Residual Values in Helicopter Leasing

By Sharon Desfor, ASA, HeliValue$, Inc.

There are two types of residual value analyses, and they do not comfortably co-exist. One type calculates usage directly on an annual dollar-per-flight hour basis, assuming a constant market, with no past or future inflation taken into account.

The second type calculates current versus low markets, accounting for past and optionally future inflation, and assuming the helicopter remains in one component status or possibly moves from one component status to another lesser status (for instance from New to Mid Time) over the term of the lease. This is the type we will address here.

Useful Definitions:

Replacement Cost New: Either the OEM's current new price, or the historical cost of the most recent production year of the asset trended for inflation.

Physical Deterioration (physical depreciation): Loss in value due to consumption of an asset's life. Maybe be "curable" or "incurable." Curable deterioration is characterized by the economic feasibility of repair. Incurable deterioration is characterized by the economic infeasibility of repair.

- In a helicopter, by means of overhaul or replacement of its components, physical deterioration may be cured at a cost less than the value of the helicopter; therefore, physical deterioration due to regular flight time is curable. Physical deterioration due to accident or incident may be curable or incurable.

Functional obsolescence (functional or technological depreciation): Loss in value due to factors inherent in the asset itself when compared to its current modern replacement.

- In a helicopter, the amount of functional obsolescence is typically the value delta between the subject helicopter and the most recent variant in the same series.

Economic obsolescence (economic or market depreciation): Loss in value due to factors external to the subject asset. In its simplest form, it's the difference between the depreciated Replacement Cost New and the observed market price for a comparable machine.

Fair Market Value (FMV): is an opinion expressed in terms of money, at which the property would change hands between a willing buyer and a willing seller, neither being under any compulsion to buy or to sell and both having reasonable knowledge of relevant facts, as of a specific date.

Orderly Liquidation Value (OLV): is an opinion of the gross amount, expressed in terms of money, that typically could be realized from a liquidation sale, given a reasonable period of time

to find a purchaser (or purchasers), with the seller being compelled to sell on an as-is, where-is basis, as of a specific date.

- *Source: Machinery & Technical Specialties Committee of the American Society of Appraisers – July 25, 2010*

The world's shortest class in appraisal theory

A residual value projection is a type of appraisal. Because of this, let's have a quick crash course in appraisal theory.

Appraising is based on the economic Principle of Substitution:

- *A prudent buyer will pay no more for an item than it would cost him to buy an item of equivalent utility.*

Substitution keeps the market in balance. For instance, if a buyer could purchase a JetRanger for $100,000, why would the purchaser buy a different JetRanger for $110,000, assuming both offered the same quality, utility, and satisfaction?

The concept of equivalence is critical in appraising helicopters. When confronted with two JetRangers built in 1990 and offered at different prices, one with 10,000 hours flight time and one with 14,000, with all the components at different percentages used, how does the buyer discern equivalency? An appraisal of current Fair Market Value will break down the components by percent used and by costs accrued toward the next overhaul or replacement.

Cost is not value. Price is not value.

Transactions have to be weighed and measured, amalgamated into groups, and analyzed. The universe of helicopter transactions includes good bargains and poor bargains, timing constraints, and technical issues that go into every purchase and sale. The bird's eye view of the entire transaction history of a model is more important than its individual elements. Step back and look for patterns; don't cherry-pick a few transactions that fit your mental mold.

Appraisers are governed by the Uniform Standards of Professional Appraisal Practice (USPAP). Remember the savings and loan debacle of the 1970s? Much like the late 2000s, there was an oil price spike which drove a speculative economy. When the bubble burst, S&Ls were left holding worthless properties that were on the books for very high appraised values. The result was FIRREA (Financial Institutions Reform, Recovery, and Enforcement Act of 1989), and an appraisal profession that realized if they didn't want to be regulated directly by Congress, they were going to have to regulate themselves. The Uniform Standards were born out of that nightmare, and have been updated faithfully for more than 30 years.

Three approaches to value are covered by the Uniform Standard of Professional Appraisal Practice (USPAP):

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- The income approach is a method whereby the net present income streams for the subject asset are capitalized to provide a value.

