Airplane Value Analysis

Alex Philip

Istanbul Technical University

Air Transportation Management

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Financial evaluation of projects

When is it time to invest in the business, how do we know what is a good investment and what isn’t?

Financial evaluation methods

Review handout of various financial evaluation techniques – discuss merits and weaknesses of each approach.

Objectives

Calculate the Present Value of future cash flows

Compare the NPV of two competing capital projects

Identify critical assumptions needed to compare competing projects

Explain sensitivity analysis and how it impacts competing projects

Table exercise

Calculate the Net Present Value (NPV) of a Capital Project

- *Worksheet and assumptions provided*

- *Fill out your worksheet and come to a consensus at your table of the NPV*

Value exercise – calculate NPV

Option 1 (Buy existing hotel)

- 12 Years Old
- 120 Rooms
- $10M acquisition price
- Will require a refresh after five years ($10,000/room)
- Estimated nightly rate ($159.50)
- Staff costs - $3M/year
- Other Expenses - $1.2M/year

Option 2 (Build a new hotel)

- More efficient heating and A/C
- 130 Rooms
- $12M Construction and land price
- Will require a refresh after seven years ($10,000/room)
- Estimated room rate ($156.70)
- Staff costs - $3.1M/year
- Other Expenses - $1.1M/year

Estimate occupancy rate is 90%/86%/83%

Calculate 10-year NPV with a 10% discount rate

Value exercise – calculate NPV

New ☒
Used ☐

Discount Rate 0.1 or 10%

Fill Rate *95%*

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Hotel Cost (enter as negative)	*($12,000,000)*										
Room Refurbishment (enter as negative $10,000/room)						(older Hotel)		(new Hotel)			
Revenue (Rate*Fill Rate*Rooms*360)		*$6,966,882*									
Staff Costs (enter as negative)		*($3,100,000)*									
Other Expenses (enter as negative)		*($1,100,000)*									
Cashflow (sum all values)	*($12,000,000)*	*$2,766,882*									
PV (calculation below)	*($12,000,000)*	*$2,515,3474*									
Cashflow for year divided by x:											
	Cashflow/1	Cashflow/1.1	Cashflow/1.21	Cashflow/1.331	Cashflow/1.464	Cashflow/1.611	Cashflow/1.772	Cashflow/1.949	Cashflow/2.144	Cashflow/2.358	Cashflow/2.594

$$PV = \frac{C_t}{(1+r)^t}$$

PV = Present Value
C_t = future value
r = annual discount rate
t = number of periods

NPV
(sum of all values)

Value analysis - example

How can we compare two alternative aircraft?

By weighing the value each aircraft provides.

We measure the earning power of a capital asset such as a commercial airplane by estimating its future cash flows and discounting them back at the airline's cost of capital.

787-8

Versus

767-300ER

What are the value elements to consider?

Revenue

- **Passenger**
- **Cargo**
- **Ancillary**

Costs

- **Fuel expense**
- **Maintenance**
- **Landing/Navigation/Handling fees**
- **Crew costs**
- **Passenger and Cargo related**
- **Lease expense**

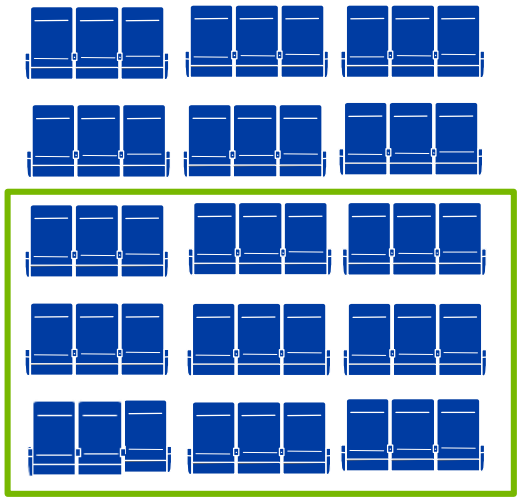
Value analysis assumptions

General Assumptions	
Number of years	12
Discount rate	10%
Average trip length (km)	7,700
Annual trips	607
Annual cost & revenue escalation	2%
Average baseline fare	$650
Fuel price (US $ per usg)	$3.00

