription Form

*Indicates new aircraft type added in this issue.



The above graphic illustrates the layout of The Aircraft Value Reference. The L/R provides Current & Future Lease Rates based on a six year term (eight years for a widebody) and to a medium credit and assumes that the lease will include a provision for maintenance reserves such that the aircraft will be returned in the equivalent of half life. The LRF - Lease Rate Factor - expresses the Lease Rate as a percentage of the Current or Mid Case Future Market Value. The Best and Worst LRFs are also a function of the Mid Case Future Market Value. The HIGH & LOW values relate to the current value only and reflect differing specification and maintenance status.

Introduction

All current and future values and lease rentals are Market Values - The Aircraft Value Analysis Company does not produce base values or base rentals.

This is Volume 1 (Jet Aircraft) of **The Aircraft Value Reference**, one of the most comprehensive sources of current and future values & lease rates of aircraft. The current values quoted herein are not based exclusively on recent market transactions but more reflect **The Aircraft Value Analysis Company's** opinion of the worth of an aircraft.

The Aircraft Value Analysis Company (**AVAC**) provides comprehensive advisory services to a broad cross section of the aviation community. The company was created specifically to examine the future value and lease rates of aircraft and the many complex factors that affect such values and rentals.

There has been a less appreciable change in the current and short term values of most aircraft types since the October 2009 issue due to greater stability in the market albeit in the context of a still weak global economy and fragile aviation industry. The values were prepared in mid April 2010 and as such reflect the market conditions at that time and only at that point. AVACs values are calculated on a daily basis such that values prepared for individual appraisals after mid April 2010 may differ from the published figures.

Current Market Conditions

General. Values experienced a secondary significant fall in early 2009 as the worldwide economic downturn translated into depressed demand for travel in all sectors. This followed the primary fall from the peak of late 2007. Despite the emergence of most Western economies from recession, values of most aircraft are continuing to experience falls as operators still seek to cope with variable traffic, reduced yields and high fuel prices. Widebodies and narrowbodies, new and old are still being affected. Values have now fallen at a rate unseen for many years - if ever. Whereas the lack of funding may have been a major concern over the first half of 2009, such a factor is of lesser relevance where there exists lesser appetite to acquire aircraft in the first instance due to reduced traffic. Lease rentals have also experienced significant declines but in contrast to values are now showing signs of stability. There exists a lag between lease rentals and values such that values could continue to fall even as lease rentals rise.

The tipping point occurred in the first quarter of 2009 when it became clear that the world economic malaise translated into much reduced demand for the all important premium traffic. The scheduled carriers are heavily dependent on premium traffic for profitability and considerable sums have been invested in upgrading interiors to attract such custom. The loss of premium traffic placed immediate pressure on the finances of operators. Places like Dubai have suffered from the effects of the worldwide downturn and a fall in property prices such that demand is failing to keep pace with increases in capacity still forcing fare discounting. The decline in passenger traffic was exacerbated by even more significant falls in cargo traffic. Premium traffic is now returning but at subdued levels.

The problem for values is that all aircraft types have and are being affected. The product life cycles of those aircraft in production is such that nearly all have been in service for a number of years. Consequently, each type has a significant number in service and a rollover in fleets is inevitable, but partially accelerated by the recession. From their peak of late 2007, most narrowbody values have now fallen by more than twenty five percent. The widebody sector, so dependent on premium traffic, has also experienced

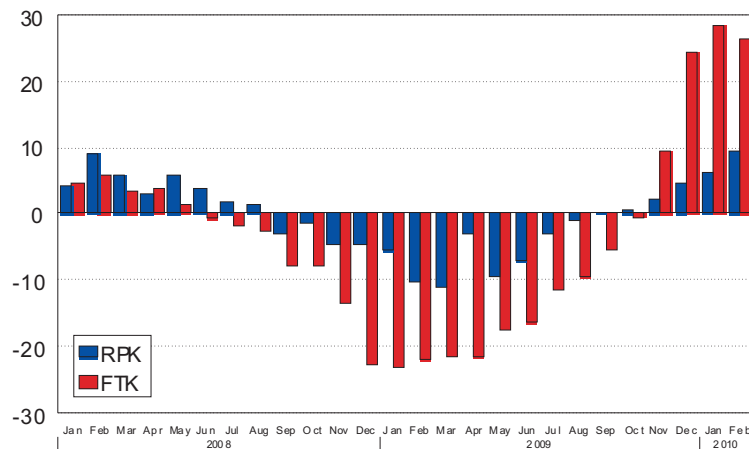
falls. Both new and old are exposed to the new world order. The B777-200ER is not as popular as it once was. While the fall in traffic may seem to suggest that operators would seek to fly smaller aircraft, this is valid only in so far as they already operate such equipment. The acquisition of smaller capacity aircraft is hardly an option. Operators at best may seek to switch outstanding orders. But this slowdown is a temporary phenomenon and operators will not wish to make long term decisions on a whim.

While values have still yet to bottom out, there is a growing need to determine when the next peak will occur as owners consider the most advantageous point for disposal. Cycles, in terms of aircraft values, are not consistent in terms of form or duration. As the market is dynamic in nature, with constantly changing variables and relationships, drawing exclusively from historical data is fraught with danger. Cycles do not necessarily exhibit a peak but rather may feature a plateau. Similarly, a trough may not be represented by the classic "V" but rather by an elongated period of uninspiring value behavior. Despite the difficulties of extrapolating the past into the future, the current cycle is showing some consistency with past events though the extent of the recovery will be more constrained due to differing market conditions.

Some data points may have shown that the peak of the previous cycle occurred in the first quarter of 2008 but such data is usually already out of date by the time it becomes available. While a sale figure may be agreed, documentation can take months to complete. Only then does the data enter the public domain, thereby creating a data lag of approximately three months. Consequently, the previous peak is considered to have occurred in the fourth quarter of 2007. By the time values reach the trough towards the end of this year, three years will have elapsed from the peak. Values have been exhibiting a lesser fall in recent months such that for perhaps six months values will be at the bottom of the trough, neither rising nor falling.

Improving Freight Traffic

Comparison with Same Month



Source: IATA

Previous cycles provide a clue rather than certainty to future events. The collapse in oil prices in 1986 saw rapid economic recovery. The increase in traffic, particularly in the international arena, was compounded by a shortage of capacity as manufacturers struggled to bring new aircraft such as the B747-400 and MD11 into service. The cyclic peak of 1990 saw values of DC10-30s nearly doubling within two years but another eight years were to elapse before the market saw a full recovery although the Asian Crisis caused some further problems. The low point for values was reached in 1995, a cycle notable for sustained production rates during the worst of the crisis. Not until 1996 did delivery rates drop to a low point as manufacturers sought to enforce severe penalty clauses on customers considering cancelling orders. Maintaining pre-downturn production rates during a market decline can delay an upturn. However, during the early 1990s production rates, expressed as a percentage of the total fleet, was in excess of six percent compared to some five percent today. Production rates should perhaps be more compared with fleet size rather than absolute production levels although utilization levels have generally increased. Values finally reached a plateau in 1998 rather than a peak during this cycle before starting to decline in the months preceding September 2001.

A three year period elapsed between the events of 2001 and the subsequent low point for values though the actual low was in late 2001 when placing any value on aircraft was a theoretical exercise in view of the absence of market activity. There were however, already indications that values were starting to erode before September 2001. The subsequent problems associated with SARS and Bird Flu prevented a more rapid recovery during this cycle. Another three years were to elapse from 2004 through to 2007 before the peak in values was next recorded.

Although each cycle and each recovery period is different, a peak or plateau appears between three to five years after the cyclic trough. The current cycle has the potential to be of average duration in terms of six years elapsing between peaks. A recovery is expected to have reached a peak in late 2012 and 2013 as traffic continues to improve in the intervening period. Initially operators are focusing on yields but with load factors already in excess of 75 percent, the pressure to acquire additional capacity that much sooner will translate into demand for additional equipment. Such demand will focus on newer types at the expense of the old as operators, having pared other expenses to the minimum, seek to improve operational efficiency.