- The sales comparison approach utilizes sales, pending contracts, offers and similar transactions of comparable assets to determine the mainstream market resale parameters.

- The cost approach derives a current value from the Replacement Cost New (RCN) by subtracting all forms of depreciation.

It is exceedingly rare to perform an income approach on a helicopter: the financial information required can be extensive and is rarely kept in a manner which allows a single helicopter to be appraised. Some appraisals include a cost approach, which serves as a checkpoint to see how a model's value is doing in comparison to its depreciated cost new or to its profitability. Most helicopter appraisals are based on the sales comparison approach, much like a real estate appraisal of your home. They can be the most valuable if the appraiser has a good network and a vast pool of sales data. After all, sales are really the defining point of a fair market. In lieu of independent market research by an appraiser, most asset classes, including helicopters, have a published bluebook available.

A bluebook is a compilation of recent sales, pending contracts, offers and similar transactions of comparable assets. It's not an appraisal, but some elements of appraising are included in creating the pricing matrix for each model. The data in in any bluebook inherently includes physical deterioration and functional and economic obsolescence, because any secondary sale inherently includes those attributes.

The type of residual projections in this article are effectively a way of averaging the annual economic obsolescence over a period of some years, so that obsolescence can be applied as depreciation going forward, for instance in a helicopter lease, to determine future values.

Who uses residual values?

Businesses, nonprofits, and government agencies finance more than $725 billion every year through loans, leases, and lines of credit in order to acquire new plants, equipment, and software. (Source: U.S. Equipment Finance Market Study 2012-2013 from the Equipment Leasing & Foundation). The majority of the leases will require one or more residual value projections in order to build up the lease rate.

While some equipment financiers calculate their own residual values in-house, many use the services of a professional appraiser. How do you know what the appraiser is doing and whether their projections make sense? It takes some experience, and an extensive value database or a bluebook of values, but let's take a look at the basics here.

Caveat to operators about overly aggressive projections!

You should consider worrying about lessors who show you a 10-year projection with 3% annual inflation. That's incredibly aggressive pricing, and should be reserved as an incentive for a new client that they *really* want, like Bill Gates (yes, he has owned helicopters).

If a lessor can't get a deal without booking residuals that aggressive, they may be a high-risk source of capital.

Methodology and constant dollars

HeliValue$ calculations are almost always given in constant dollars. To reach these projections, we trend all historical values to today's dollars, then give our projections *still in today's dollars*. This means the historical inflation over the past decade is taken into account; future inflation is not.

The majority of banks do not account for any further inflation in their calculations. They might use this conservatism to mitigate their risk factor. Some will then calculate the present values at various inflation rates just to see what kind of margins they might enjoy at lease termination, but then book the residual at the uninflated number.

What does "residual value" mean?

Let's define the word "residual" as "that which is left."

The ASA publishes a book titled "Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets, Third Edition." It defines "residual value" this way:

"Essentially, the term *residual value* means the value remaining after some of the asset's normal useful life has been consumed. It can also refer to the value of the asset at a defined future point in time. Though the future value is often defined as the future Fair Market Value, that's not always the case. Again, it is important that the pertinent sections of the lease document be reviewed prior to performing any valuation in connection with a lease."

Validity of projections

Is a projection of future value even valid? At HeliValue$, we believe the answer is a resounding, "Yes!" With enough historical pricing data, you can calculate a credible depreciation rate.

To demonstrate the validity of our approach to residual projections, we didn't want to "give away the store" with a new calculation, so we pulled a 2014 analysis. The green squares are HeliValue$' residual analysis of the then-new 2014 Bell 412EP with no PBH over a 15-year term. The red squares are actual sales trended to 2014 dollars. The black line is a standard Microsoft Excel trend line, which we don't actually use in our projections but makes the validity of our methodology more obvious. Note how closely our projection follows the trend line. (Note that the trend line starts at 120% because of a single odd 2007 sale of a one-year-old 412, trended to 2014 dollars.)