Characteristics	787-8 (new)	767-300ER (new)
OEW (kg)	119,975	93,576
MTOW (kg)	228,383	186,880
Engines	GEnx-1B67	CF6-80C2B7F
Thrust (lbs)	67,000	62,100
Seats	242 (24/218)	197 (20/177)
Gross cargo volume (m^3)	124.4	108.7
Fuel use (kg)	40,500	44,108
Block time (hrs)	9.1	9.5
Monthly lease rate	$1,000,000	$400,000

787-8 higher capacity generates additional passenger revenue

NPV of: Number of flights x trip length x passengers x yield



Drivers

Seat Count

Cabin Area

Interior Configuration

Passenger Preference

787-8 45 additional seats generate more revenue

20.2 additional passenger per trip

45 more seats

Using spill model

$9,636 more revenue per trip

$488 incremental fare

$5.8M more revenue per year

607 trips per year

$57M NPV advantage

12 years
2% annual escalation
2% commission
2% demand growth
10% discount rate

787-8 generates more cargo revenue

NPV of: Number of flights x trip length x tonnes x yield

Drivers

Structural limit

Volume limit

18% more volumetric space

1.0 tonne more
60% volumetric load factor

→

$2,374 more revenue per trip
Yield: $1.0/lb

→

$1.44M revenue per year
607 trips per year

$10.5M NPV advantage

12 years
2% inflation
2% commission
10% discount rate

787-8 higher efficiency translates in a fuel cost advantage

NPV of: Number of block-hours x fuel burn per block-hour x fuel price per gallon

Drivers

Aerodynamic efficiency

Engine technology

Airplane integration

Weight

Thrust

New optimized design

Superior technology

3.6 tonnes less fuel per trip

→

$3,560 lower cost per trip

$3.00/gal fuel price

→

$2.16M lower cost per year

607 trips per year

$16.1M NPV advantage

12 years
2% cost escalation
10% discount rate

787 maintenance overview

The 787 was designed for Low Maintenance

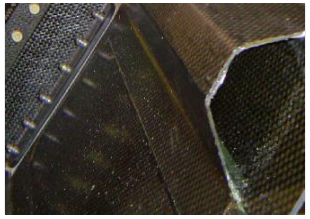
Less Scheduled Maintenance

Longer Check Intervals

- *Twice as long as the 767*

Composite Structure

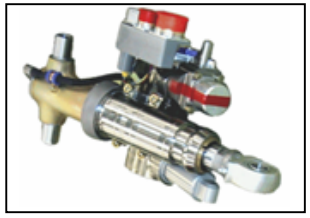
- *Resists fatigue*
- *Resists corrosion*
- *30% Fewer tasks*



Fewer Maintenance Tasks

- *Less inspections with composite structures*

Less Unscheduled Maintenance



More Reliable Systems

- *Designed for low life cycle costs*
- *No Pneumatic system*

More Durable Structure

- *Less accidental damage*
- *Easy to inspect*
- ***Quick repair techniques***

Health Monitoring

- *System monitoring*
- *Engine monitoring*

787-8 is designed for lower maintenance costs

NPV of: Cost per flight hour x number of flight hours x number of flights

Drivers

Materials

Systems

Weight

Thrust/Derate

Utilization

Environment

Age

Newer design
Composite fuselage
Fewer maintenance tasks
Higher thrust derate

$1,168 lower cost per trip
16% lower airframe maintenance

$708,976 lower cost per year
607 trips per year

$5.3M maintenance advantage

12 years
2% cost escalation
10% discount rate

787-8 advanced technology has fewer days out of service

Drivers

Check length, Check interval

Intervals	767	787
A-check, hours	750	1,000
C-check, months (elapsed time, days)	18 (7 days)	36 6,000 CYCLES (5 days)
D-check, years (elapsed time, days)	6 (20 days)	12 24,000 cycles (15 days)