Manufacturers are already showing their willingness to meet demand for new aircraft despite a rise in storage levels. Values of older aircraft - the first and second generation Chapter 3 aircraft – are therefore the most exposed in this recovery. While the newer aircraft will be more favored, with values increasing perhaps by ten percent in nominal terms between 2011 and 2012, different market conditions will make it difficult to contemplate a significant increase in value. The development of updated narrowbodies will make the current range of aircraft less attractive even if lease rentals rise to compensate for lesser residual values. The best that can be expected is for values to exhibit a similar plateau as in the late 1990s. The introduction of new widebodies in the form of B787 variants and the A350 will make it difficult to justify an increase in values of existing widebodies in view of their imminent replacement. The introduction of new models may cause operators to delay placing new orders thereby leading to shortage but in such an event, there will be a surplus of older equipment available to fill any void on a temporary basis. An imbalance in supply and demand for newer equipment may lead to a temporary improvement in values of existing types but lease rentals are likely to be the principal beneficiaries.

Lease rentals – at least of more modern jets – are considered to have reached the trough of the current cycle and are beginning the long haul to recovery after experiencing a significant fall from the peak of late 2007. In the two and a half years since the peak of the third quarter of 2007, lease rentals have fallen by more than 20 percent for those aircraft in production and to an even greater degree for the many older examples that are exposed to the baking heat of the desert. In late 2007 the lease rental of a five year old B737-800 amounted to approximately \$350,000 per month. Today the lease rental is likely to approximate \$240,000 per month. A ten year old A320 in 2007 was likely to secure a lease rental of \$285,000 but today this is fortunate to top \$200,000 per month. A 2001 vintage A330-200 in 2007 was able to command a lease rental in excess of \$700,000 per month but today the rental is less than \$525,000 though representing a 20 percent fall compared to the 25 percent of the newer narrowbodies. The B747-400 has not been so successful in resisting the volatility of the market. A 1995 B747-400 may have been able to secure a rental of \$645,000 in late 2007 but today the rate is around \$400,000 per month and likely to fall further in the context of more disposals of the type from primary operators such as JAL.

The fall in rentals is partly due to the fall in interest rates. With LIBOR having fallen in recent months as the financial sector has shown signs of growth, rises in lease rates have been constrained, obscuring perhaps the first signs of comparative recovery. The lessors have generally managed to retain their 15-20 percent margins during the worst recession the industry has known for 30 years. In contrast to previous downturns, the lessors have been faced with lesser calls for renegotiation of existing leases and instead have preferred to take aircraft back and lease to other carriers. This is because the market structure has experienced a significant change such that the stranglehold of the major carriers has been broken. There now exist a myriad of operators around the world for whom leasing is the only means of acquiring aircraft. Lessors are no longer dependent on a few operators. Lessees are less able to renegotiate existing agreements because lessors are able to lease elsewhere, even if subsequent rentals to other lessees have had to become more realistic.

The interest expense Babcock & Brown Air in the last three months of 2009 amounted to \$20 million compared with \$22.5 million for the same period in 2008. The company had a fleet of 62 aircraft at the end of 2009, the same as at the end of 2008. Operating lease revenues for the last quarter of 2009 was only slightly down from that of the final quarter of 2008. For 2009 as a whole, operating lease revenues amounted to \$214 million compared with \$219 million for the previous year. The company reported that rents still owed at year-end 2009 were less than two percent of total annual rentals, an improvement over the previous year, indicating fewer defaults and late payments.

ILFC was able to show net income of \$900 million for 2009 based on revenues of \$5.3 billion, again demonstrating a near 20 percent margin. Aircastle reported net income of \$102.5 million for 2009 on revenues of \$571 million, only slightly down from the \$115 million income in 2008 on revenues of \$583 million. BOC Aviation saw profits increase to \$137 million for 2009 from the \$107 million of the previous year, albeit with a much expanded fleet. Aerocentury, a lessor of turboprops, was able to report net income of \$5.6 million on revenues of \$34 million for 2009 while Willis Lease Finance, the leader in engine leasing, reported net income of \$19 million on revenues of \$150 million. The margins being experienced by the leasing community have been largely maintained even as net rental levels have fallen by more than 20 percent.

A problem for the lessors is that the maintenance of operating revenues has been at the expense of leases agreed before the recession. As these leases expire in the near term, there will be little opportunity to place aircraft at the same levels with either existing or new lessees, undermining revenues. If all aircraft currently possessed by the lessors were re-leased at current market rates, the lessors would inevitably report losses rather than profits. Fortunately, most lessors are likely to see a limited number of lease expirations during the next eighteen months when lease rentals will be recovering. Nonetheless, the proportion of premium grade leases will be eroded during the course of the next year.

With LIBOR perhaps only likely to increase as interest rates rise once again, there will be a positive impact on lease rentals though this will increase the expense for the lessors. The overall recovery of the industry, still very much fragile, is evident. Latest traffic figures show an important upward trend. The focus may be on newer aircraft but at present there exists sufficient capacity to meet demand. Operators prefer to increase load factors and focus on yields rather than seek rapid expansion. The still near record production rates from the manufacturers, set to rise still further by year-end, will meet demand and constrain the recovery in lease rentals, at least in the short term. The lease rentals of older aircraft are only likely to experience a sizeable recovery due to shorter terms to the less financially secure operators. The improvement in rentals, commencing in the second quarter of this year, will take time to feed through to values. Indeed, values of aircraft are still expected to continue to fall until at least the end of this year.

Lease rentals are expected to reach their next peak in 2012-2013. However, in the event both Airbus and Boeing launch re-engined narrowbodies, lessors are likely to refrain from ordering additional capacity such that a shortage of newer equipment may emerge enabling lease rentals of existing types to enjoy an extended recovery through to 2014. With the bottom of the leasing cycle having been acknowledged – and all but passed – there is now an expectation that rentals will start to experience an improvement, albeit labored.

The levels of availability continue to show relatively modest levels which can distort the perceived strength – or weakness - of the market. The number of aircraft actively being marketed today would seem to be at lower levels than during the depths of the market in 2002-2003. With a current fleet of some 20,000 jet aircraft, the 650 being advertised at the beginning of this year represents less than 3.5 percent of the fleet, suggesting a measure of equilibrium between supply and demand. Some owners are simply not advertising aircraft because of the lack of demand while others will be undertaking direct re-marketing. The real level of availability is therefore much higher.

In December 2002 there were approximately 15,000 aircraft in service of which 920 were being advertised representing more than six percent of the fleet, a clear excess of supply. Yet, the current downturn is considered to have seen far greater falls in values than during 2002.

Jet Availability 2002-2010



Source: OAG

The level of availability needs to be considered in relation to the number of aircraft that are also parked. At the end of 2009, there were just under 2,000 aircraft (source: Jet Information Services) listed as being parked of which 1,570 were narrowbodies, a rise of 45 percent compared to the low of December 2007 when some 1,350 were parked. These figures do not include those aircraft undergoing maintenance, conversion or modification which indicates a measure of realism. A large number of aircraft listed as being parked are likely to have had engines and components removed and are therefore awaiting final scrapping. The previous high was recorded in 2003 when 1,890 were listed as being in storage. In December 1993 there were 850 aircraft in storage which, in view of only 11,000 aircraft being in service, represents a similar percentage when compared to the figures of today. With current data indicating availability of 650 and a parked fleet of nearly 2,000, some 1,500 aircraft are likely never to be returned to service, even with the improvement in traffic levels. Whereas in the past the level of availability was seen as a key indicator of relative value strength, this has now to be seen in the context of those aircraft parked and those never likely to be returned to service.

The problem in anticipating the timing and extent of any upturn is that there can be too much emphasis on extrapolation of trend lines whereas the last thirty years has been characterized by singular events that cause a deviation in trends. Such events cannot be anticipated in terms of timing nor magnitude but they have occurred with regularity.

Even though transactions are still taking place, these have become less frequent not least because operators wishing to acquire capacity will be able to select from a myriad of aircraft on short term wet and dry leases from those carriers who have parked aircraft. Finding finance for used aircraft remains difficult for used aircraft.

The firm order for 40 Bombardier CS300s – and 40 options - increases the pressure on Airbus and Boeing to develop an upgrade to existing products but such a move is beginning to raise concerns that current residual value forecasts for the existing A320/B737NG families may need to be reduced.

The Republic order for 138 seat CS300s, which now increases the CSeries orderbook to 90, represents a clear incursion into traditional Airbus and Boeing territory. The fleet operated by various airlines within Republic Airways Holdings may mostly focus on regional jets but Frontier operates Airbus equipment while Midwest operates MD80s. Both Airbus and Boeing have to be concerned that orders are now being diverted away from their own products to new equipment that were previously dismissed as inconsequential. The CSeries may be a new aircraft, indicating potential risks for customers in terms of delivery dates and initial performance, but the problems and delays associated with the A380 and B787 have been notable.

