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International Aviation Advisors

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International Aviation Advisors ("IAA") has worked for many years developing valuations methodology for commercial aircraft and a more rational means of evaluating the projected future price of those assets than is available from the existing aircraft appraisal community.

Rather than produce a bi-annual listing of aircraft prices and projected future values, IAA's approach has been to be more statistically relevant and to build on mathematical modelling to provide simulations of possible future market value outcomes for aircraft. This approach is to provide investors in aircraft with a realistic range of the future price of their asset, rather than a single price at a future point (which is rarely achieved in practice).

As IAA developed this model, it became clear from discussions with aircraft investors that there was an appetite for IAA's future valuation methodology, which differs significantly from the products offered by the existing appraisal community. We also found that there was demand for an investment return and pricing model that could assist existing and potential investors to build in these future value assumptions into their analysis of existing portfolios and evaluating new purchases.

Given the unprecedented disruption to the aviation sector following the effects of the Covid Pandemic ("Covid"), many of the investors that invested in aircraft over the last decade are faced with a highly uncertain future in terms of lease rates and values for aircraft. No one has a crystal ball that provides absolute clarity on the time taken for the aviation industry to recover, but investors in aircraft will want to model a variety of scenarios on the time taken to "get back to normal" and the impact these differing scenarios.

As with any downturn, this part of the cycle will also produce opportunities for investors that wish to take advantage of some of the inevitable market price corrections that will come as the industry begins to emerge from the Covid crisis.

Existing and new investors both have an interest in properly analysing their exposure to the industry and the impact that future price movements will have on their returns, driving the decisions on the timing of selling existing aircraft exposure, or the price at which it will make sense for new investors to enter the market and buy or build an aircraft portfolio.

IAA has developed a Lessor Trading Model (the “Model”) to assist investors for aircraft leasing investors. The model is available on-line and is an easy-to-use risk analysis tool. It combines the IAA approach to future aircraft valuations with a powerful IRR based analysis of future cashflows to provide decision-makers with a tool that can easily model the returns under differing scenarios.

The Lessor Trading Model allows investors to understand the impact of movements in value of the main leasing cashflows:

- purchase price
- rentals (and downtime)
- finance payments
- maintenance reserves, and
- sales price

IAA has transferred the Model logic into Python code (a high level general purpose programming language for data science) and it is available on IAA's secure server. The Model is therefore available for:

- Licence subscriptions
- One-off analysis of potential investments
- Special Projects

IAA can provide additional services to complement the Model including:

- Assistance on market analysis
- Aircraft sourcing
- Targeting of potential portfolios and selection of most attractive aircraft types and deals.

Why invest in aircraft…?

Large commercial aircraft are attractive assets to lease as they are easily moveable, recoverable and produced by a stable duopoly of manufacturers. In normal times, aircraft generate fairly predictable USD lease flows over their long economic lives and there is no near-term risk of a technology leap that will replace them as the fastest means of mass transport.

Demand for travel drives demand for aircraft, and historically this has meant that the aircraft fleet has doubled approximately every 15 years as the long term annual demand for travel has risen by 5% pa on average. Passenger growth has grown by 1.6 – 2 times world GDP growth over the last 30 years.

The airline industry is not immune to the economic cycle, and reductions in world growth lead to slow-downs in the aviation sector. It is also prone to occasional external shocks as the result of war, terrorism or as we are currently experiencing, disease.

Historically the industry has a proven resilience to these shocks, and over the last 30 years the industry has generally recovered within a relatively short time, with demand reverting to the long-term trend line.

The impact of SARS on the industry in the early 2000s was barely noticeable, as the impact was largely confined to Asia, and predominantly to China, which was a considerably smaller economy than it is now. The impact of Covid will be considerably larger given its global prevalence and national lock-downs restricting travel between economies.

Existing and potential investors in this sector need the tools to analyse the potential impact on current or future aircraft investments.

Why do aircraft investors need the Model…?

We have worked with a large number of aircraft investors (lessors and other financial investors) and have been surprised by the variety of approaches to risk analysis and the logic used to justify and manage acquisitions and investments.

In the current challenging market environment, we believe that existing investors would benefit from a third-party model developed by a knowledgeable and independent group to examine, and maybe challenge, the assumptions of their own models. Some of the existing models are very sophisticated, and others less so. The Model will allow investors to logically and consistently evaluate the returns on their investment an examine the impact on those returns from future value movements.