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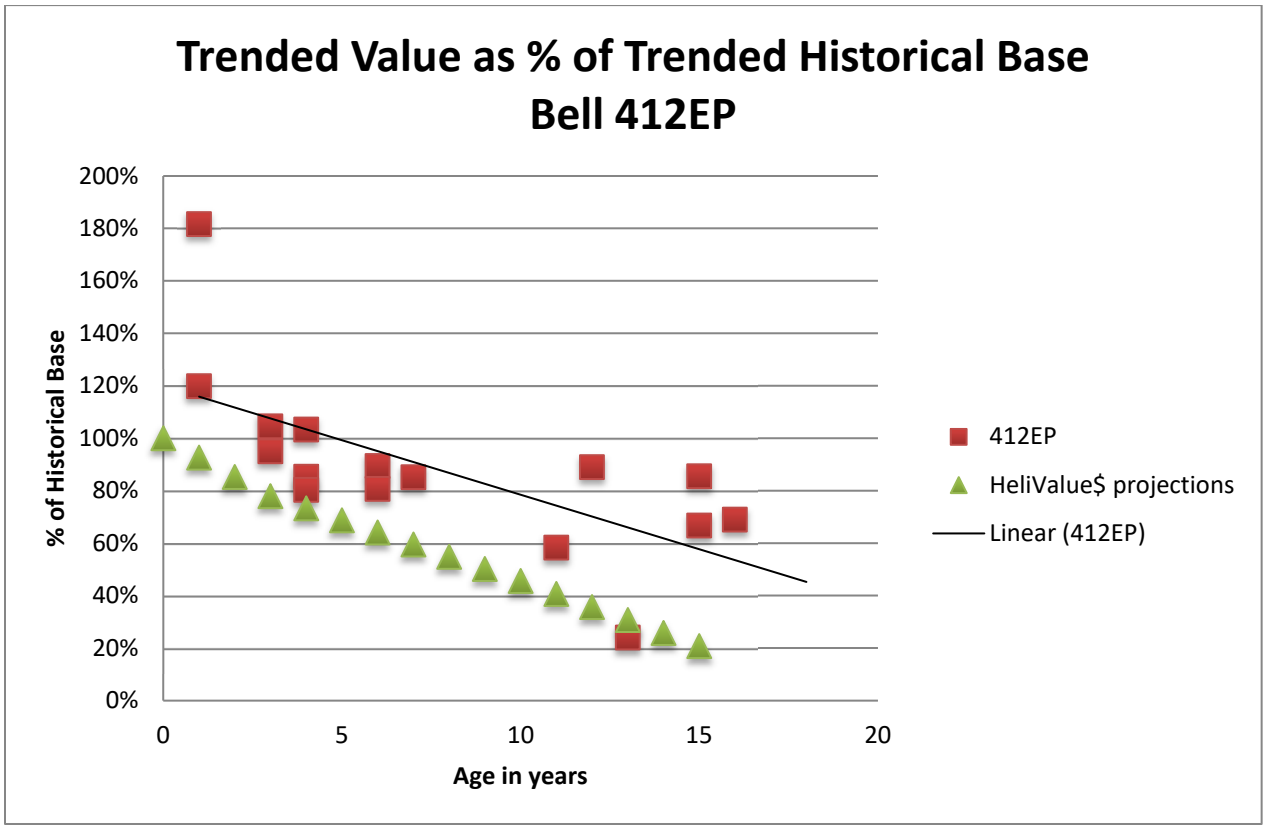

Who uses residual projections and when?

Owners of an asset, operators of those assets, lenders to those owners, taxing authorities (IRS, Inland Revenue), and lessees of the assets all rely on residual projections, but most of all Lessors. These projections are used at lease inception, at annual FASB compliance audits, and any time an asset is substituted during a lease term. Residual projections are used for determining an asset's end-of-lease value, generally for the purpose of developing the lease rate, but sometimes for audits.

Bankers rely on residual value projections to book a deal, to talk to their credit departments, to create risk profiles for different models of equipment. Once the residual spreadsheet is set up, there shouldn't be huge variances in the lease-termination values from year to year when you look at the annual FASB updates.

Why and how are these projections used?