The placement of an order for an aircraft that offers the prospect of much better operating costs than current offerings from a manufacturer that has no experience of building such a large aircraft, suggests that the market is seeking to reduce operating costs sooner rather than later. After dismissing the potential for re-engining, both Airbus and Boeing are now due to make a decision on a replacement or upgrade to the B737NG and A320 families later this year. The order from Republic indicates that the decision for incumbent manufacturers is not “whether” but “when and what”.

Some residual value calculations to date – particularly those featuring base values – may have preferred to downplay the possibility of a replacement for the A320/B737NG arriving before 2025, thereby allowing a steady downward trend for values. The decision by Airbus and Boeing to re-engine may therefore see a marked deterioration in such residual value calculations. For other market based future value forecasts, the possibility of an upgrade has been a core assumption for many years with only the timing and improvement in operating costs of the new product remaining undetermined. A decision this year may therefore see an adjustment in such residual values in certain years but perhaps not in the overall trend. The introduction of the CFM56-7BE on the B737NG which will also feature other airframe improvements in 2011 may therefore not be received with the envisaged enthusiasm.

The appreciation that the narrowbody product line is undergoing fundamental change is already having an effect. Reportedly AerCap has opted not to place any new orders for narrowbodies until Airbus and Boeing indicate how the A320 and B737NG will look. The residual values of those aircraft built in the swansong years of a program are usually impacted the most when a new product arrives. Qantas has also changed the depreciation policy on aircraft from 12.5-20 percent residual at 20 years to only 10 percent. The economic useful life of aircraft has been gradually shortening over the last 15 years such that 20-25 years is now much more realistic than 25-30 years.

The danger for the manufacturers in developing a new product is evident with the reported reaction of AerCap. A new product will prevent new orders from being placed. In this specific instance however, the move by Republic to order the C Series reflects a more serious threat. Fortunately the backlogs of Airbus and Boeing may be sufficient to take the manufacturers through the service entry of an upgrade in 4-6 years. Boeing has a backlog of more than 2,000 B737NGs while Airbus has a backlog of nearly 2,400. Unfortunately, customers may be anxious to switch some of the existing orders to any new product. In 1993, at the time the B737NG was being launched, Boeing saw a net order book of minus 12. Deliveries of the B737 Classic in the years leading up to the service entry of the B737NG, fell by more than 60 percent. The lack of B767-300ER deliveries in the face of the B787 in recent years is all too apparent.

However, while the threat of new narrowbodies has implications for residuals, the combination of a revival in traffic, a reluctance to order new aircraft, a focus on operating costs and therefore new not old aircraft, the pursuit of new environmental measures by ICAO, and the many thousands of aircraft that will need to be replaced, may even see some upturn in values of existing A320/B737NGs in the lead up to the service entry of new products. Re-engining of existing equipment may be offered as an alternative to buying new. Investors just need to be aware of the risks thereafter.

As it becomes evident that the large number of aircraft sitting idle in the desert will not return to service in any meaningful manner, values will start to rise such that by late 2011 there will be a discernible improvement. Even during the peak of the market in 2006-2007 there were still a large number of aircraft in desert storage. There is now an appreciation that many of those laying idle will only be candidates for the junkyard. The likely launch and service entry of more capable aircraft in the coming years will limit any such rise but then the same was said of the B767-300ER in 2005-2007 as development of the B787 progressed only for values to rise by 50 percent and for lease rentals to double.

With the net price of new aircraft facing new downward pressures, the values of both new and used aircraft are being adversely affected. The danger for the manufacturers and the market is even more marked than the headline net pricing. A low rate of escalation – potentially negative – means that it becomes even easier for customers to contemplate deferring deliveries, safe in the knowledge that the delay of a year or two will not see a significant increase in the delivery price of aircraft already on order. Indeed, with deflation comes the prospect of customers holding back on ordering new aircraft. The cancellation of existing orders, based on the assumption that a new order may elicit a lower base price, will not endear such customers to the manufacturers, unless they are “strategic” customers. The effect of lower escalation and potentially deflation will be a further reduction in demand, leaving gaping holes in the manufacturers production schedule such values of new aircraft will be further impacted. There are inflationary pressures such that in a few years, a rise inflation will see an increase in net pricing of new aircraft which in turn will be to the advantage of used values.

Freighter Aircraft. Fortunately the airfreight sector is the first to experience a revival when the global economy starts to recover. The return of high yielding business travelers takes much longer than the recovery in airfreight. Surplus airfreight capacity is quickly reabsorbed back into the fleet. The conversion process and the ordering of new freighters takes much longer such that a shortage of freighters quickly emerges, allowing lease rentals to jump and values. As operators of passenger aircraft experience renewed demand and place used capacity back into service, a shortage of feedstock for conversion emerges, consolidating the improvement in lease rentals. With each cycle the types most in demand changes such that those held in high regard during the last growth period, notably the MD11F, will be overshadowed during the next by the B777F and B747-400BCF. The airfreight sector is exhibiting a recovery in early 2010, a year ahead of the passenger sector, though the next peak, similar to that of late 2007, will still be some four to five years away. Values of some freighters such as the B777F have therefore exhibited a marked improvement from October 2009.

Operators are at last placing surplus capacity back into service. The focus of attention is clearly on the newer aircraft types which offer greater fuel efficiency but there are some operators keen to also utilize the less capital intensive B747-200Fs. There continues to be a considerable gap between demand and supply, particularly in terms of directional services, such that yields have some way to go before achieving pre-recession levels.

The increase in traffic over recent months will be however, be distorted by the recent effects of the ash cloud from the Icelandic volcano. While Northern Europe, Scandinavia and Eastern Europe may represent a relatively small proportion of the earths surface, a large proportion of cargo aircraft operate to and from the affected areas. Fortunately, cargo operators have been able to mitigate some of the negatives by operating to unaffected airports and then relying on surface transportation. The problems for the ad hoc charter companies are particularly relevant in view of their carriage of perishable produce. Many operators rely on cash flow to survive and the lack of revenue in the short term could have immediate consequences. The wider problems of the industry are highlighted by the collapse of the MK Airlines and the deletion of cargo operations by Japan Airlines.

The air cargo industry relies to some extent on the shipment of high value, low weight items such as computers and mobile phones. The US Department of Transport (DoT) is seeking to introduce new rules relating to the carriage of lithium batteries. Such batteries are used extensively in modern electronics which are transported by air for speed of shipment and security. The re-classification of lithium batteries to hazardous and therefore subject to much tighter regulations could either force operators to introduce expensive modifications or limit the ability to carry such high yielding traffic. The new rules, if implemented, could require carriers to carry lithium equipped devices in Class C compartments. Class C compartments require both fire detection and fire suppression in the cargo hold and is the norm on passenger aircraft. However, dedicated freighter aircraft usually only possess fire detection and venting but not suppression. The DoT also wishes the area where hazardous material is being carried to be accessed by the flight crew. Such access is usually confined to a limited number of containers. While hazardous material may be carried in special containers, no such containers are currently available. Combined with the extra administration involved in managing hazardous materials, the cost of carrying computers and mobile phones will be greatly increased forcing such traffic to surface transportation and eliminating an important source of revenue for operators. Even if fire suppression is installed on dedicated freighters the issue of crew access remains. The incidents prompting such proposals have, argue industry opponents, been generated by the failure to follow existing measures rather than as a result of the intrinsic danger posed by such batteries.

Corporate Jets. The values of corporate jets are showing a slight improvement although stability is more likely. Production rates remain variable. There are approximately 17,000 business jets in service of which nearly 3,000 are being advertised for sale. Values of business jets have in some cases fallen by more than 30 percent. Recent indications show a flattening in the rate of decline but the level of availability needs to fall to less than ten percent to enable the market to show a distinct level of improvement. Over 1,000 used business jets need to be sold for the market to enjoy equilibrium and for prices to register a significant rise.

During the period 2003-2007 values of used corporate jets rose significantly such that owners were able to sell aircraft for much more than they acquired aircraft for only a few years previously. Indeed, the overall rate of depreciation of corporate jets over a 10-15 year time frame has perhaps been half that experienced by commercial jets. Instead of being worth 50 percent of their acquisition cost after ten years, corporate jets could command some 75 percent of their original price with some even being worth more used than when new. While values dropped by a large margin in the period 2001-2003, the expansion of the world economy and the availability of cheap and ready finance has since enabled the expansion of the corporate jet sector. Both large and small corporate jets have enjoyed value rises of more than 25 percent in just a few years.