The Model is based on the Internal Rate of Return ("IRR") of the value at risk in the transaction. The IRR function is derived from valid cash inflows and outflows over the term of the deal, which are derived after taking into account all of the necessary parameters on an annual basis. The logic must be based on normal accounting practices, which do differ by jurisdiction, but the underlying cash movements will drive return assumptions and decisions to buy or sell.

The two largest expenses of a leasing company are depreciation and finance costs. The main lease parameters are therefore:

- Debt/equity split of the purchase
- Base Interest rate
- Debt terms, including fees, margin and balloon payments
- Lease terms, including rentals (fixed or floating) and maintenance reserves
- Depreciation policy and residual value assumptions
- Future sales value at lease end or following a lease extension/new lessee, plus analysing passenger to freighter conversions at the end of the initial lease term.

The Model can be used by investors to fact-check and examine existing IRR assumptions for changes in lease rental assumptions (for re-lease, or to incorporate a lease payment “holiday” or deferral for existing lessees) as well as the downward impact on future values as the result of the Covid crisis. Various scenarios can be accurately modelled, including lease downtime, and the results have been tested and verified by several large lessors.

The Model also includes a number of solve functions that can be used to determine the lease rate, debt/equity split or future sale amount required to achieve an investor’s targeted return.

The Model also takes into account Maintenance Reserve (“MR”) amounts and spend events (actual maintenance) and can be set up to reflect the actual maintenance status of the individual aircraft. We have also included the ability to model taking a percentage of the MR payments as income, which has become more accepted by auditors in a number of jurisdictions.

Model Outputs

Once the underlying lease parameters have been entered, the Model will ask the user to choose a future sale year and value. The Model will also evaluate the sale of the aircraft at that date for Book Value in the chosen year and subsequent three years. The Model produces an IRR for each of these 5 assumed sale dates and amounts.

The result is that investors will obtain a reasonable view of pricing and future value risk, together with the investment returns from possible book-value sales in the transaction time horizon. It also gives investors a review of their depreciation policies against expected market values for the underlying asset, and whether they could expect a book gain or loss on disposal.

The Model includes a simulation module which will provide the investor with a probability distribution of IRRs, based on the inherently random uncertainty involved in the underlying investment.

To properly handle more complex analyses, IAA has transferred the logic into software which allows us more ability to control the parameters. The Model's ability to analyse simulations and lease downtime between lessee scenarios would not have been possible otherwise.

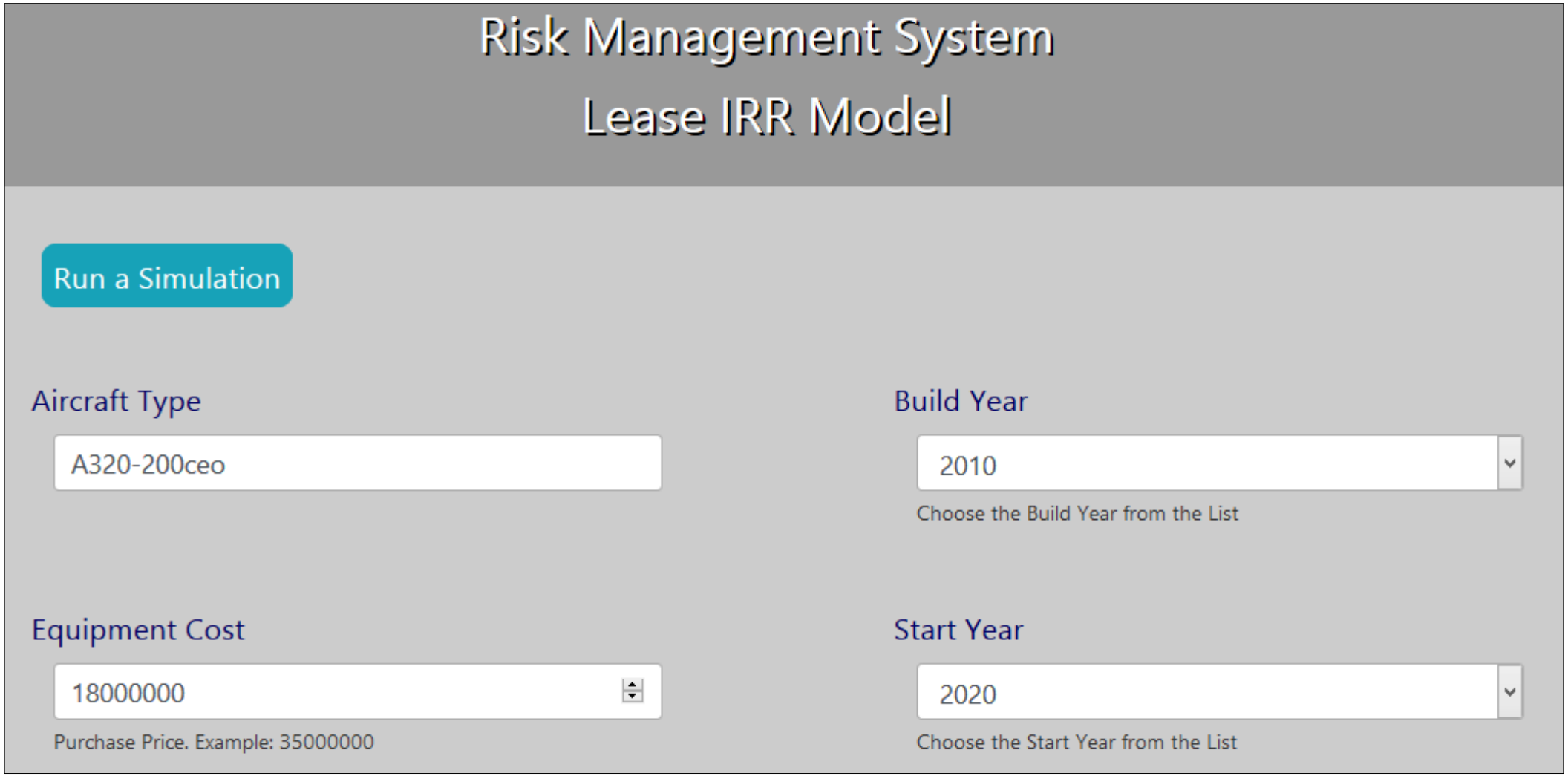
The lease downtime simulation provides three possible scenarios (none, 6 months or 12 months), but can be customised by IAA to meet your own requirements.