- Determining an assets' end-of-lease value
    - The ultimate purpose is developing the lease rate
- Fair rental calculations
- Lease rate buildup

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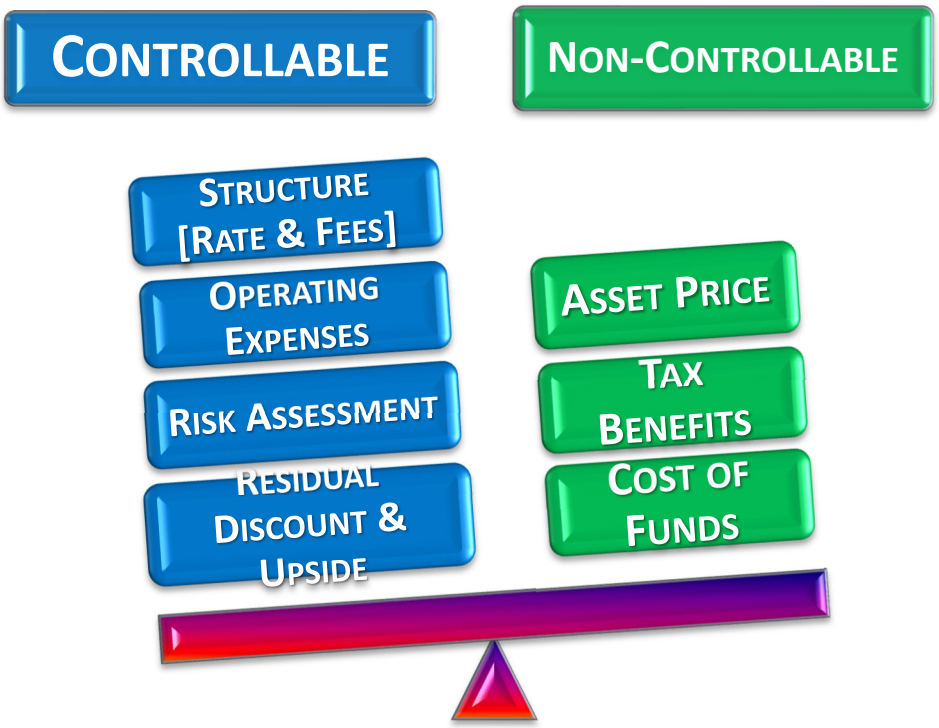
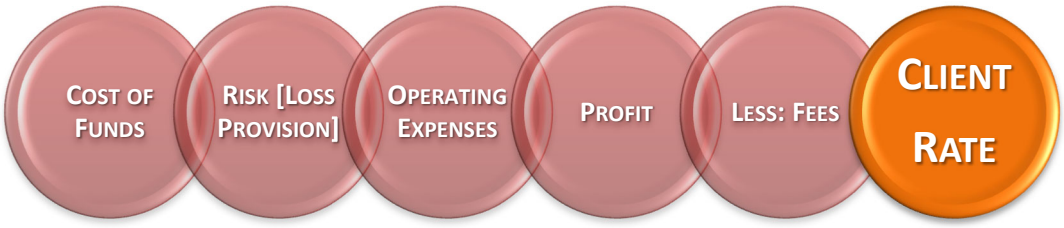
Wait a minute…

What is a lease rate buildup?



A lease rate is built of both controllable and non-controllable elements. The lessor can adjust its internal structure, operating expenses, assessment of risk on the deal, and the "haircut" it gives the appraiser's residual value at lease termination. They have no ability to affect the deal price if it's not a sale/leaseback. The tax benefits are mandated by federal and state taxing bodies. And the cost of funds is set on a bank-wide level.