Such increases in values and the relative limited differential between new and used, persuaded investors that the returns on corporate jets could be more assured than those on commercial aircraft. The business jet sector experiences the same cyclic conditions as commercial aircraft. When the corporate jet market weakens demand can quickly wither. With economic recession the number of companies able to contemplate retention of existing equipment quickly falls while demand also dries up. This leads to a sharp imbalance between supply and demand resulting in "motivated" sellers coming more to the fore. The fall in values is much more rapid than any gains. The fall in values to a trough can take 1-2 years while the recovery to the next peak can take 3-4 years.

The problem for the market in this weak economy is that there was a substantive expansion of the corporate jet market based on previously strong economic growth and cheap finance. Also, the use of corporate transports has been viewed as something of a necessity in the context of less desirable travel by commercial aircraft. The number of airlines offering a credible business or first class service on short to medium haul routes has diminished as has the ability to fly frequently non-stop to myriad of destinations. As airlines have boosted load factors, short term seat availability has diminished making travel difficult. The rise of fractional ownership programmes has allowed the overall corporate jet sector to expand.

Even though on average, corporate jet aircraft have yielded greater returns than the commercial jet sector, the sector has always been characterized by extended disposal periods during a downturn. Owners have previously been less willing to sell aircraft at a significant discount, safe in the knowledge that prices will pick up in a year or two. With this recession, the conditions are slightly different.

Overview. Previous cycles have demonstrated all too clearly the problem of too many orders being placed during periods of growth only to be delivered in quantity when the market is facing severe difficulties. This cycle appears to be a little different. There has been a fundamental shift in the nature of the problem facing the airlines. The spike in oil prices in 2008 had undermined the cost structure of many operators using older aircraft, stimulating the demand for new efficient equipment. Costs grew rapidly, overtaking revenues. However, despite the fall in the price of fuel, operators are now faced with much weaker economic conditions which are limiting revenues. Finding passengers to fill aircraft at any fare became the issue. High yielding business traffic became more difficult to attract as corporate travel budgets were slashed.

Much of the considerable backlog has been placed directly by, or on behalf of business models, that can only sustain a limited period of loss. With the dire financial situation comes lesser appetite from lenders to fund sustained losses. For aircraft to be delivered as scheduled, these will act more as replacement rather than growth capacity. Older aircraft, and early examples of those aircraft still in production, are being displaced, leading to rising availability.

The need for some major players to dispose of assets has the potential to influence values as sale prices more reflect book rather than market values. Larger organizations, having previously acquired aircraft at large discounts, have written down such assets to levels that may be considerably less than current market values. With the lack of credit in the market and the need to raise cash to perhaps finance new aircraft, some companies have the potential to sell existing assets. The selling price could still achieve a book profit but be significantly lower than current market values. While not strictly representing a distressed sale, the effective substantive discounting can then be viewed as the new benchmark for future transactions, undermining the book values of other organizations. European banks, falling under Basel II regulations (a capital adequacy framework), may then in turn be forced to dispose of some assets to reduce the perceived risk associated with aircraft financing.

The issue of global warming and the contribution of aviation is likely to have a significant impact on the industry in the coming years and will not be derailed by the economic crisis. The engine and airframe manufacturers will be under pressure to produce more environmentally friendly aircraft and the use of taxes may seek a curtailment of demand. A move away from the dependency on fossil fuels is seeing a drive towards alternatives much sooner than is currently anticipated. While existing engines may be able to use new fuels, there may also be a need to consider the possibility that only new engines will be able to fully utilize new technology.

Aircraft Values in Economic Downturns

During the previous growth period it was easy to forget that aviation is essentially a cyclical business and a downturn could be just around the corner. The volatility of the stock market in recent months due to concerns over sub-prime lending provides an indication of how easily the good times can be reversed. One of the primary considerations for any forecaster is to attempt to predict the timing of the next cyclical change. When the market is good it becomes necessary to consider when the times will become tough.

Any forecasting needs to draw upon past events. The industry has been through some five major M events over the course of the last 35 years. M or Mutating events are occasions when the expected trend line is materially altered. The oil crisis of the early 1970s, the Iran-Iraq war of the late 1970s, the collapse in oil prices in 1986, the invasion of Kuwait, the events of 2001 all, to a greater or lesser extent, represented a major change to the then expected trend. The aviation industry is dynamic in nature such that historical trends may not necessarily act as an indicator of future events.

A decade separates the two events and there are similarities as well as differences. The invasion of Kuwait in 1990 led to a significant decline in the global economy while the events of 2001 had a direct effect on aviation as well as a wider impact on the world economy. The University of Southern California's Centre for Risk and Economic Analysis of Terrorism Events has recently estimated that a similar event to that of 2001 could cost the US industry as much as \$240 billion, resulting in a seven day shutdown of the US air transport system, and by inference a major part of international traffic. A recovery is expected to take two years though values and lease rentals react differently.

The Early 1990s.

The significance of the recession in the early 1990s lays just as much with events preceding the invasion of Kuwait as those that followed. The hike in oil prices as a consequence of the Iran-Iraq war had placed considerable constraints on the world economy and the regulation of the aviation industry outside of the US made expansion difficult. Such was the increase in price in the early 1980s that the engine manufacturers pursued the propfan design. The collapse of oil prices in 1986 which saw jet fuel fall to around 30 cents a gallon quickly allowed operators to register profits once more and seek to replace ageing and noisy equipment. Combined with new monetary policies and increased funds, not least from Japan, the aviation market experienced a boom period. Values rose quickly as manufacturers not only struggled to accelerate production to meet demand but as new products were delayed.

The MD11 for example suffered production problems. By 1989 list prices were being paid for aircraft amid the expansion of the operating lease phenomenon. Prices of DC10-30s doubled from \$20 million to \$40 million and a new B747-400 was considered for purchase at \$160 million despite list prices being significantly lower. The prices being paid for new A320s, only just having entered service, increased to approximate \$40 million while new B737-300s were being bought for more than \$30 million. The economic growth of the late 1980s had led to a significant increase in disposable income and high yielding traffic such that operators failed to meet the demand for capacity. Prices being paid for aircraft in 1989/1990 were even higher than many values.

Such was the demand in the international sector that both current and residual values of widebodies were considered unassailable. Residual value projections made in the late 1980s regularly predicted little change in the short to medium term despite the appearance of new products. With the airframe manufacturers able to raise pricing in real terms in the second half of the 1980s, some future value projections assumed that the price of new aircraft would continue to rise. With the strong correlation between new and used pricing, this perpetuated the assumption that the latter would also rise at a similar rate.

Speculative orders fuelled the market with GPA representing a new generation of lessors. Excessive backlogs led to the widespread participation of financial institutions, eager to seek the returns offered by high lease rentals and string residuals. This is the crux of the issue with the events of 1991, 1992 and 1993. The market was experiencing considerable hype which exaggerated the effects of the subsequent downturn. Even B727-200s and BAC1-11s, as well as Tristars, were gaining attention from financial institutions anxious to participate in aircraft financing, despite warnings of over inflated pricing and short term attraction.

Fuel prices prior to the invasion approximated 50 cents a gallon. The price rose at one time to nearly \$1.50 though within a year the price had settled down to 60 cents, not least because of lesser demand. Nonetheless, the damage was done. The aviation industry failed to cope with the decline in passenger numbers, the effect of higher expenses and the rise in interest rates and inflation. The speculative orders faded and with it some notable lessors. Eastern and Pan Am were high profile airlines that collapsed although their demise had perhaps been a possibility even before 1990. The failure of Eastern and Pan Am saw a number of A310s, A300s and B727s come onto the market as well as L1011s and early vintage B747s.

With a rapid imbalance between supply and demand, the aircraft ordered in previous years acted as replacement rather than growth capacity. B737-300/-400/-500 deliveries in the years 1990-1992 were 50 percent higher than 1989. Only by 1994 had B737 deliveries fallen by a significant margin. The A320 featured a similar spike in 1991 and 1992 seeing a 100 percent increase in deliveries compared to 1990. The B767 also featured a rapid rise in production as did the B757. With customers unable to cancel orders, older aircraft types were quickly withdrawn from service. Operators soon found that the cost of new aircraft meant maximising their utilisation as higher leasing and finance charges needed to spread over as many hours as possible. With higher fuel prices, older aircraft became more costly to operate. The level of availability of older aircraft therefore quickly increased. The B727, DC9 as well as the DC10 and B747-100/-200 soon became the least sought after aircraft – after the L1011 of course. Scrap pricing became a feature of the industry for the first time in many years.