6.5 Fewer Days out of service Per Year

$43,996 profit per trip

$479,233 more profit per year

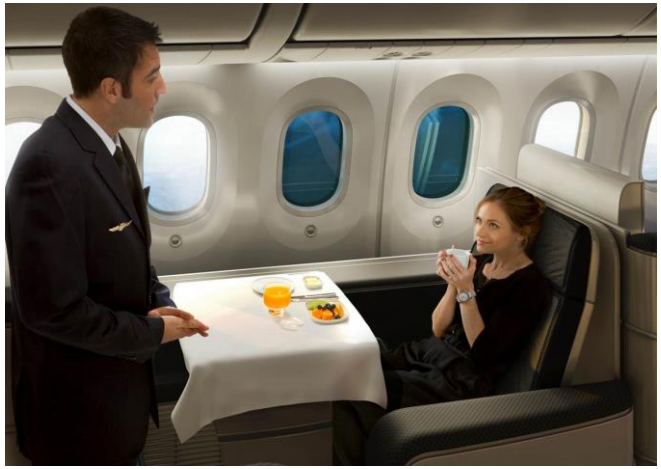
11 more trips per year

$3.6M maintenance advantage

12 years
2% cost escalation
10% discount rate

787-8 increased speed offsets increased crew

NPV of: (Flight crew + Cabin crew cost per flight) x number of flights



Drivers

Number of seats

Block time

Number of cabin attendants

$158 higher cost per trip
+ 1 additional cabin attendant
29 minutes less flight time

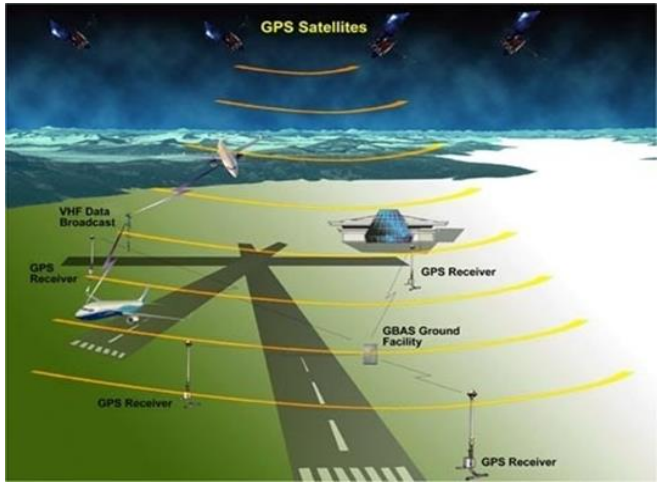
$95,906 higher cost per year
607 trips per year

$0.7M crew disadvantage

12 years
2% cost escalation
10% discount rate

787-8 higher MTOW brings higher fees

NPV of: (Landing fees + Navigation fees + Handling fees per flight) x number of flights