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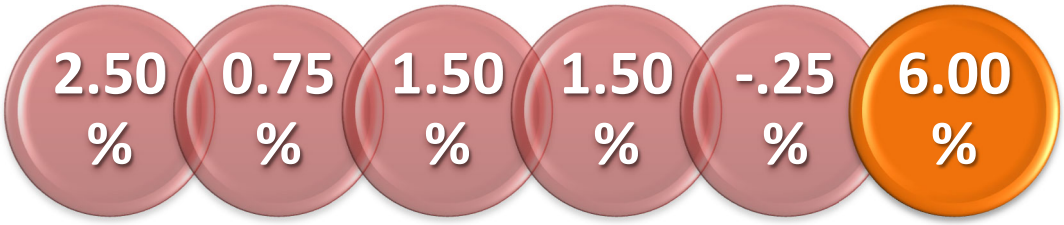
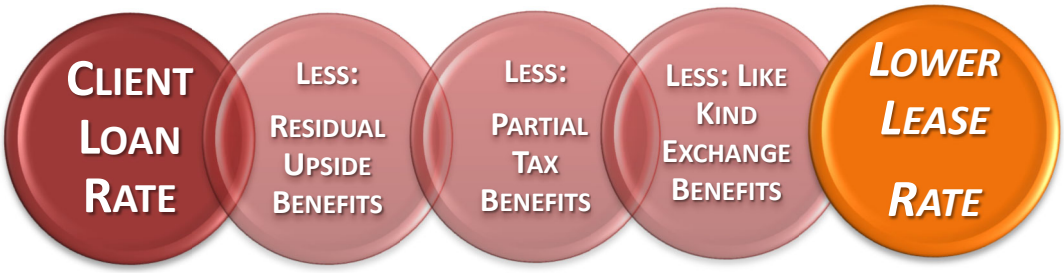


If we want to look at an example of a loan (in comparison to a lease), the bank's cost of funds in this example is 2.5%. It's fixed and non-controllable – they have to purchase the money at that rate. Add the bank's risk provision of 0.75%, which is controllable to a certain extent – within bank parameters anyway – to get 3.25%. Then add the bank's operating expense of 1.5%, which is also controllable, to reach 4.75%. Add again for the bank's profit of 1.5%, which is controllable depending on how influential the dealmaker may be on either side of the table (and never forget that sometimes it's the guy on the other side of the table with the power: even gazillionaires get leases) and you get 6.25%. Deduct the bank fees of 0.25% (controllable) and you end up with a loan rate to the client of 6% even.

A lease rate, on the other hand, might look like this:



The lessor starts with the client's loan rate.

He deducts the upside benefits of residual value, less any haircuts mandated by internal policy.

Then he deducts some of the tax benefits which accrue to the bank (he has to keep some to make a profit, you know).

Finally, he deducts any Like Kind Exchange benefits that come with the deal, for instance in a trade-up.

The result is a lease rate which is almost invariably lower than the rate the same client would pay for a loan.

Typical errors in calculating residuals

The top two? Using only current market data and using an outdated historical price.

Manufacturer's Historical Price			Worldwide Blue Book Resale Values Weighted Average Component Life at					
Year	Serial Number	Base Price	100% Used	80% Used	60% Used	40% Used	20% Used	0% Used
1992	52001-52011	$975,000	$600,000	$700,000	$790,000	$880,000	$970,000	$1,065,000
1993	52012-52067	$975,000	$650,000	$750,000	$840,000	$930,000	$1,020,000	$1,115,000
1994	52068-52117	$995,000	$700,000	$800,000	$890,000	$980,000	$1,070,000	$1,165,000
1995	52118-52161	$1,020,000	$750,000	$850,000	$940,000	$1,030,000	$1,120,000	$1,215,000
1996	52162-52187	$1,045,000	$800,000	$900,000	$990,000	$1,080,000	$1,170,000	$1,265,000
1997	52188-52204	$1,070,000	$850,000	$950,000	$1,040,000	$1,130,000	$1,220,000	$1,315,000
1998	52205-52218	$1,095,000	$900,000	$1,000,000	$1,090,000	$1,180,000	$1,270,000	$1,365,000
1999	52219-52227	$1,120,000	$950,000	$1,050,000	$1,140,000	$1,230,000	$1,320,000	$1,415,000
2000	52228-52256	$1,175,000	$1,000,000	$1,100,000	$1,190,000	$1,280,000	$1,370,000	$1,465,000
2001	52257-52267	$1,210,000	$1,050,000	$1,150,000	$1,240,000	$1,330,000	$1,420,000	$1,515,000
2002	52268-52275	$1,250,000	$1,100,000	$1,200,000	$1,290,000	$1,380,000	$1,470,000	$1,565,000
2003	52276-52281	$1,275,000	$1,150,000	$1,250,000	$1,340,000	$1,430,000	$1,520,000	$1,615,000