Because of the inflated market conditions of the late 1980s, the impact of excess availability on pricing and values was significant. Partly because of the problem of consistency contamination, values initially fell only slowly. However, by the time 1993 arrived values of some aircraft types had halved. With the arrival of the B747-400, values of the B747-200 had almost halved from over \$50 million to less than \$30 million. Some B747-400s were even parked in the desert following completion by Boeing. The extraordinary hike in DC10-30 pricing saw values crash from over \$40 million to less than \$20 million. The appetite for ageing DC9s and B727s diminished such previous values of more than \$2-3 million fell to less than \$1 million. Newly delivered A310-300s, featuring values of more than \$60 million prior to 1990, fell to less than \$40 million. The rapid decline in A300B4-200 values led to the creation of a cargo conversion line. Such was the lack of appetite for older aircraft that the market saw a number of auctions taking place, stimulated in part by the need for financial institutions to dispose of under performing assets. Although the operating lease market was increasing, there was a lack of appreciation that for more modern aircraft at least, there was lesser need to dispose of the aircraft if at least some revenue could be generated through a short term lease.

During this recession the issue of maintenance status as it relates to the value of aircraft took on a new significance. Contrary to some opinion, the impact of maintenance status is not a constant. At the extremes of the cycle the relevance of lesser maintenance status can either be exaggerated or minimised. When there exist a number of aircraft on the used market featuring a higher level of maintenance status those in a lesser condition are at a greater disadvantage. A downturn will usually see owners or prospective buyers less willing to expend cash on aircraft that have an uncertain future. The need to offer greater incentives to prospective buyers therefore takes on even greater significance in the form of a lower price. This can even extend to the point at which parting out becomes a viable option. During a period of growth, where there exists a shortage of quality equipment, prospective buyers are more willing to consider an aircraft in lesser condition such are the lack of alternatives and opportunity to recoup the cash outlay through higher rentals or higher sales price.

The Mid 1990s Recovery

With a rapid conclusion to the first Gulf War there was an expectation that the market would soon recover. However a recovery in aviation, defined as an improvement in firstly lease rentals and then values, usually occurs 18-24 months after the G8 economies experience three consecutive quarters of economic growth. For the recession of the early 1990s, this meant that it was not until 1994-5 that the market began to experience an improvement in terms of lesser levels of availability. Lease rentals began to improve in the initial instance to be followed by values. Contrasting with previous and more recent experience the DC9s were among the first to enjoy a recovery. However, such recovery was mainly due to acquisition by a single carrier, as well upgrades to the basic specification. The values of the B737-300 enjoyed only a modest improvement due to the arrival of the B737NG and the difficulties of McDonnell Douglas created problems for not only the MD80 but also the MD90 such that values failed to experience any significant improvement. The values of the DC10-30 perhaps at best stabilised such was the increased focus on the twin engined widebodies.

The rise in JT8D powered aircraft values from 1995 onwards was also a consequence of the lack of spares and the higher value of spare engines. With the recovery comes greater utilisation of aircraft and the placement of stored aircraft back into service. Unfortunately, the availability of spares did not keep pace with the demand and a shortage appeared. With prices of JT8Ds rising to \$1 million or more, this was passed onto the values of aircraft they powered. The B747-100/-200 saw some improvement as a result of the rising appetite for freighter conversion. The values of the A300B4-200, which had fallen to perhaps \$5 million from a high of nearly \$20 million, increased to around \$8 million as a result of freighter conversion. Values of older aircraft powered by the JT8D also saw an improvement as a result of Deliveries only began to increase three to four years after the first signs of an economic recovery. In 1997 deliveries of the B747-400 jumped by 50 percent compared to the previous year. In the 1990s the airlines of the European Union began to exploit the opportunities afforded by deregulation, creating additional demand for capacity. The introduction of new noise rules also meant that operators either had to hushkit or acquire more acceptable aircraft.

Despite the recession, the list prices of new aircraft continued to rise. As the control of airlines moved to more business orientated methods and with two/three competing manufacturers, actual pricing quickly diverged from list prices. Buyers were now in the left hand seat. The forecasts made on the premise of rising actual prices proved to wildly inaccurate.

The recovery in values of aircraft was therefore widespread but for most types there could be no returning to the days of the late 1980s. In 1990 the value of a new A320 was just under \$40 million. Ten years later a new A320 was still only worth \$40 million. The recovery was more muted as a consequence of a number of events. The Asian crisis contributed to lack lustre demand for widebodies. The dot com bubble also saw a significant fall in the stock market contributing to the decline in disposable income as well as high yielding traffic.

The 2001 Recession

The market prior to 2001 was experiencing a reasonable recovery. Values of widebodies were improving while Airbus and Boeing were once again increasing production. By 2001 the problems of the late 1990s in terms of the dot com bubble and the Asian crisis still had their legacy in terms of making the financial markets initially more cautious. The orders placed for the 50 seat regional jets as well as for members of the A320 and B737NG families buoyed the market. Fuel prices were edging upwards and some of the major operators were beginning to feel the effects of a changing market structure in terms of an increasingly liberalised environment. The cost structures of major airlines were however, showing signs of strain. The rise of the EETC and securitisations helped to mask such problems and contributed to higher pricing of aircraft with some values showing similar characteristics as those of the late 1980s. The market conditions prior to 2001 may not have featured the same over inflated pricing of the 1980s but the specific nature of the crisis in 2001 had a severe effect on values. Constraining the improvement in values was the intense competition between Airbus and Boeing which saw more modest increases in net pricing for new aircraft.

In contrast to the 1990s recession the nature of the 2001 event meant that placing a value on virtually any aircraft for the first few months after September was essentially a meaningless exercise. As the event was directly linked to aviation, passenger perceptions were adversely impacted. Though hijackings were prevalent in the 1970s, they failed to have the same widespread adverse impact in terms of travel. In contrast to the 1990s recession the manufacturers had to readjust manufacturing rates although Airbus, partly because of tighter employment laws, maintained similar rates of production. The manufacturers were forced to offer greater purchase incentives. The deal struck by Ryanair was particularly notable. The disparity between list and net prices became ever more apparent with the former failing to take any note of the prevailing market conditions. Today the starting point for discounting starts at 30 percent.

Once the initial hiatus in trading had subsided, it again began to be apparent that the principal effect of the recession was to accelerate the retirement of older aircraft in favour of the new. However, because of the longevity of A320 production and the delivery rate of new aircraft, newer A320s displaced the older examples as lessors offered new equipment at similar rental levels. While some lessors accepted the need to reduce rentals in order for operators to survive, others failed to heed the lessons of the 1990s recessions and dispose of their assets at heavily discounted prices. Just as with the 1990s recession which saw the demise of Eastern and Pan Am, this recession brought about the collapse of such carriers as Swissair and Sabena and undermined the confidence of investors. However, the use of Chapter 11 in the US failed to generate the corporate collapses that may have shortened the recovery period.

In the months immediately following the events of September 11th 2001 it was considered that the industry would stage a recovery starting in 2002. Such recovery indeed occurred but not to the extent anticipated nor within the all important US market. For example, the low cost carriers in Europe enjoyed considerable growth and the European majors are reacting by offering similar low cost fares. New problems have instead emerged.

The volatility in world stock markets affected US consumer confidence and limited disposable income; corporate scandals and tighter accounting rules contained profitability as companies sought conservative valuations of their assets; sustained economic weakness in the world's largest economy reduced the appetite for air travel; new banking regulations served to increase the potential for supply; high profile media attention on terrorism diverted traffic away from travel and aviation; the uncertainty over the Middle East continued to be a cause for concern for the travelling public; the SARS outbreak reduced demand in South East Asia and elsewhere and saw a shortfall in demand for widebody capacity. In contrast to the 1990s recession, distressed sale pricing became more prevalent as some financial institutions sought to exit aircraft financing. Auctions though failed to reappear. Despite having modern aircraft in their portfolio disposal became the preferred option rather than seeking to lease at lower rentals for the short term. Some of the complex financing of the late 1990s started to unravel such that they allowed aircraft to be sold at hefty discount. Such was the level of discounting that private equity firms, recognising that a recovery was inevitable, started to acquire aircraft at highly attractive prices.

North America represented an important source of demand for major airlines around the world and continued weak yields and traffic limited the ability of carriers to absorb additional capacity though a large number of aircraft parked in the wake of September 11th were reintroduced into service. The fragility of some US Majors overshadowed the prospect of a prompt recovery. With respect to new aircraft deliveries, despite a few successes, the manufacturers continued to face problems as the US majors sought to defer outstanding orders. The prospect of deflation in new aircraft prices became a reality and as such values of used aircraft were impacted.

