

Engine sale & leaseback transactions are a method for airlines to raise liquidity from their spare inventories when profits are under pressure. A recent drop in engine trades has seen engine values decline. While this provides an opportunity for lessors, debt financing is harder to secure.

The economics of engine sale & leasebacks

Engine sale and leaseback transactions have regularly been used by airlines to raise liquidity from engine sales, and by engine lessors to increase their engine portfolios. There tends to be a larger number of engine sale and leaseback transactions when airline profit margins are under pressure, and the demand for engine sale and leasebacks is strong in the current economic climate, despite there being less debt available for aircraft financing generally.

Under sale and leaseback an airline sells an engine from its spare engine inventory to an engine lessor, who then leases the engine back to the airline for a term of 3-10 years. Engines have good residual value retention, so they raise a predictable amount of liquidity for the airline. An engine's ability to have a residual value as a high percentage of its original cost over an extended period makes it an attractive asset for a lessor, and can lead to a high profit margin.

The strong residual value also means it is an attractive asset for debt providers to finance. Debt balloons are a common feature of most engine leases, and lower the monthly debt repayments that lessors have to make, enhancing their cashflow.

The current appetite by airlines for engine sale and leasebacks is strong, since they have assets they can release relatively quickly to raise cash without impairing their operation. "We are currently facing a unique set of circumstances. Banks are in difficulty and there is a lack of debt in the market. Some engine lessors are still open for business, and Macquarie Aviation Capital can access funds from Macquarie Bank," says Andrew Pearce, managing director at Macquarie Aviation Capital. "The lack of funds means fewer deals are being done, so engine base values have dropped. Airlines, in the meantime, are more interested in sale and leasebacks than they were a year ago, and

many types have become available. This gives lessors an opportunity to acquire engines at attractive rates, but only if they can get the debt financing for them."

Downturns are usually a good time for acquisitions from airlines looking to raise cash. "A lot of investors have been looking at the engine market in recent years, since the aircraft market was regarded as being overcooked," says Phil Seymour, managing director of IBA Group. "Engine manufacturers take an active interest in the engine aftermarket, so they are also interested in engine leasing. There are also some new entrant lessors, including DVB Bank, Doric Asset Finance and Royal Aero. Engines are more easily funded, since the capital outlay is smaller than for complete aircraft."

Sale & leaseback structure

The basic structure of engine sale and leaseback transactions starts with an equity investment in the engine by the engine lessor. The amount of equity the lessor is required to invest is determined by what percentage of debt it can secure from the debt providers. This depends partly on the appetite of the debt provider and general health of the market, and partly on the appraised value and predicted residual value performance of the engine.

Engine appraisers, such as IBA Group and Avitas, appraise an individual engine's base and current market values. This will take into account the engine's maintenance condition and status, but also the base and market values of the engine type for a given maintenance status. Appraisers publish base and market values for all engine types in annual guides, such as IBA Group's Engine Values Book and Avitas's Engine Bluebook of Jet Engine Values.

These values change with varying

market conditions, and engine base and current market values have generally been downgraded over the past year.

Engine appraisers also make residual value forecasts in their engine value guides, as well as more detailed inspections and appraisals for individual engines. Debt providers use these individual appraisals to gauge their appetite for providing financing, and give them guidance over the preferred engines to finance. Current and young engine types have generally attracted 80-85% of debt for financing purchases by lessors, but debt portions are likely to now be lower in the current financial climate.

Lessors then lease engines to airline lessees for 3-7 years in most cases, but sometimes for up to 10 years. Monthly lease rentals will be 0.7-1.0% of the engine's purchase value, which lessors will use to pay monthly debt repayments and their overheads.

Not only do lessors aim to generate a positive cashflow each month from lease rentals, but also realise an upside from the difference between the engine's actual residual resale value and its depreciated book value.

In cashflow terms lessors can generate an attractive margin from the difference between the resale value and the amount of debt outstanding at the end of the lease. The strong residual value performance of engines has generally encouraged debt providers to provide financing terms with debt balloons. These have historically been as high as 50-60% of the purchase value after five years. That is, the lessor with 85% of debt financing has to repay 25% of the engine's purchase value over five years if given a debt balloon of 60%.

The consequence of this debt balloon is that a smaller portion of the monthly lease rentals are required to cover debt repayments, giving a larger margin over monthly lease rentals. The residual value

Popular narrowbody engine types are the staple candidates for engine lessors. Types such as the CFM56 and V2500 have good residual value retention, enhancing the economics of sale & leaseback transactions.

performance of engines is generally still strong enough to leave a positive margin over outstanding debt.