Drivers

MTOW

Number of passengers

Stage length

$1,522 higher cost per trip

45 more seats

Higher MTOW

$923,854 higher cost per year

607 trips per year

$4.8M NPV disadvantage

12 years
2% cost escalation
10% discount rate

787-8 passenger revenue advantage reduced by the cost of carrying them

NPV of: Cost per flight x number of flights

Drivers

More seats & passengers

Type of airport & on-board services

Business model

Stage length

$2,160 more cost per trip

45 more seats

20.2 more passengers

$1.31M more cost per year

607 trips per year

$11.2M NPV disadvantage

12 years
2% cost escalation
10% discount rate

787-8 cargo revenue advantage reduced by cost of carrying it

NPV of: Cost per flight x number of flights

Drivers

Cargo Capacity

Short / long haul

Type of handling costs

Airport costs

$128 more cost per trip

1.0 tonne more cargo

$77,960 more cost per year

607 trips per year

$0.6M cargo cost disadvantage

12 years
2% cost escalation
10% discount rate

787-8 advantage is reflected in higher lease rate

NPV of: Initial deposit and monthly lease payments

Drivers

Operator base

Ability to reconfigure

Residual value and asset risk

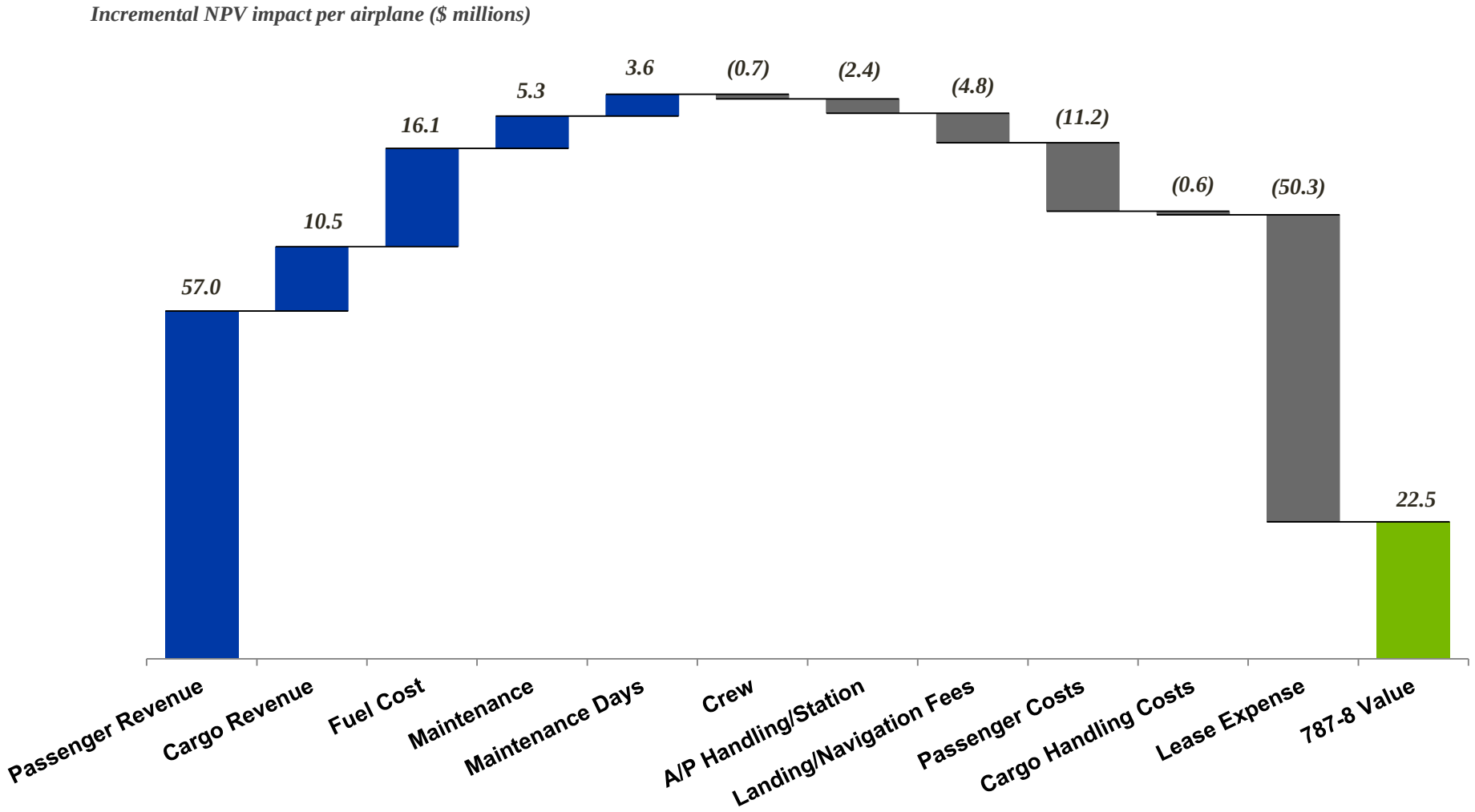
$600,000 higher monthly lease rate

$50.3M lease cost disadvantage

12 years
2% cost escalation
10% discount rate

787-8 value advantage is $22.5M including ownership

12 year NPV per aircraft value comparison: 787-8 vs. 767-300ER



Value analysis - example

Conclusion

Based on this analysis, investing in the 787-8 generates $22.5 million more value than the 767-300ER over 12 years