For riskier credit lessees, the Model can be adapted to assume downtime, additional costs (such as aircraft repossession/storage/re-configuration etc.), and discounted re-lease rates, for example. The solve functions can then be utilised to model the parameters that might still allow the investor to meet its return targets in these circumstances.

By running different scenarios and using the simulation module in the Model, investors can make prudent pricing and risk-based portfolio return decisions.

In the next section we will demonstrate examples of how the Model does this and the outputs provided for investors.

After logging in through your browser, the lease parameters are entered on an intuitive User form:



The relevant parameters are all included:

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Start Month

9

Enter the Start Month as an Integer. Example: September = 9

Balloon Payment

0.0

Enter the Balloon Payment as a Percent. Example: .25

Debt Fees (monthly)

7000

Example: 5000

Annual Salaries and Other Costs

1000000

Example: 1000000

Debt Percentage vs. Equity

0.80

Example: .75 (Range: 0 - .90)

Debt Interest Rate

0.055

Example: .055 (for 5.5%)

Debt Term

12

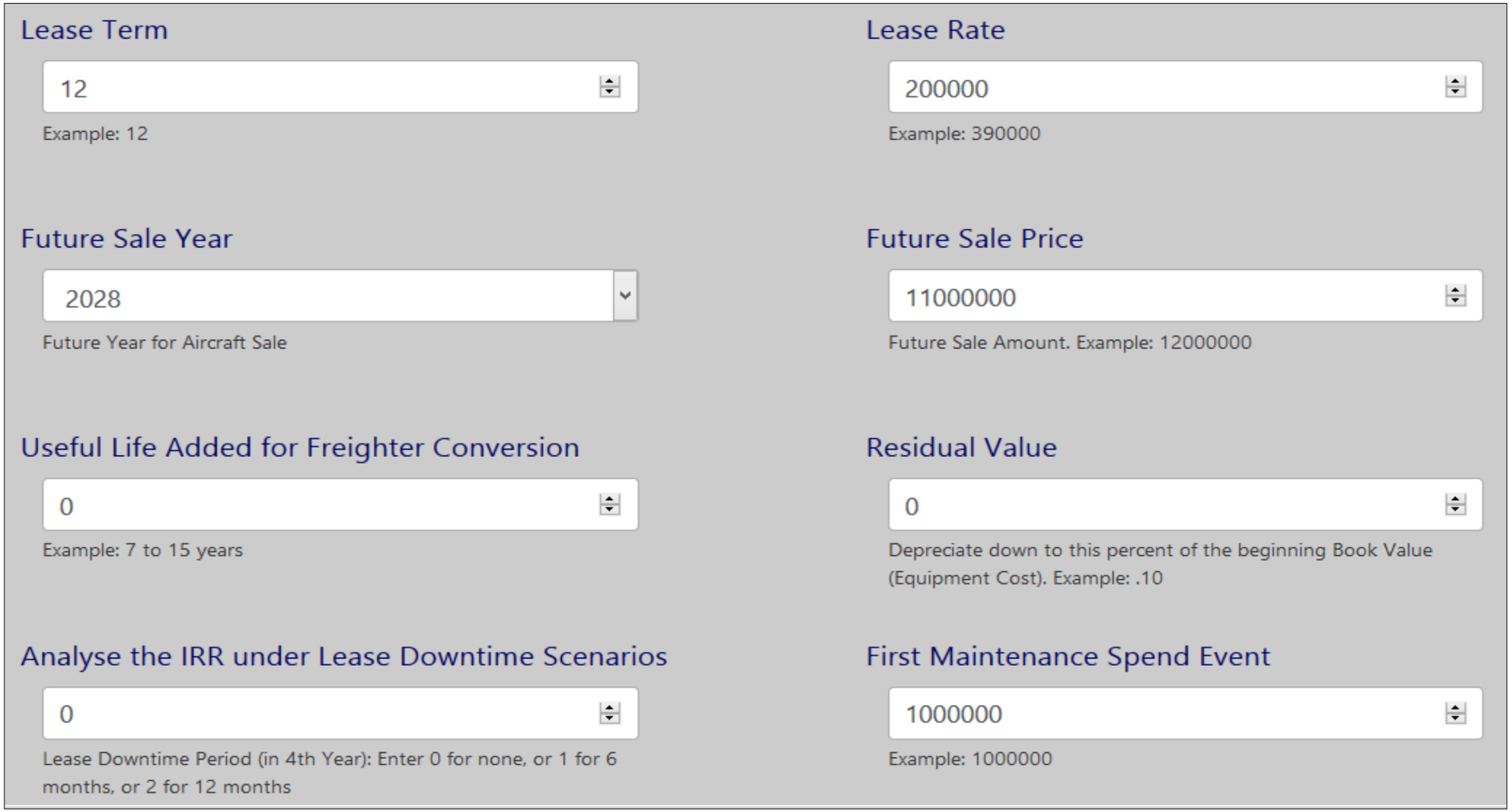
Example: 12

Total Aircraft in Portfolio

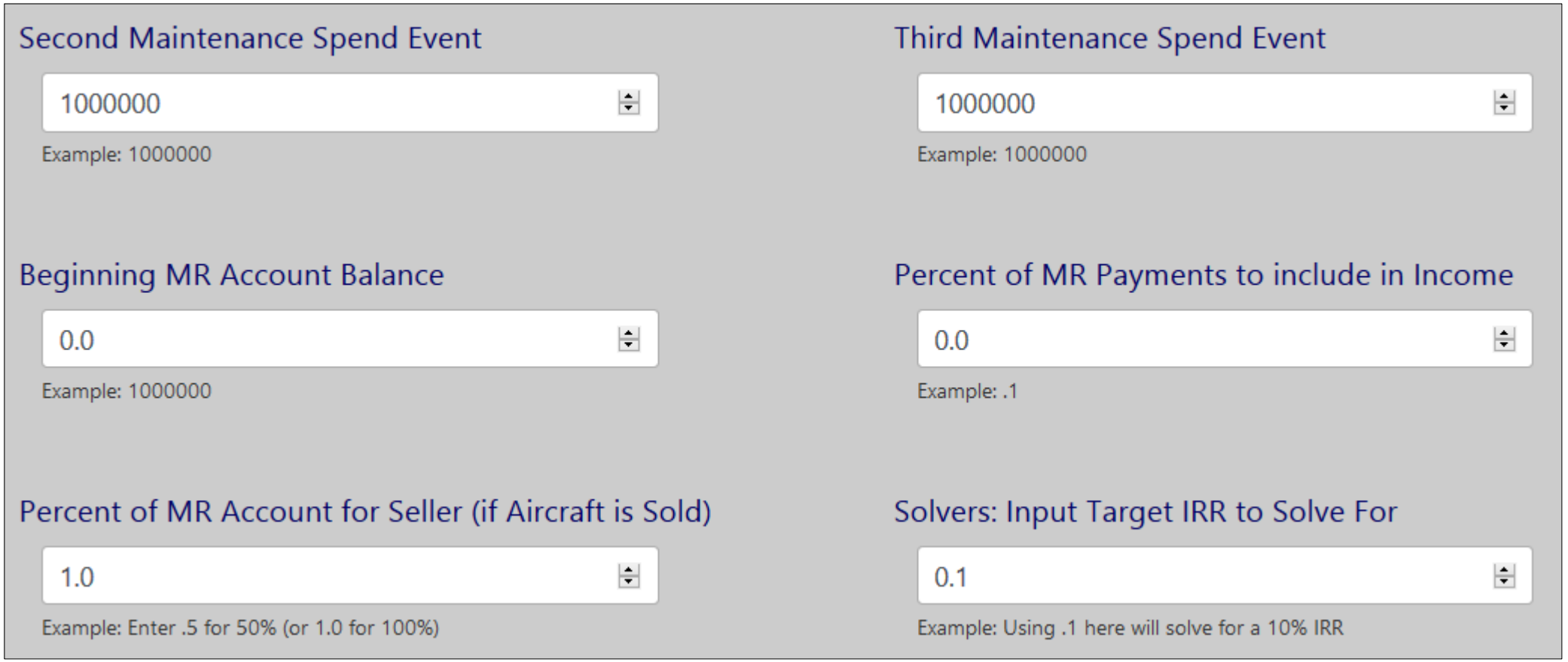
10

Example: 10

We also allow the analysis of freighter conversions, and potential lease downtime:



The Maintenance Reserves and spend amounts are also taken into account:



After entering all of the parameters, and running the code, this is the displayed result:

Risk Management System

Lease IRR Model

Aircraft Type:	A320-200ceo	**Build Year:**	2010	**Equipment Cost:**	18,000,000
UL Remaining:	15	**Debt Term:**	12	**Lease Term:**	12
Debt Rate:	5.50 %	**Loan Payment:**	136,825	**Lease Rate:**	200,000
Depreciation:	100,000	**Start Year:**	2020	**Sale Year:**	2028
Sale Price:	11,000,000	**Debt vs. Equity:**	80 %	**Downtime:**	None
IRR:	19.1 %				

IRRs for Sales at Book Value

Year	**2028**	**2029**	**2030**	**2031**
Book Values:	8,100,000	6,900,000	5,700,000	4,500,000
IRR for Book Value Sale:	11.203 %	13.094 %	16.852 %	19.177 %

Solvers: By checking a check box, we can run a solver routine to calculate the 2028 Sale Price required for the transaction to achieve a target IRR (10% in this case):

☑ Solve for Sale Price to achieve Target