There is generally a trade between cashflow made from monthly lease rentals and cashflow from residual values. High debt balloons result in small monthly debt repayments, but smaller residual value margins. Conversely, smaller debt balloons require larger monthly debt repayments, but can leave larger residual value margins. Younger engines with better residual value prospects are more likely to secure financing terms with higher debt balloons.

Engine candidates

The strongest engine candidates for sale and leaseback transactions are the latest-generation narrowbody types. The CFM56-5B, CFM56-7B and V2500-A5 are consequently the engines most sought after by lessors. These types are the most numerous and supply of spares is relatively tight. This keeps market values high, so there is a strong possibility of a resale value upside. "It is better to buy engines that are 3-5 years old, since the cost of new engines includes a premium. Some engines can keep their values during a 3-7 year term, partly because the list prices of new engines are increasing," explains Pearce. "Values of some engines can hold up well for 10-12 years when the change in their maintenance condition is compensated for."

In usual market situations most new-generation widebody engines are harder for lessors to acquire, since original equipment manufacturers (OEMs) like to maintain control of the aftermarket. "Current market conditions have recently made it possible for some lessors to acquire types like the Rolls-Royce Trent 700 and 800 series, and other large widebody engines from the PW4000 and GE90 families," says Seymour.

Lease rentals are expressed as lease rate factors: a monthly rental expressed as a percentage of market value. Lease rate factors are generally 0.7-1.0% per month for new-generation engines with with 5-8 year leases. Large debt balloons mean lease rentals have to cover smaller debt repayments.

Some lessors have, however, offered lower lease rentals of 0.7-0.8% per month. These are competitive rates and do not always provide enough funds to



cover monthly debt repayments, or depreciation, and the lessor's overheads. Lease rentals of 0.9-1.0% provide more comfort for covering all foreseen costs.

Lease rental factors for older engines need to be higher. Engines powering older types have a higher risk of becoming obsolete, or at least suffering large falls in market values as the type ages. Engines therefore have to depreciate over shorter terms and are less likely to have a strong residual value upside at the end of the lease. Lease rate factors therefore have to be 1.2% of market value and higher.

The IBA engine value book (EVB) puts current market values of bare CFM56-3B2s at \$2.2 million. Long-term lease rentals at a lease rate factor of 1.0% put rentals at \$22,000-25,000 per month.

Current values of bare CFM56-3C1 engines are higher at \$3.1 million, and corresponding lease rentals are \$30,000 and higher.

The more recent -5B series engines have higher values. A bare CFM56-5B4/P costs \$5.7 million and has lease rentals in the region of \$57,000 per month. Values of lower-rated bare -5B6/Ps are \$4.8 million, and lease rentals in the region of \$50,000 per month. A similar pattern can be seen for the -7B series, with values of different variants at \$3.9-5.8 million.

"Lease rate factors were 0.7-0.8% per month because the market was highly competitive in recent years, but factors have now risen to the 1.0% level," says Seymour. "Higher risks of airlines going bankrupt have also pushed lease rate factors up.

"The cost of the quick engine change (QEC) kit and its associated lease rental also have to be added," adds Seymour.

IBA's EVB says that the QEC for a CFM56-3 has a value of \$350,000-950,000, and rental of \$35,000-95,000. A QEC for a -5B engine has a value of \$1.6-1.85 million, with a corresponding lease rental of \$16,000-19,000 per month. A QEC for a V2500-A5 has a value of \$1.5-2.2 million, and corresponding rental of \$15,000-22,000 per month.

Technical considerations

Engine purchase and resale market values clearly have a large effect on the profitability of sale and leaseback transactions. Market values are influenced by engine maintenance condition due to utilisation by lessees, and lessors have to be compensated for this loss of value in addition to the lease rentals they receive.

The two main factors in engine maintenance status are the condition of the turbomachinery, and the remaining lives of life limited parts (LLPs). As well as lease rentals, lessors should charge for maintenance reserves to cover the eventual restoration of the engine's turbomachinery and replacement of LLPs.

Maintenance reserves will be agreed between the lessee and lessor at the start of the lease. Reserves will take into consideration the maintenance condition at the start of the lease, the expected rate of utilisation during the term, the forecast time on-wing to the next shop visit, and its workscope and cost.

Maintenance reserves collected should adequately cover shop visit costs and LLP replacements when they come due.



Lessees should pay a share of the refurbishment costs that is in proportion with their utilisation of the engine between shop visits. If an engine can achieve 20,000 engine flight hours (EFH) between removals, a lessee that has use of the engine for 12,000EFH of this period should pay reserves equal to 60% of the shop visit cost. Reserves also take into account the inflation of the cost of a shop visit over the removal interval. Care has to be made when assessing reserves since intervals can be less than predicted, or shop visit costs higher. Lessees often have to pay for shortfalls between actual costs and accumulated reserves.