The value of older aircraft fell by more 25 percent in the aftermath of 2001 in recognition of the rapid rise in availability and the inability to reinvent. The values of more modern narrowbodies fell by approximately 15 percent while regional jets perhaps enjoyed the least decline at around 10-12 percent. Lease rentals perhaps suffered far greater falls. The lease rentals of the B757 for example fell from more \$200,000 to less than \$100,000. The lease rentals of the A330-200 declined from \$725,000 to around \$400,000. The lease rentals of the B767-300ER declined from \$500,000 to less than \$300,000. One of the most apparent differences between the recession of the 1990s and that of 2001 was to signal that older aircraft were not to re-enter service.

The recovery in lease rentals and values took longer than expected mostly because of problems in the US and on-going issues such as SARS. Lease rentals started to improve once again in 2004. The improvement in lease rentals eventually allowed values to recover. Only by late 2005 was it clear that the market had turned a corner allowing owners and lessor to start to recover their losses. By 2006 the improvement accelerated. Both the recent recessions have been characterised by a decline in values and lease rentals for perhaps 12-18 months after the M event, followed by another 12-18 eighteen months of stagnation. A recovery only seems to become evident after near four years with a clear growth trend occurring after five years. There also exists a clear lag between the behaviour of lease rentals and values with values taking perhaps 12 months longer than lease rentals to exhibit a notable change in trend lines.

The lessons to be learnt from both recessions is that the decline in values and lease rentals is swift and the recovery slow. Aircraft on order and still being delivered act as replacement rather than growth capacity and displace older aircraft types. Higher fuel prices inevitably favour such newer aircraft. Those aircraft that have already managed to stage one recovery are unlikely to recover a second time. The disposal of more modern aircraft through fire sales in the early part of the recession fails to appreciate the inevitability of a recovery for those specific aircraft and owners/lessors should instead seek to lease the aircraft for short term on a lower rent, ready to take advantage of higher rentals that will emerge three to four years later. The renegotiation of leases rather re-leasing to another operator may be the preferred option.

The past however, needs to be seen in the context of a changing market. In the late 1980s it was envisaged that should there be a downturn in one region then other regions would absorb any excess. At that time the US dominated the market and such a view failed to materialise. However, with the spread of liberalisation, other markets are now enjoying considerable growth such other regions not affected by a recession in either the US or Europe may take surplus aircraft, reducing the effect of a downturn. Though future base value forecasts may show a smooth decline, actual experience shows that actual behaviour is anything but. Though seeking to predict when the next downturn will occur is fraught with difficulty, the volatility of the past should at least highlight the prudence of assuming that future values will be subject to cyclical forces.

M Events

Major shifts in aircraft values over a relatively short time frame have not been caused by a fall in traffic growth or a rise in production rates by the manufacturers. Rather they have changed due to a possibly unforeseen event, or one that has failed to be actively countered within a sufficient time. The Mutating – or M – Event seeks to account for the unforeseen event that has now occurred six times (including the September 11th attack) in the last 30 years. The M Event represents a single event that has major consequences for the world economy, travel growth, supply and demand for aircraft, and therefore values. The M Event diverts the economy away from its expected course or may exacerbate an existing condition, causing the current downturn or upturn to be extended or foreshortened. Five previous occurrences of the M Event can be identified over the last 30 years – each causing a change in projected economic conditions. In the mid 1970s the Yom Kippur War precipitated a rapid rise in fuel prices that caused an economic slump. Demand for aircraft fell as a consequence. The Iran-Iraq war of the late 1970s caused a similar economic slowdown that had a dramatic impact on production and the appetite for used aircraft. In 1986 the collapse of oil prices boosted the economy, preventing a stall in recovery and in 1990 the Gulf Crisis precipitated another recession in the world economy. All these M Events were divorced from normal forecasts and expectations concerning their reoccurrence in one form or another have thus far been largely ignored.

The very concept of the M Event means that the timing or severity of the event is an unknown. While the unpredictability of the M Event may seem to make it inappropriate for use in forecasting, its fundamental impact on aircraft values cannot be ignored. Any attempt to forecast market residual values with accuracy therefore has to be expect the M Event. The strategic nature of forecasting requires an analysis of possible future scenarios which encompass factors that are not only non-industry specific but also are unexpected and of a major nature.

The problems of the financial markets, the effect on the global economy and the volatility in the price of fuel are factors that have combined to produce an M event.

Assumptions

The represented current value depicts an aircraft in average condition with a standard interior, avionics suite (including TCAS, EGPWS, 8.33MHz, RVSM) and does not relate to any specific example. It is assumed that the aircraft is in the equivalent of “half-life” condition (except that for new aircraft full life is assumed then deteriorating to half life at year four after which half life is assumed - for example an aircraft built in 2007 is assumed to have 75 percent life remaining). Both the current and future values are based on the most popular engine selection, unless otherwise stated. Consequently for other airframe / engine combinations, where appropriate, values will be subject to alteration. A range of values for a model of a specific year are provided to give an indication of the upper and lower prices that may be paid to compensate for maintenance condition, specification, finance terms etc. Inevitably there will be instances where transactions will be higher or lower depending on whether the deal is for a sale-leaseback or is on a “distressed” basis. It should be noted that the percentage relates to the current dollar value **not** the constant figure.

The specification of the aircraft is also an important consideration, for the price can be increased considerably. The indicated values usually relate to an aircraft in standard specification including basic BFE (buyer furnished equipment). Most operators will wish to increase the specification in order to perhaps match the configuration of other aircraft in the fleet or to offer the greatest comfort for both passenger and flight crew.

Future value forecasting can be accomplished on two levels and are reflected in the concepts of Base Values and Market Values. Base Value analysis, dependent on a sustained balance between supply and demand, is theoretical and only occurs twice in any cycle and then only momentarily. While it allows aircraft to be represented as a good assets over the long term, it does not take into account peaks and troughs, which determine whether a profit or loss is to be made. Hence, Market Values attempt to represent the fluctuations in the market. Peaks and troughs are still a feature of the industry but determining their timing remains extremely problematical. Historical data may provide some clue as to how much values may be impacted – positively or negatively – by a particular event. But the dynamic nature of the industry makes it extremely difficult to not only extrapolate past data with any degree of confidence (statistical or otherwise) but also ensures that new events will occur for which no historical data exists. While time may allow such data to be collated and for the industry to be experience at least a degree of stability in its structure, for the foreseeable future, calculating market residual values will be dependent on making judgements. **The values quoted in The Aircraft Value Reference are Market Values and do not reflect Base Values.**

Achieving accuracy in forecasting the behaviour of aircraft values is just as much a function of anticipating future events than assessing historical factors. The dynamic nature of the industry requires an appreciation that what has occurred in the past may not be repeated, at least not in exactly the same way. Over the last decade the most significant events have not been anticipated, particularly with respect to their influence on aircraft values. Cost cutting measures, production cycle reductions, the demise of MDC, the rise of Airbus, the hesitation of Boeing, the collapse of demand from Asia, the problems of the US airline industry, the recovery of Boeing in the widebody arena – all these were either ignored or not anticipated. Global warming can be expected to accelerate stricter emissions from aircraft. The impact on residual values has been significant and will continue to be so.

Methodology

Since 1991, The Aircraft Value Analysis Company has been publishing and providing estimates of the future value of jets. During that time the basic methodology has remained constant although the underlying assumptions have been frequently updated to reflect actual and perceived changes in the world economy, the supply and demand for aircraft, and the prospects for specific types.

Current Values. The estimation of values and lease rates is not an exact science but is one which is dependent on making a number of subjective assessments. The values and lease rates provided assume that the transaction was, or is, made on the basis of a single unit bought for cash by a willing buyer from a willing seller. While the determination of historical and current values is partly based on actual market transactions, only a certain degree of reliance can be placed on such data. Reported values of specific transactions rarely reflect the pre-conditions necessary for the appraisal process. Announced new values usually reflect the list prices of manufacturers and can include a number of additional cost items as product support and training. Financing levels for new aircraft can also reflect list prices rather than the actual price paid. For used aircraft, reliable and consistent data is equally difficult to locate in view of the lack of reporting requirements and due to confidentiality. Even when an average of reported market transactions is calculated, in some years only a few or even no figures are reported, thus distorting the result to an unacceptable degree. The problems associated with relying solely on market data are compounded by the absence of any requirement in most countries for customers to disclose real purchase prices. Therefore considerable difficulty exists if the assessed value is based solely on market data.