Aircraft Type:	A320-200ceo	**Build Year:**	2010	**Equipment Cost:**	18,000,000
UL Remaining:	15	**Debt Term:**	12	**Lease Term:**	12
Debt Rate:	5.50 %	**Loan Payment:**	136,825	**Lease Rate:**	200,000
Depreciation:	100,000	**Start Year:**	2020	**Sale Year:**	2028
Sale Price:	7,805,195	**Debt vs. Equity:**	80 %	**Downtime:**	None
IRR:	10.0 %				

Or we can solve for the Lease Rate:

Equipment Cost:	18,000,000
Lease Term:	12
Lease Rate:	181,030
Sale Year:	2028
Downtime:	None

Or the Debt/Equity split:

Build Year:	2010
Debt Term:	12
Loan Payment:	113,653
Start Year:	2020
Debt vs. Equity:	67 %

By choosing simulation ranges for the main parameters, we can set up a simulation that takes into account the uncertainty involved (.05 = 5 %):

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Lease Rate

200000

Example: 390000

Lease Rate Simulation Upper Limit

0.05

Example: .10

Lease Rate Simulation Lower Limit

0.05

Example: .05

Future Sale Year

2028

Future Year for Aircraft Sale

Future Sale Price

11000000

Future Sale Amount. Example: 12000000

Sale Price Simulation Upper Limit

0.05

Example: .10

Sale Price Simulation Lower Limit

0.05

Example: .10

Useful Life Added (for Freighter Conversion)