*The **Blue Book** excerpts for this example are still from 2014 to match the rest of this case study. If you were looking at a current residual projection today, you would use today's **Blue Book** values and today's Replacement Cost New.*

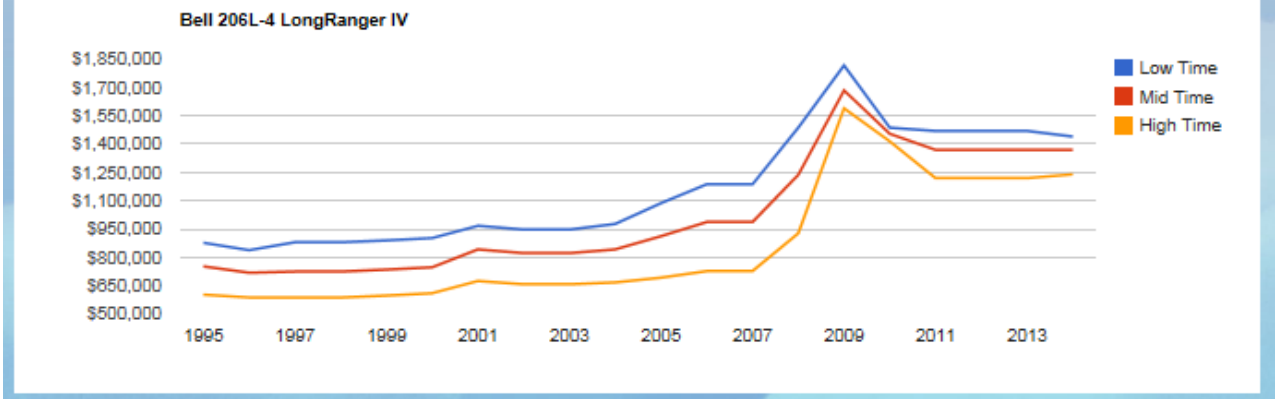
Using this **Blue Book** excerpt for the Bell 206L-4, assume the 2003 current Mid Time value is $1.385MM (halfway between the 40% Used and 60% Used values), and the 2003 Factory List Price was $1.275MM. The 2003 list price of $1.275MM divided by the current Mid Time value of $1.385MM returns a value of 108.6%. So, should a lessor book a residual of 108.6% of the acquisition price for an eleven-year lease? Of course not!

The 108.6% residual at ten years displays an error by first, using only (then-) *current* market data, and second, using an outdated historical price. In the first error, there is no way of establishing from the given data whether the current value of the asset is historically relevant. It is absolutely critical to incorporate data from at least the past ten years in order to include representative market factors. In the second error, the correct price to use is the Replacement Cost New – in the example, the 2014 OEM new price of $2,420,000, NOT the corresponding year of the data set chosen.

Another frequent error: forgetting adjustments

A Helicopter Resale History 1979 to Present ™ compiles over thirty five years' worth of The Official Helicopter Blue Book® pricing data. Each data point shows the helicopter models' mean resale prices at the first calendar quarter of each year, regardless of the helicopter's year of manufacture. Compared to the components' service life used, the age of the aircraft has little impact on its value. Price spreads shown are based on the realities of then-current market scenarios. No adjustments have been made for inflation: 1979 values are given in 1979 dollars, 1989 values in 1989 dollars, and so on through the present. All values are given in US dollars and are net retail prices.

