One Engine, Two Engines, 3 Engines: Fishing for the Impact on Values

Adam Pilarski, AVITAS, Inc.
IATA Maintenance Cost Conference, Sept 11th, 2014
One fish
two fish
red fish
blue fish
Dr. Seuss
Engine Choice & Value Retention
Contents

- Theory
- Art of forecasting residual values
- Analysis and results
Theory
- Depends on interested party
  - Engine manufacturers – One is enough
  - Aircraft manufacturers – More is better, Bigger market
  - Airlines – More is better
  - Leasing companies – Mixed, desire for vanilla but bigger market
Al Baker stressed that he “wants choice. We have said that to Boeing and Airbus. We want a choice so airlines are not with their back against the wall” from a commercial perspective.

Aviation Daily July 17th, 2014
Robert Martin, CEO of BOC Aviation stressed that he is happy with having only one supplier on the A330 Neo (Rolls Royce).

“As a lessor I much prefer one engine type. You don’t have a split market.”

Aviation Daily July 16th, 2014
Steven Udvar Hazy wants engine choice.

“The market is big enough for two engine options” he said, adding that he was disappointed that GE wasn’t ‘involved’

Hazy says ALC sees a demand for up to 1,200 A330 Neos
CIT’s Jeff Knittel also argued for one engine
“If Airbus goes ahead with it, we’d prefer that they stick with just one engine type,” says McClelland.

“From a lessor’s point of view, it’s not clear that the supposed benefit of lower acquisition cost from a second engine choice outweighs the ease of future placement that comes from having just one engine. Furthermore, it’s not clear that the market for an A330 Neo would be large enough to sustain two or three engine programmes.”
Chief Operating Officer – Customers John Leahy downplayed the significance of only having one engine supplier on the A330 Neo – Rolls Royce and its Trent 7000. He says the only reasons airlines want two suppliers is so that they can get a better deal on the engine.

“But we have taken the liberty to negotiate a good engine price with Rolls Royce for all customers in advance” Leahy said.

Aviation Daily July 21st, 2014
“We tried hard to have an engine choice” (on the A330 Neo), Tom Williams, EVP Programmes, Airbus said.
Art of forecasting residual values
Why should we care?

- Pay correct price for the airplane
- Obtain financing, liquidity
- Reduce cost of financing, reduce risk
- Get opportunity for upside gains
Analysis and Results
Aircraft Transactions in Current Price

Source: AVITAS’s transaction database.
Aircraft Transactions in Constant Price

Source: AVITAS’s transaction database.
- Inflation matters
- So does original price
Aircraft Residual Value

Regression on aircraft age variables

$R^2 = 0.8251$

Source: AVITAS's transaction database.
Aircraft Residual Value

Source: AVITAS’s transaction database.

Regression on aircraft age, aircraft characteristic, and market related variables

\[ R^2 = 0.8648 \]
Comparing Estimation Residuals of Aircraft Residual Value Analysis

Source: AVITAS’s transaction database.
## R-squared of Regressions

<table>
<thead>
<tr>
<th>Variables</th>
<th>Single Aisle</th>
<th>Twin Aisle</th>
<th>Single Aisle and Twin Aisle</th>
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</thead>
<tbody>
<tr>
<td>Aircraft age</td>
<td>0.8510</td>
<td>0.7045</td>
<td>0.8251</td>
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<tr>
<td>Aircraft age, aircraft characteristic, and market related variables</td>
<td>0.8828</td>
<td>0.7689</td>
<td>0.8648</td>
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</table>
## Airplanes included

### Study of the Effect of Engine Options on Aircraft Retained Values

<table>
<thead>
<tr>
<th>Airplane Types Included in the Study</th>
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## Population considered

<table>
<thead>
<tr>
<th></th>
<th>Total delivered</th>
<th>One Engine</th>
<th>Two Engine</th>
<th>Three Engine</th>
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</thead>
<tbody>
<tr>
<td>Narrowbody</td>
<td>22,119</td>
<td>14,190</td>
<td>7,939</td>
<td>N/A</td>
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<tr>
<td>Widebody</td>
<td>7,579</td>
<td>2,251</td>
<td>1,951</td>
<td>3,377</td>
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</tbody>
</table>
Observations

- Narrowbody – 2,368
- Widebody – 653
- Timeframe – 1970-2013
# Study of the Effect of Engine Options on Aircraft Retained Values

<table>
<thead>
<tr>
<th>STATISTICAL MODEL</th>
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<tbody>
<tr>
<td>Function</td>
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</table>

<table>
<thead>
<tr>
<th>Narrowbody Results</th>
<th>R-squared</th>
<th>0.86 - 0.88</th>
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<tbody>
<tr>
<td></td>
<td>Coefficient of engine option dummy</td>
<td>0.02 - 0.05</td>
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<tr>
<td></td>
<td>Sales Price (in 2013 USD)</td>
<td>$0.1 - $85 mill, Average $22.1 mill</td>
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</table>

<table>
<thead>
<tr>
<th>Widebody Results</th>
<th>R-squared</th>
<th>0.76 - 0.77</th>
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<tbody>
<tr>
<td></td>
<td>Coefficient of engine option dummy</td>
<td>0.05 - 0.06</td>
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<tr>
<td></td>
<td>Sales Price (in 2013 USD)</td>
<td>$0.1 - $235 mill, Average $53.2 mill</td>
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</table>
Summary

- Preliminary indications are that engine options enhance average aircraft resale values
- Impact circa $400,000 to $1M for narrow bodies and $2.5M to $3M for wide bodies
Cycles Explained in Musical Terms
Things are wonderful

- Airlines finally profitable
- Low interest rates $\rightarrow$ Money looks for investment opportunities
- Fuel prices stable

Hence

- Huge orders
- Huge deliveries
- Huge backlog

Hence

- Talk of serious production ramp-up by both Airbus and Boeing
EVERYTHING IS AWESOME

EVERYTHING IS AWESOME
What Now?
AVITAS, Inc. - World Headquarters

14520 Avion Parkway
Suite 300
Chantilly, VA 20151
USA

Phone: +1 703 476 2300
Fax: +1 703 860 5855

AVITAS Europe

PO Box 38
Betchworth
Surrey RH3 7YZ
UK

Phone/Fax: +44 1737 843 756

www.AVITAS.com