0

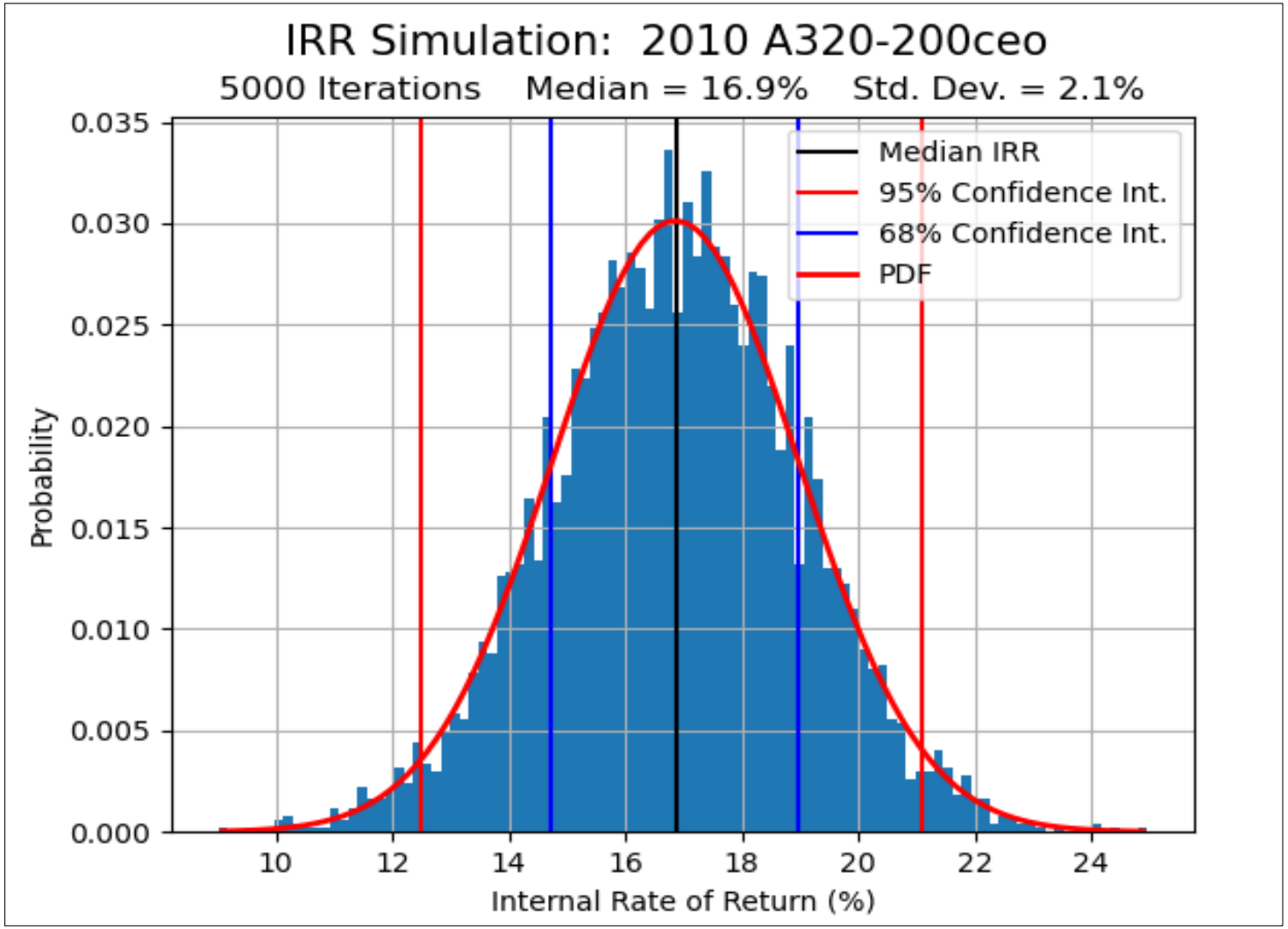
Example: 7 to 15 years

The Simulation Module results in an analytical probability distribution of IRRs.

The simulation code lets us take advantage of the random number generator in the computer.

The model is run and recalculated for each iteration as the parameters are varied randomly through a defined range.

The results are stored and displayed as in the graph to the right, including confidence intervals and the probability density curve.



We have invested in the necessary people and technical disciplines, with a view to expanding our thought leadership, and improving on the status quo.

By using simulation, and some other innovative ideas, we feel that we have done, and this process will continue.

Our multi-cycle experience, modelling skills, analyses and market expertise can help your company understand the risks involved more clearly, better inform your business decisions, and maximise your future returns.