Bell 206L-4 LongRanger IV



	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Low Time	877,500	838,250	880,000	880,000	890,000	902,500	967,500	947,500	947,500	977,500
Mid Time	752,500	718,875	725,000	725,000	735,000	747,500	842,500	822,500	822,500	842,500
High Time	602,500	587,625	587,500	587,500	597,500	610,000	675,000	657,500	657,500	667,500

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Low Time	1,087,500	1,187,500	1,187,500	1,487,500	1,817,500	1,487,500	1,470,000	1,470,000	1,470,000	1,440,000
Mid Time	912,500	987,500	987,500	1,237,500	1,685,000	1,455,000	1,370,000	1,370,000	1,370,000	1,370,000
High Time	692,500	727,500	727,500	927,500	1,590,000	1,415,000	1,220,000	1,220,000	1,220,000	1,240,000

It is all too easy for a newer appraiser to forget to adjust ALL past data for inflation. *Make sure your appraiser isn't comparing 2002 dollars to 2008 dollars to 2014 dollars (or whatever the year of the residual projection that you're analyzing.) Always make sure all pricing data has been brought to a common date!*

The most … and least … obvious: failing to see the big picture

Thinking both generically and critically, imagine any small, short-lived asset: maybe your office computer. You examine the residual calculations on the initial cost of that small asset, first at lease initiation, and next at lease termination, and find yourself with a large residual value of 67% at year seven. Does this sound right? For a desktop computer? Really?

Always engage your brain to pick out unrealistic projections. Always truly look at the results. After a while various formulae all start to look alike. If you're not paying attention to the

projections' bottom line, you might not even notice if the result doesn't make sense. Use your common sense; read everything carefully and critically before you rely on any appraisal.

What about out-of-production assets?

Manufacturer's Historical Price			Worldwide Blue Book Resale Values Weighted Average Component Life at					
Year	Serial Number	Base Price	100% Used	80% Used	60% Used	40% Used	20% Used	0% Used
1982	51001-51049	$550,000	$350,000	$433,000	$516,000	$599,000	$682,000	$765,000
1983	51050-51073	$550,000	$370,000	$453,000	$536,000	$619,000	$702,000	$785,000
1984	51074-51121	$550,000	$390,000	$473,000	$556,000	$639,000	$722,000	$805,000
1985	51122-51167	$595,000	$410,000	$493,000	$576,000	$659,000	$742,000	$825,000
1986	51168-51186	$640,000	$430,000	$513,000	$596,000	$679,000	$762,000	$845,000
1987	51187-51234	$695,000	$450,000	$533,000	$616,000	$699,000	$782,000	$865,000
1988	51235-51264	$725,000	$470,000	$553,000	$636,000	$719,000	$802,000	$885,000
1989	51265-51328	$749,000	$490,000	$573,000	$656,000	$739,000	$822,000	$905,000
1990	51329-51427	$875,000	$510,000	$593,000	$676,000	$759,000	$842,000	$925,000
1991	51428-51553	$895,000	$530,000	$613,000	$696,000	$779,000	$862,000	$945,000
1992	51554-51611	$910,000	$550,000	$633,000	$716,000	$799,000	$882,000	$965,000

Consider the Bell 206L-3. It ceased production in 1992, so what RCN should have been used in 2014: $910,000? Sorry, that's 1992 dollars. It needed to be trended to the correct year's dollars or for a 2014 206L-4 to be used as a comparable instead.

Failure to adjust historical cost to a *current RCN* is an incredibly common error for out-of-production assets. *We repeat: make sure your appraiser isn't comparing 2002 dollars to 2008 dollars to 2014 dollars.* ALL pricing data must be trended to a common date before the residual analysis is even begun.

Understanding the point – what's going on here?

1. Scope

   What is the objective? What is the lease term, and when did it begin? What type of return provisions exist? Are there any PBH programs? What is the configuration of the helicopter?

2. Purpose

   Why do you need this calculation? Are you checking someone else's work? If so, you'll start with their parameters unless you find an error. Are you preparing a lease? If so, you'll be starting from scratch and will need the information below.

3. Type of Value

   Fair Market Value? That's an arms-length transaction with no compulsion to buy or sell.

Orderly Liquidation Value? That's a reasonably-timed transaction with an element of compulsion, which generally causes a lower price in order to shorten the marketing period.

4. Information needed and where it's found
    a. Lease termination and inception dates from the lease documents
    b. Return provisions from the lease documents
    c. PBH from the contracts existing at lease inception or entered later
    d. Configuration from the operator or lessee
    e. Anticipated flight hours per year from the operator or lessee

Reality check

Before you go finalize a deal or rely on a residual projection, take a look from a bird's eye perspective. Do you believe the bottom line? Does it match what you know of the market history for this model? In ten years, is it reasonable to think that someone will pay that much for this asset in used condition? Think of the desktop PC example earlier.