The maintenance reserves collected from the lessee during the lease should be enough to return the engine to the same maintenance condition the engine had at the start of the lease, so that the lessor is adequately compensated for the utilisation of the engine.

"Maintenance reserves are complicated by the engine shop the lessee uses to perform the maintenance," says Seymour. "Some engines are maintained under a power-by-the-hour (PBH) contract, which the subsequent or previous lessee may not want. A lessee may also have its own maintenance shop. There is also the problem of two lessees using different shops, with FAA approval or EASA approval, for example."

The alternative to maintenance reserves is a contract clause stating the lessee return the engine to the lessor fresh from a full overhaul. This often results in the lessee paying excessive maintenance costs, since in most cases the engine's utilisation during the lease will not be enough to need complete refurbishment.

Another issue concerns the implementation of the service bulletins

(SBs) and airworthiness directives (ADs) that will be issued during the lease term, and which party should pay for them.

"This depends on who will benefit from their implementation," says Seymour. "If a new AD is issued shortly before the end of the lease then the lessor should pay for its implementation. A lessee will benefit from an SB or AD if it is implemented early in the lease term, in which case they should pay for some or all of the cost."

Lease terms & structures

"Lease terms are at least three years, and average 5-7 years for narrowbody types," says Seymour. "Terms for widebody engines are longer, in the 8-10 year range, because of the longer commitments that airlines make to larger aircraft."

Engine book depreciation rates used by lessors are 3.5-15.0% per year, depending on engine vintage. "The youngest engine types can be depreciated at 3-5% per year, since their market values can still be at least 50% of their original purchase cost after 15 years," explains Pearce. "Book depreciation rates then increase for older types. At the other end of the spectrum an annual depreciation rate of 15% should be used for a type like the JT8D-200 series. This means the engine can be depreciated to a level where its market resale value will leave a positive margin after 5-7 years."

Taking a V2530A5 and an older CFM56-3C1 as examples, these may be purchased at current market values of \$6.3 million and \$3.1 million. Both may be leased for five years until 2014. The older CFM56-3C1 is likely to depreciate at a rate of 6% per year, so it will have a

The global economic downturn has resulted in more opportunities for lessors to acquire young generation widebody engines. Many lessors are finding it harder to secure debt that allows them to complete all potential transactions.

book value of \$2.15 million at the end of the term. The V2530-A5 will depreciate at the lower annual rate of 3.5%, and so have a book value of \$5.2 million at the end of the term (see table, page 17).

These have to be considered against probable market values. IBA's EVB current forecast for market values of a bare CFM56-3C1 in 2014 is \$3.0 million. Interestingly this engine's market values are forecast to hardly change and remain strong until 2012-2013, but then decrease at 5% per year thereafter. A conservative estimate is for a resale value of \$2.6 million at the end of the term in 2014.

Market values of lower rated -3B1 and -3B2 variants are forecast to fall by 5% per year.

As explained by Pearce, market values of current generation engines are generally buoyed by the annual rise in list prices of new engines. The market value for a V2530-A5 might be \$5.8 million after five years, representing only a \$0.5 million drop over the term of the lease.

The implications of this are that the difference between market value and book value will be \$430,000 for the CFM56-3C1, and \$600,000 for the V2530-A5 (see table, page 17). In some cases the market value of the V2530-A5 could be higher than the original purchase market value, generating a large residual value upside for the lessor.

Another element of the economics of the transaction will be the equity and debt portions, and the monthly debt repayments. Lessors used to be able to secure 80-85% debt financing in the past, but the current financial downturn has tightened the supply of debt. Most lessors are now able to secure 60-70% debt, which makes transactions harder difficult to justify.

The amount of debt also has to be considered together with the cost of debt and debt balloon terms. Interest rates have declined in 2008 and 2009 to unprecedented levels. Five-year debt now costs 2.4%, while 10-year debt costs 2.9%, compared to 5-6% in the past.

Unfortunately the financial crisis means that the advantage of low interest rates is offset by additional costs. The first of these is a liquidity premium of 1-2%, which is at unprecedentedly high levels. There are also the additional costs of a credit spread, and a government guarantee. This last item only applies

during the credit crunch, but these three additional elements take the five-year 2.4% rate up to 5%, and the 10-year rate to 5.5%.

Debt balloons of 55% might have been achieved for an 85% debt portion, while smaller debt balloons of 40% are now likely with debt portions of 60%. This means that \$0.62 million of debt would have to be repaid for the CFM56-3C1, and \$1.26 million of debt repaid for the V2530-A5 (see table, this page). This compares to \$1.89 million of debt for the V2530-A5 under previous financing terms.