The estimation of current values of a particular aircraft - whether new or used - does not, and should not, rely exclusively on the average of such reported market transactions. There are a number of other factors that need to be taken into consideration. Values, although not entirely, should reflect the possibility of remarketing, and disposing, of newly delivered aircraft in the event they enter the used market. Focusing on delivery prices provides a historical, rather than a current perspective. In assessing the prospects for remarketing it is necessary to consider such aspects as number in service, number on order, backlog, geographical distribution (both units and operators), position of the aircraft on the product life cycle, availability of competitive products, availability of the same model, projected life span, build standard, specification etc. These factors, while essentially subjective in terms of application, are crucial in establishing the assessed value.

Future Values. Projecting aircraft values for five, ten, or fifteen years, is equally dependent on making a number of assumptions about the condition of the world economy, the internal and external pressures on the air transport industry and the assessment of the prospects for specific aircraft models. The projected future values are initially based on the estimated economic service life of the aircraft which are then subjected to the combined effects of major economic indicators on air transport, thereby establishing supply and demand fluctuations.

In determining the future value of aircraft there are a number of distinct methods which are used. Time Series, which relies heavily on historical data does not adequately cater for the dynamic and changing nature of air transport. The General Curve method provides an idealised smooth curve projection for values over the life of the aircraft. This again fails to match the volatility of values on an annual basis. Phase Analysis, which provides the basis for our own projections, perceives a number of distinct periods through which aircraft pass. The number of phases is dependent on the aircraft type but generally comprises between five and seven periods during each of which values can be stable, rising or falling. For example, for a new model entering service for the first time for which a number of orders have been placed, the used value may actually increase due to a perceived shortage of new aircraft in the short term. The position of the aircraft on the product life cycle is also significant. As an aircraft type nears the end of production, or availability of new aircraft is immediate, then the position on the curve changes. However the above illustration represents the ideal behaviour of aircraft values in a state of equilibrium. The condition of the world economy will largely dictate whether values will actually rise or fall as predicted. Variable Phase Analysis will therefore result in the theoretical curve being amended according to the predicted state of the air transport industry on an annual basis.

As a service industry, air transport is heavily dependent on the state of the economy for its growth. As a starting point the idealised curve is altered according to the prevailing economic conditions. To establish the principal objective of reflecting the peaks and troughs of the market, the curve has to reflect the perceived economic climate on an annual basis. In establishing the state of the economy, the forecasts made by some of the UK's clearing banks as well as the OECD are used. Four basic variables are incorporated into the model - the price of oil, interest rates, inflation level, and GDP growth. To a greater or lesser extent, all four variables are interdependent with one another but can influence the demand/supply equation in different ways. For example, a sustained rise in oil prices could force airlines to consider replacing their older, inefficient aircraft, with newer models - and vice versa; high interest rates may cause some airlines to look at older equipment; and significant GDP growth could cause a demand for additional equipment.

It is recognised that the further into the future projections are made, the greater the uncertainty. A projection period of 15 years is considered to be the maximum reasonable forecast period. For the economic indicators, annual changes are less pronounced as they pass eight years and the variance between peaks and troughs reduces although the deviation between "best" and "worst" cases increases. In the first three years of each forecast, the Best & Worst represent 20 percent probability levels; from years four onwards, the Best & Worst reflect ten percent probability. The Worst differs from various Soft cases which may only reflect 65 percent probability instead of the indicated 90 percent.

The last 30 years have made it apparent that there is a reasonably close correlation between GDP and RPK growth. Consequently to more accurately determine the deviance from the ideal state of equilibrium, GDP - together with an assessment of changes in yields - is used to calculate the rate of travel growth. A constant figure is also part of the formula as air traffic has historically continued to grow despite an adverse economic climate. The effect of yield improvement also changes on an annual basis. The resulting RPK forecast is translated into a demand for additional units. The basic economic indicators will influence to what extent this demand will comprise growth or replacement units, particularly with respect to the anticipated number of retirements. In the first years of the projection, the actual backlog of the manufacturers, coupled with an assessment of their production rates, will provide a means of comparison.

Through the above methods, the general demand, including peaks and troughs has been established. The anticipated economic life of each aircraft is determined and placed into one of three categories. Having established whether used or newer aircraft will be the more favoured (dependent on the capability of the manufacturers to meet short term demand), the anticipated demand for each aircraft type is then considered and alterations made to the curve which has already been subject to considerable refinement. The perceived changes in demand for a specific aircraft are inevitably subjective in nature. Nonetheless the considered advantages and disadvantages are translated into a numerical negative or positive adjustment to the trend line. Just as with the economic indicators a number of factors are taken into account some of which are interdependent. By apportioning a score to a specific attribute it is possible to compare and contrast the different aircraft types. Any scoring system has advantages and limitations. It enables various generalisations about a specific aircraft type to be translated into an easily absorbed figure. The objective is to provide a figure that illustrates the potential for remarketing a specific aircraft. In turn, this will provide an indication of the possible strength of values.

Aircraft Rating.

The latest update to The Aircraft Value Analysis Company's (AVAC) Aircraft Ratings indicates that the relative asset strength of the majority of aircraft still in production is set to decline over the next seven years, largely as a consequence of the service entry of new products.

The Aircraft Ratings, the industry standard created by AVAC and published in Aircraft Value News since 2003 as a measure of assessing asset risk and since adopted by investors and the appraisal community, compares and contrast the attributes of over 330 commercial jet and turboprop variants. The seven years of publishing AVACs Aircraft Ratings in Aircraft Value News provides a unique insight into how the risk associated with each aircraft variant has changed on a quarterly basis.

The Aircraft Rating calculates approximately 27 different variables for this and each of the next seven years and takes into account such factors as number on order, product life cycle, competitive production, level of availability, number of customers, number of operators, geographical distribution assigning a weighted score to each factor. The score is translated into an "A++" to an "E—" rating with "A" or "B" ratings representing a product that has the potential to be remarketed with relative ease and exhibiting better than average value behavior. A "C" or "D" rating indicates that values will exhibit greater volatility and therefore greater risk. More experienced traders and investors will likely be willing to invest more readily in such aircraft but will be aware of the risks. An E rating indicates that any value lies more with the operator than the investor.

The next seven years will be characterized by a sweeping change in the product line. Very few of those aircraft currently in production and being delivered today, will be in production in seven years time. This contrasts with the year 2000 when the product line was much more settled with the A320, B737NG, A330, B747, B767 and B777 all set to remain in production through to 2007. Consequently, in 2004 the B737-800 low gross weight secured an Aircraft Rating of A—but with the likely re-engining programs, the rating has now dropped to a B-. Similarly in 2004, the B767-300ER had a rating of B- but this has dropped to a C—signifying considerable more risk as both the B787 and then the A350 enter service.

Lease Rentals.

The current and lease rentals are calculated independently of values. Actual rentals are forecast rather than lease rental factors. The rentals are all market based - The Aircraft Value Analysis Company does not produce base values or rentals. The mid case lease rental reflect an average lease term and medium risk credit which varies with each aircraft type. Generally, older aircraft will be on shorter lease terms compared to younger equipment. Widebodies will normally longer rental terms than narrowbodies. The variation in low and high current lease rentals reflect differing terms and credits. The future mid lease rentals reflect changing market conditions such that during weak market conditions lease terms generally tend to be shorter and vice versa. The lease rentals quoted are fixed for the expected term of the lease and take into account the expected prevailing interest rate in the year that the lease commenced. The assumed interest rate is forecast for each specific year.

Inflation.

In determining the future value of aircraft, for a variety of reasons the inflation rate is considered to be an integral part of the methodology of The Aircraft Value analysis Company. There exists a relationship between inflation rates and used values. As the modeling is market orientated rather than a function of financial engineering it is therefore necessary to consider inflation on an annual basis. The rate used varies annually. Consequently, our future value projections build in an adjustment for inflation rather than calculate a constant value and then add an abstract and static rate of inflation. To produce our constant dollar values, the rate of inflation used in our modeling is extracted and applied to current dollar values. It should be noted that the nature of our modeling technique takes into account other factors such as cost reduction measures and the competitive environment. Such factors impact the price increases for new aircraft and therefore the level of used values but cannot be included in the inflation rate as required for the calculation of a constant value.