787-8 Net Present Value of all CF's ***$142.2M***

767-300ER Net Present Value of all CF's ***$119.7M***

Net 787-8 advantage $22.5M

Additional elements to consider

Delivery availability

Introductory costs

Disruption during airplane type rollover

Services offerings

Ancillary revenue

CO2 and noise charges

Range

Passenger preference

Group exercise

As a group rank the top five most critical assumptions

- **List them in order of importance**

Assign a spokesperson

Report out to group

Five minutes

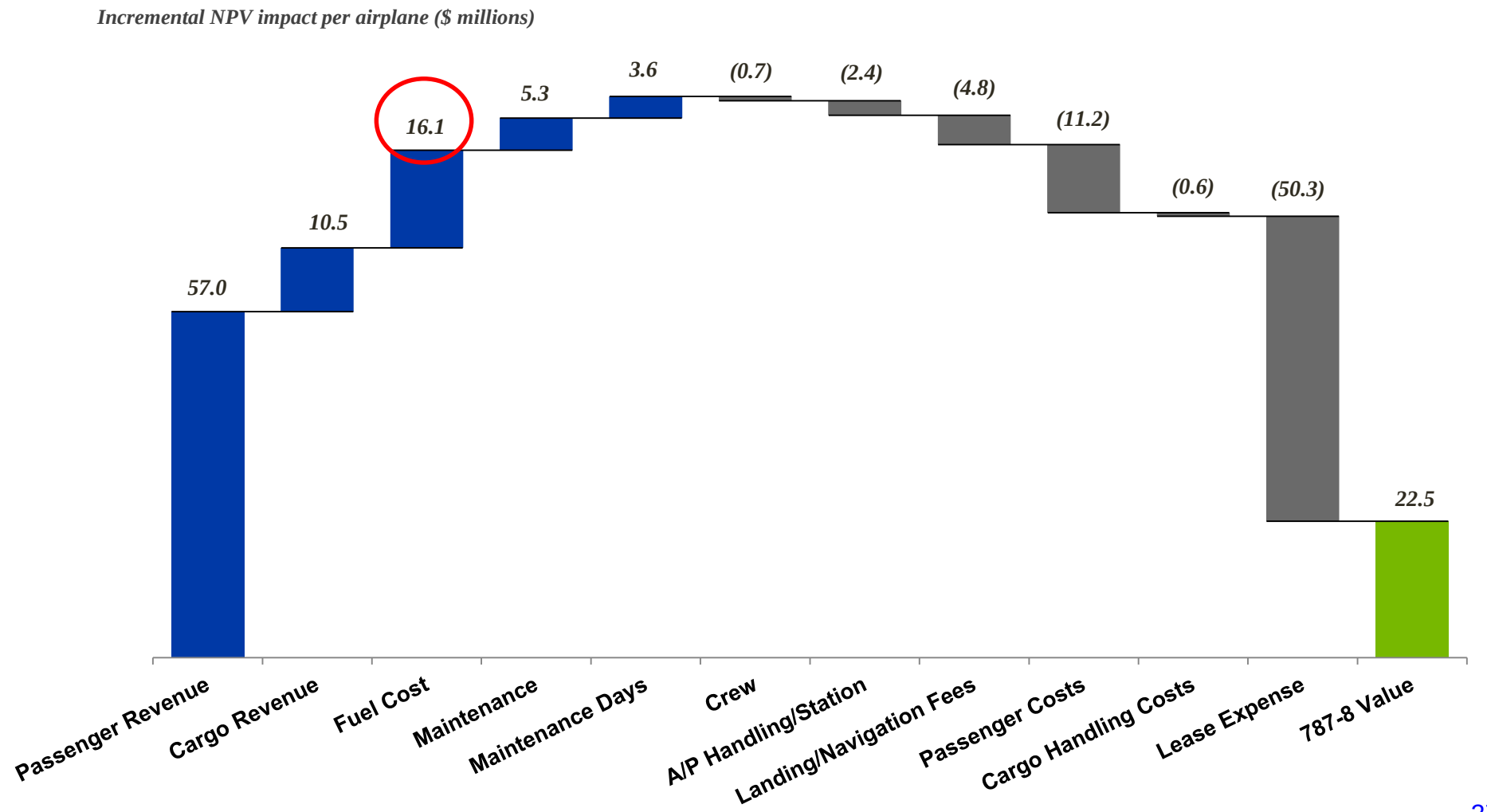
Sensitivity analysis

It is important to look at the NPV calculations and determine the critical variables and assumptions that will determine the project's success or failure…..