Financed at 5.5% over five years, the monthly debt repayments for the CFM56-3C1 would be \$11,850, and \$24,100 for the V2530-A5. This compares to a \$32,000 monthly debt repayment for the V25230-A5 under previous financing terms.

The current lower monthly debt repayments would clearly make things easy for lessors, but would inevitably lead to them cutting lease rentals to stay competitive. While a lessor will be required to make smaller debt repayments from the lease rental under current financing terms, it will also have to invest a higher level of equity.

Additional costs incurred will be the lessor's overheads which, for the sake of simplicity, are taken as 2-2.5% of the engine value per year, and so \$72,000 for the CFM56-3C1 and \$120,000 for the V2530-A5.

While lease rate factors are reported to have increased to 1.0% per month, a conservative approach would be to use 0.80% per month for the CFM56-3C1. This would have a monthly rental of \$24,800. A lower lease rate factor of 0.75% for the V2530-A5 would be a rental of \$47,250.

On this basis, the cashflow from lease rentals, debt repayments and lessor's overheads would be \$417,000 for the CFM56-3C1 over the 60-month lease, and \$790,000 for the V2530-A5 (see table, this page). This would have been \$321,000 for the V2530-A5 under previous market conditions due to higher debt repayments.

There is also the issue of residual value upside or cashflow. The higher equity investments of 40% now required by lessors mean an investment of \$1.24 million would be required for the CFM56-3C1 and \$2.52 million for the V2530-A5. These equity portions have to be deducted from the difference in resale value and book value to give a true indication of residual value upside or cashflow. The residual value upside would be \$120,000 for the CFM56-3C1, and \$760,000 for the V2530-A5 (see table, this page). Under previously available financing terms, the smaller equity portion of 15% that was required

ENGINE SALE & LEASEBACK TRANSACTION FINANCIALS

Engine type	CFM56-3C1 Current terms	V2500-A5 Current terms	V2500-A5 Previous terms
Acquisition value-\$	3,100,000	6,300,000	6,300,000
Term-months	60	60	60
Annual depreciation	6.0%	3.5%	3.5%
End book value-\$	2,170,000	5,200,000	5,200,000
Residual value-\$	2,600,000	5,800,000	5,800,000
Equity-%	40	40	40
Equity-\$	1,240,000	2,520,000	945,000
Debt-%	60	60	85
Debt-\$	1,860,000	3,780,000	5,355,000
Debt balloon @ 60 months-%	40	40	55
Debt balloon-\$	1,240,000	2,520,000	3,465,000
Debt to repay-\$	620,000	1,260,000	1,890,000
Cost of debt-%	5.5	5.5	5.5
Monthly debt repayment-\$	11,850	24,100	31,900
Monthly overhead-\$	6,000	10,000	10,000
Total monthly costs-\$	17,850	34,100	41,900
Lease rate factor-%	0.80	0.75	0.75
Lease rental-\$	24,800	47,250	47,250
Cashflow over debt-\$ & overhead	6,950	13,150	5,350
Margin over term-\$	417,000	789,000	321,000
Residual value less debt-\$ balloon & equity	120,000	760,000	1,390,000
Total cashflow-\$	537,000	1,550,000	1,710,000
Lease rentals-\$	1,488,000	2,835,000	2,835,000
Book depreciation-\$	930,000	1,102,500	1,102,500
Interest-\$	90,563	184,048	276,072
Lessor's overhead-\$	360,000	600,000	600,000
Profit-\$	107,437	948,452	856,428
Engine value book profit-\$	430,000	602,500	602,500

would have resulted in a higher residual value cashflow of \$1.4 million.

The total overall cashflow for the transaction would be \$537,000 for the CFM56-3C1, and \$1.55 million for the V2530-A5 (see table, this page). Under previously available financing terms, the overall cashflow for the V2530-A5 would have been \$1.7 million, because of higher lease rentals under current conditions.

The transactions should also be examined in profit and loss terms, in this case the difference between the lease rentals and the three cost elements of book depreciation, debt interest charges and lessor's overheads.

In the case of the CFM56-3C1, book depreciation over the term is \$930,000 and interest charges total \$91,000, resulting in a book profit of \$107,000. Depreciation and interest charges for the

V2530-A5 are \$1.1 million and \$184,000, leaving a book profit of \$948,000.

Additional residual value profit, resale value less depreciated book value, is \$430,000 for the CFM56-3C1 and \$602,000 for the V2530-A5.

Transaction profitability is especially sensitive to lease rental factors and lessors overheads. These can only be estimated, and are highly variable between lessors. Higher overheads than used here can be incurred. Legal costs and tax advice, for example, can be particularly high. There is also the associated risk of residual value losses. [AC](#)

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