If the bottom line isn't credible, there may be errors in math, in assumptions, in depreciation schedules, or in the very methodology of your appraiser, if that methodology isn't driven by empirical data as described in this article.

Other considerations

There are often other things considered in a residual value projection: options and accessories with a different useful life or a different depreciation rate than the helicopter itself, different ages for different parts of the machine, different return provisions written into the lease, prepaid service agreements, maintenance reserve payments.

Options and accessories

As one example, optional mission equipment may cost $300,000 new, depreciate down to $65,000 over seven years, and then stay at that value until lease termination. These calculations for these types of items may be based on any appropriate form of depreciation or from market observation.

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Reconfiguration

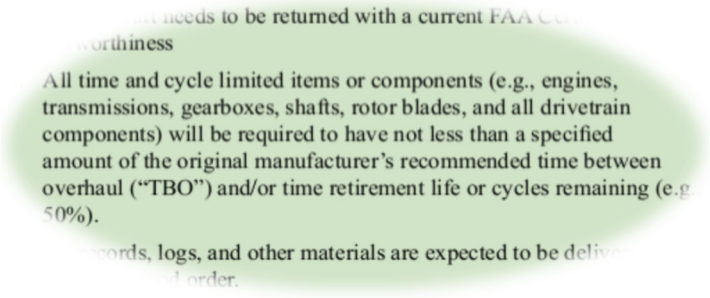
- 2006 Sikorsky S92A, Corporate configured, factory demonstrator
- Purchased used in 2009
- Corporate configuration removed, replaced with SAR interior
- Interior is therefore 3 years younger than the airframe

File photo

This is an example of a helicopter that had a complete configuration change at 3 years old. In this case the work was completed prior to closing and was calculated into the FMV, but had the work been planned part-way through the lease contract, we could have calculated for it using a variation of the methodology on the previous slide.

Lease contract provisions

Always verify the residual values against as much of the lease contract as you can get your hands on. Excerpts of the maintenance and return provisions are the absolute minimum requirement for verification.



needs to be returned with a current FAA
orthiness

All time and cycle limited items or components (e.g., engines, transmissions, gearboxes, shafts, rotor blades, and all drivetrain components) will be required to have not less than a specified amount of the original manufacturer's recommended time between overhaul ("TBO") and/or time retirement life or cycles remaining (e.g. 50%).

cords, logs, and other materials are expected to be deli
order.

Different leases with different return provisions (such as 50% used, 20% used, a requirement for a prepaid maintenance program or maintenance reserve account to a certain age or to lease termination) will impact the bottom line, and therefore your depreciation schedule.

Sharon Desfor, ASA, is Chairman of the Board and Owner of HeliValue$, Inc., the world's most trusted helicopter appraisal firm, and publisher of **The Official Helicopter Blue Book®**, the accepted standard for helicopter resale pricing information.

Sharon is an Accredited Senior Appraiser of the ASA. She served proudly on ASA's Board of Governors as International President and multiple committees before that. She edited their

M&TS Journal as well as "Valuing Machinery and Equipment, Third Edition." Sharon is past Chair of the Helicopter Foundation International and of the HAI's Finance & Leasing Committee, where she was a contributing author and editor of HAI's finance handbook, "Helicopter Funding: Assembling the Pieces of the Puzzle."

She performs appraisals for finance and leasing, helicopter acquisitions and sales, bankruptcies, estate settlements, mergers and acquisitions, subrogation, and litigation support. She enjoys teaching finance people about the helicopter industry and helicopter people about the finance industry.

Sharon is respected and warmly welcomed everywhere in the helicopter and aviation finance industries. She has published over 50 seminars, webinars, and articles for more than twenty different organizations and publications in the last two decades.

She is a vigorous advocate for professionalism in appraising, and an outspoken participant in appraisers' forums on LinkedIn. You can find her profile and groups at www.linkedin.com/in/sharondesfor.