INFLATION RATE USED IN THE AIRCRAFT VALUE REFERENCE																					
YEAR	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Avg
%	20	2.6	2.9	3.2	3.0	2.3	2.1	2.0	2.4	3.3	2.5	2.0	2.2	1.8	2.2	3.0	3.2	2.8	2.8	3.0	2.6

The future values provided - based on an analysis of the market rather than solely the revenue earning power of the aircraft - are calculated by means of a flexible user dependent model that enables annual changes to be made to the price of oil; the inflation rate; the interest rate; and GDP growth. These variables, which are interdependent and affect RPK growth; demand for additional aircraft; and the rate of retirals; and the current value of an aircraft; are not constants but are frequently updated. In forecasting the values of the aircraft over the next ten to fifteen years, it has been necessary to make a number of assumptions. Firstly, values of aircraft do not operate in isolation but rather are dependent on the state of the economy. This tends to affect virtually all aircraft. The examination of past trends clearly indicates that airlines order new equipment during times of growth but which are then delivered during a downturn. Values for used aircraft therefore tend to climb rapidly during the good times as they are readily available to cope with increased traffic but also decline quickly as airlines seek to dispose of excess capacity quickly. This cycle is fundamental to the future value model. Values are not seen as constantly rising in real terms but rather will decline over a fifteen year period, excepting rises in the growth periods. Each time the value of a used aircraft declines due to reduced demand, it becomes more difficult to regain the lost amount.

Format

The Aircraft Value Reference is in alphabetical sequence by manufacturer followed by aircraft designation. Each aircraft variant has a dedicated page. The left column provides the date of build and current value. The matrix provides future values, in future dollars, for “Best”, “Mid-Case” and “Worst” conditions - all three of which have been adjusted for inflation but are also expressed in constant dollars. The Best Case (20 percent probability between 2011-2013, 10 percent probability thereafter) considers that there will be a significant increase in travel demand over the next twenty years as a result of sustained economic growth and that capacity will continue to be slightly below demand. However, fluctuations in the economic cycle will continue to occur. For the “Mid-Case”, this presupposes that there will be occasions when capacity exceeds demand and values will drop as a result. For the Worst Case (20 percent probability between 2011-2013, 10 percent probability thereafter), this assumes that capacity will consistently exceed demand emanating from depressed economic conditions and resulting in occasionally depressed prices. The mid-case is accompanied by a percentage figure that compares the yearly value to the current April 2010 current value. The mid-case also includes a constant dollar value which represents the future value in 2010 dollars - i.e. unadjusted for inflation. A lower current value is also provided. The different lines refer to the date of build whereas the “Y” axis provides a value in US\$ millions.

The format is based on the following parameters:

- **All values are based on the year of build (ie first flight) not the date of first delivery. Aircraft used for test purposes will be subject to a discount as will be those involved in accidents or incidents and the subject of major repairs.**
- **The three projections provided are in INFLATED & UNINFLATED DOLLARS which varies on an annual basis seeking to reflect the potential risk.**
- **The aircraft are assumed to be in the equivalent of half life condition except that new aircraft experience a fall from full life to half life as of year four (for example a 2007 aircraft has 75 percent life while a 2006 aircraft will be considered to have 50 percent or half life remaining as will a 1998 build aircraft).**
- **For the purposes of this reference, all widebodies are classified as Stage 3/Chapter III.**
- **The current value for 2010 built equipment is based on aircraft being sold by an organisation other than the manufacturer - it is not the estimated purchase price.**
- **The build period indicated on the upper table of each model may differ from the current value listing. This may be attributable to an insignificant number of aircraft being built outside the quoted current value table years.**
- **Order information is of the first quarter of 2010 while other data is valid as of the end of 2009.**

The baseline specification for newly delivered A320 and B737NG family members is changing to reflect recent upgrades to the engines as well changes to the structure and interiors. Both CFMI and IAE have introduced upgrades to their engines. As a consequence, the CFMI designation has changed to the -3. For example the CFM56-7B26 has become the CFM56-7B26/3 on the B737-800 and the CFM56-5B4/P has become the CFM56-5B4/3 on the A320 family. The TechInsertion standard is already in service with the IAE SelectOne programmed to be introduced later this year. Both engine upgrades offer lower fuel burn, greater EGT margins, lower emissions and greater on-wing time. Both the TechInsertion and SelectOne upgrades can be retrofitted. While the new standard to the engines are being offered to customers at no additional cost, the improvement in the engines warrants a discount to the existing airframe/engine combinations.

The A320 family is also the subject of further improvements in the form of new interiors and aerodynamics though a decision of new winglets has yet to be made. The improvement to the engines and other areas of the A320 family is sufficient to warrant a change in designation similar to that of the A330-200, A330-300 and A340-300 which saw the Enhanced designation being added. For the A320 family the Enhanced designation should now perhaps be employed though for the B737NG, the upgrade to the engines only should warrant a "T" suffix – the B737-800HT for example denoting a high gross weight version featuring the tech insertion.

Monthly Adjustment.

Monthly Adjustment. The Aircraft Value Reference is published on a six monthly basis – April and October. Only a single annual figure is provided. To adjust the value for each month from April (or October) the following adjustment factors should be used.

Take the first April (or October) figure - \$25.365m for example – and deduct the following years figure - \$22.365m for example. The difference is \$3m. Use this difference of \$3m and multiply by the factors listed below in sequence. The resulting difference is the dollar difference to be deducted/added from the October (or April) value.

However, if the difference between one year and the next is positive the set of adjustments detailed in the brackets should be used. The adjustment factors can generally be used for all aircraft types although in reality some types will justify differing adjustment factors.

The adjustment for lease rentals differs - please contact the Editor for further information.

	TAVR Adjustment		Dollar	Negative Value
	Factor		Adjustment	Adjustment
	Oct 2003	\$25.365m	\$3.00m	\$25.365m
	Negative Difference	(Positive Difference)		
Nov	0.17	(0.00)	$3.00 \times 0.17 = 0.51$	$25.365 - 0.51 = 24.855$
Dec	0.10	(0.04)	$3.00 \times 0.10 = 0.30$	$24.855 - 0.30 = 24.555$
Jan 0*	0.16	(0.06)	$3.00 \times 0.16 = 0.48$	$24.555 - 0.48 = 24.075$
Feb	0.13	(0.08)	$3.00 \times 0.13 = 0.39$	$24.075 - 0.39 = 23.685$
Mar	0.10	(0.10)	$3.00 \times 0.10 = 0.30$	$23.685 - 0.30 = 23.385$
Apr	0.04	(0.02)	$3.00 \times 0.04 = 0.12$	$23.385 - 0.12 = 23.265$
May	0.00	(0.17)	$3.00 \times 0.00 = 0.00$	$23.265 - 0.00 = 23.265$
Jun	0.04	(0.10)	$3.00 \times 0.04 = 0.12$	$23.265 - 0.12 = 23.145$
Jul	0.06	(0.16)	$3.00 \times 0.06 = 0.18$	$23.145 - 0.18 = 22.965$
Aug	0.08	(0.13)	$3.00 \times 0.08 = 0.24$	$22.965 - 0.24 = 22.725$
Sep	0.10	(0.10)	$3.00 \times 0.10 = 0.30$	$22.725 - 0.30 = 22.425$
Oct	0.02	(0.04)	$3.00 \times 0.02 = 0.06$	$22.425 - 0.06 = 22.365$
Oct 0*		\$22.365m		\$22.365m

Abbreviations.

<i>HGW</i>	<i>High Gross Weight</i>
<i>LGW</i>	<i>Low Gross Weight</i>
<i>IGW</i>	<i>Intermediate Gross Weight</i>
<i>EFIS</i>	<i>Electronic Flight Instrument System</i>
<i>ANALOG</i>	<i>Standard Instrumentation</i>
<i>C</i>	<i>Convertible</i>
<i>F</i>	<i>Freighter</i>
<i>H</i>	<i>Hushed (Chapter 3)</i>
<i>M</i>	<i>Combi (Mixed)</i>
<i>ER</i>	<i>Extended Range</i>
<i>SF</i>	<i>Special Freighter (post production conversion)</i>
<i>BCF</i>	<i>Boeing Converted Freighter</i>
<i>PF</i>	<i>Package Freighter</i>
<i>P</i>	<i>Passenger</i>
<i>EU</i>	<i>European Spec.</i>
<i>En</i>	<i>Enhanced</i>
<i>T</i>	<i>Tech Insertion</i>
<i>W</i>	<i>Winglets</i>

In the event of any suggestions, inaccuracies or comments, please direct them to the Editor.



The Aircraft Value Analysis Company

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