- **Passenger and cargo yields**
- **Load factors and demand**
- **Discount rate**
- **Fuel price**
- **Unit costs**

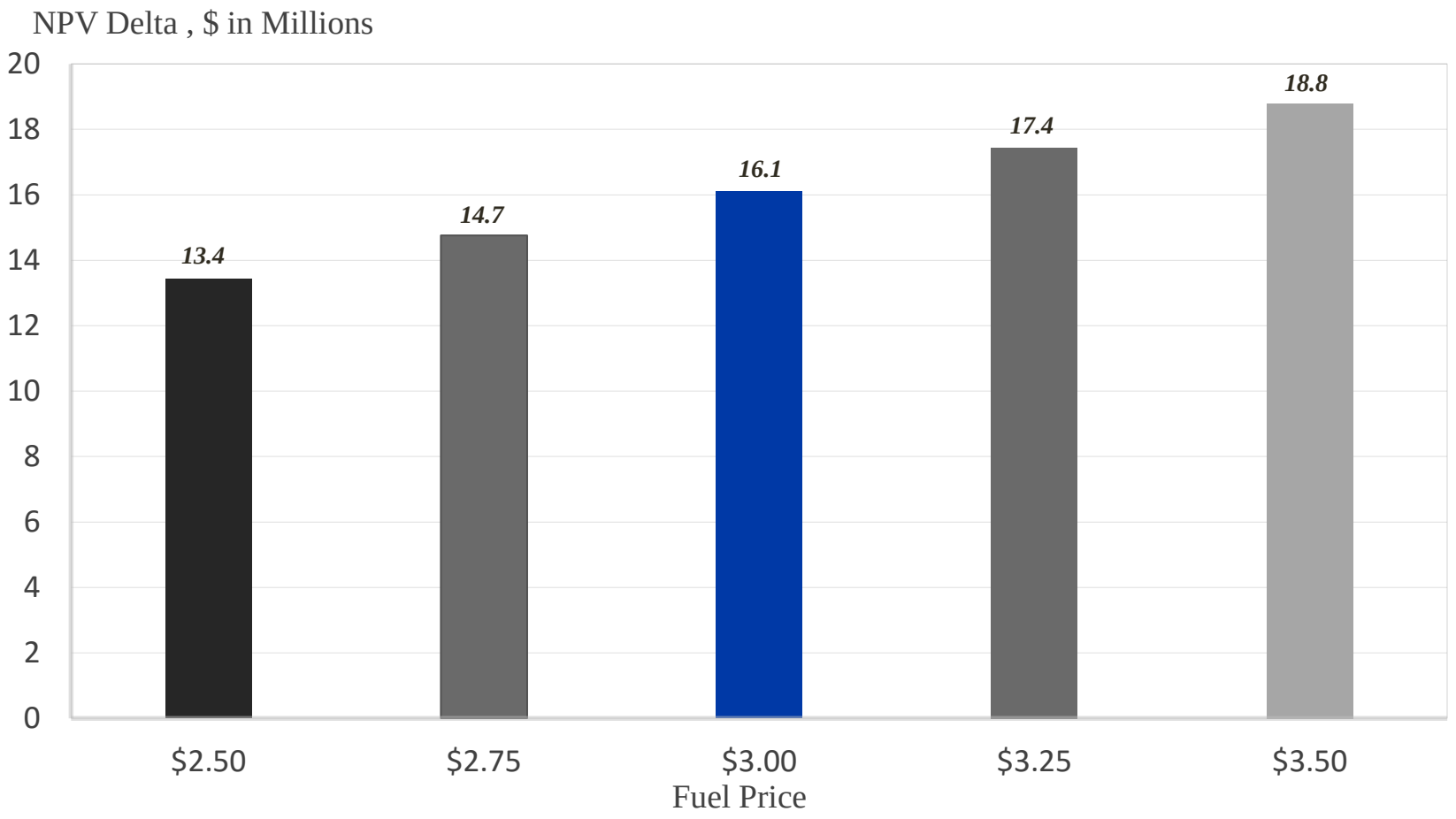
The 787-8 fuel advantage is worth US $16M more than the 767-300ER?

What is the likelihood of that happening?



787-8 vs. 767-300ER fuel price sensitivity

How does fuel price affect your decision?



Key takeaways

Assumptions matter!

Calculating the net present value of yearly cash flows is critical to making the right capital decision

Sensitivity analysis enables you to quantify the variability of assumptions

MonteCristoAir case study connection

1. Your team can use these tools to quantify the value of various aircraft choices

2. Your assumptions on revenue and cost elements will drive investment decisions

3. You can perform sensitivity analysis on load factors, fuel price, cargo, and more