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**ISHKA LIVE WEBINAR**

**Taking Flight into a New Aviation Cycle  
Evolving Opportunities and Enduring Risks**

Thursday 28<sup>th</sup> September 2023

# Presenters



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ISHKA



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Analysis  
ISHKA

# Agenda

## **Macro & Airline Market**

Signals and indicators from airline traffic and financial results.  
Regional performance. Upsides and positives are interwoven with headwinds and risks.

## **The Metal – Special Focus**

We lift the bonnet on the P&W GTF engine issue and consider its repercussions

## **The Money**

The Ishka Values Indicators: aircraft values and lease rate performance 2023 to date.  
New build pricing v secondary market developments.  
Where to next...

**Live Q&A:** put your questions to the team

# Market Talking Points: Push and Pull in a fragmenting Aviation Market



## Regional and Sectoral Differences

- Still not back to 2019 traffic/demand for some regions/sectors
- Its 2024 already for others
- GDP creates traffic growth
- New build rates still hampered
- Secondary market is the beneficiary

## Costs are up, up and away

- Interest Rates
- Fuel
- Staff
- Geopolitics created more cost disruptions
- Supply chain and Engine issues
- Cargo market softened Q1-Q3...

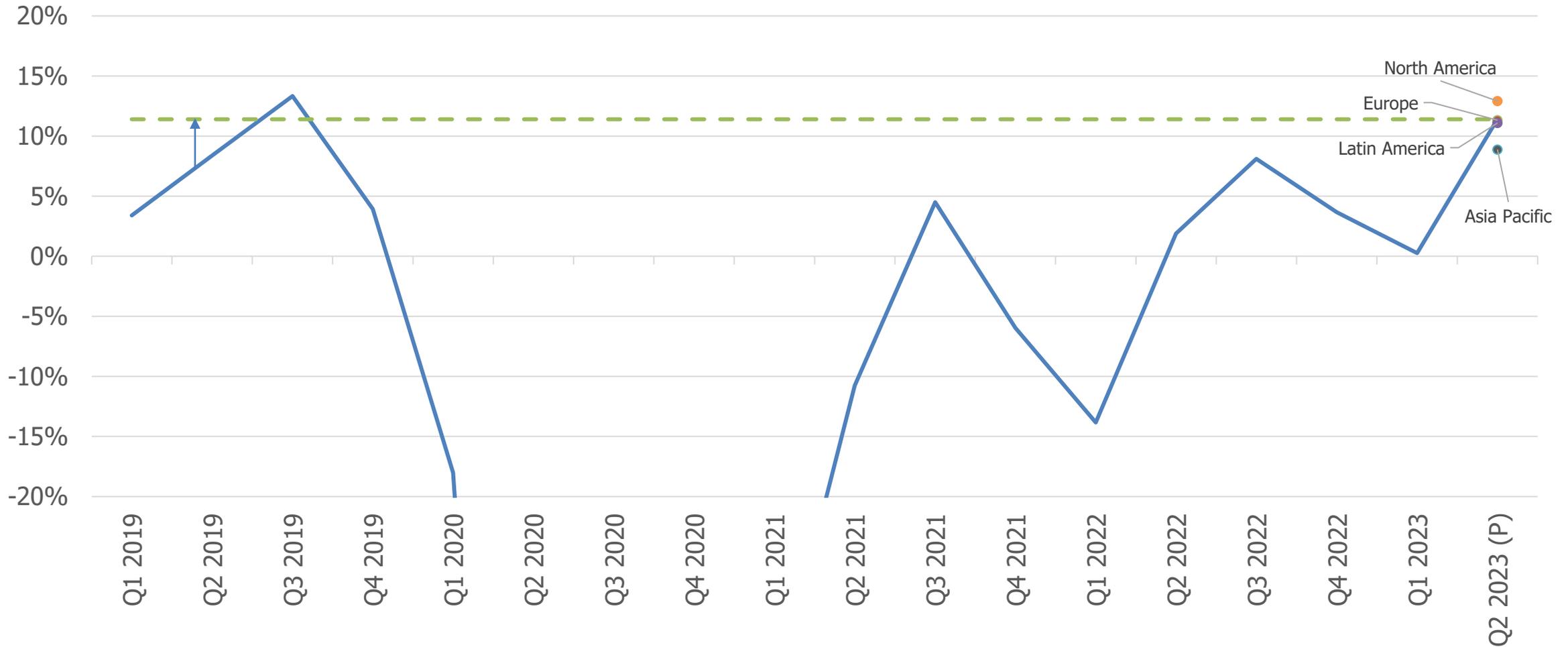


Sid Narkhede  
Head of Airline Analysis  
The Airline Market

# Operating profits exceed pre-pandemic levels in Q2 2023

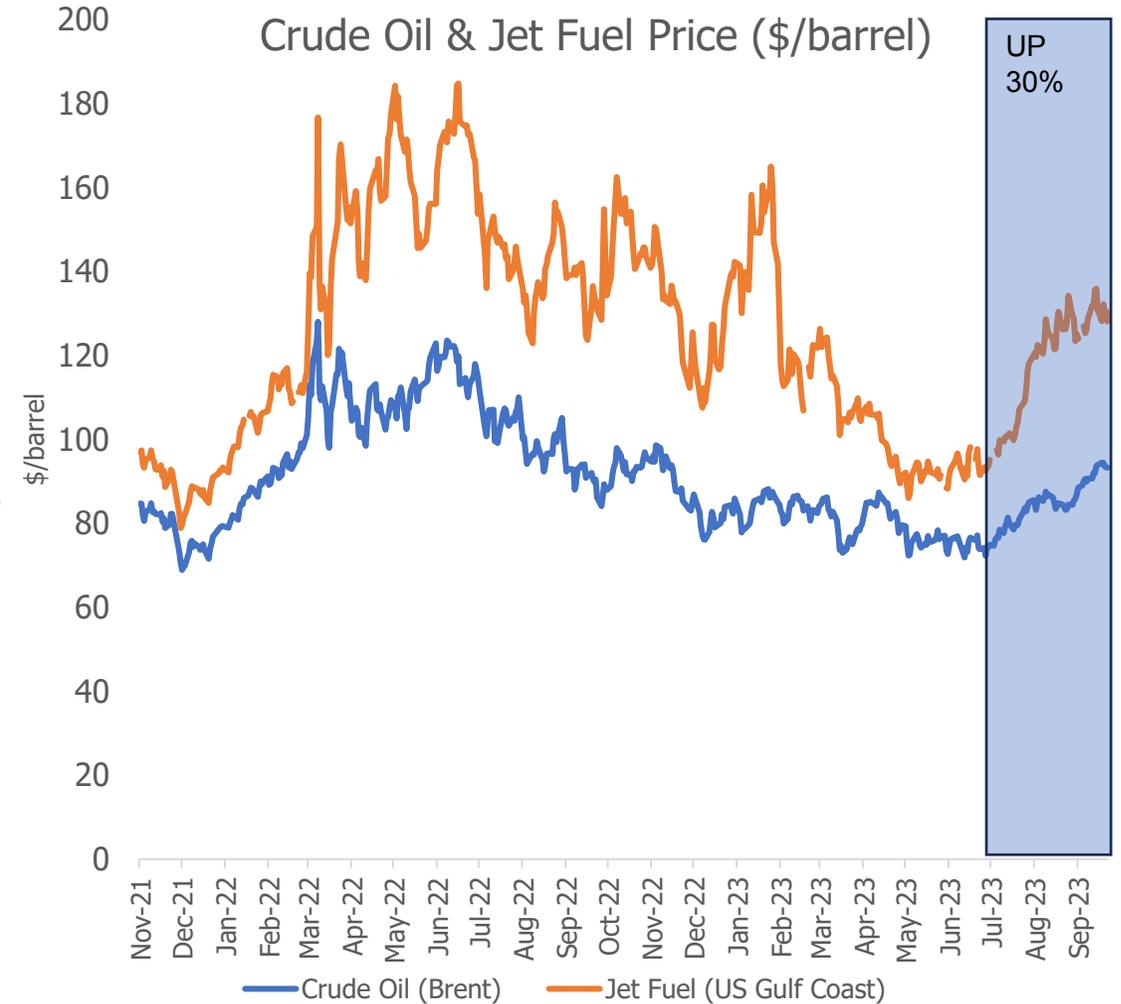
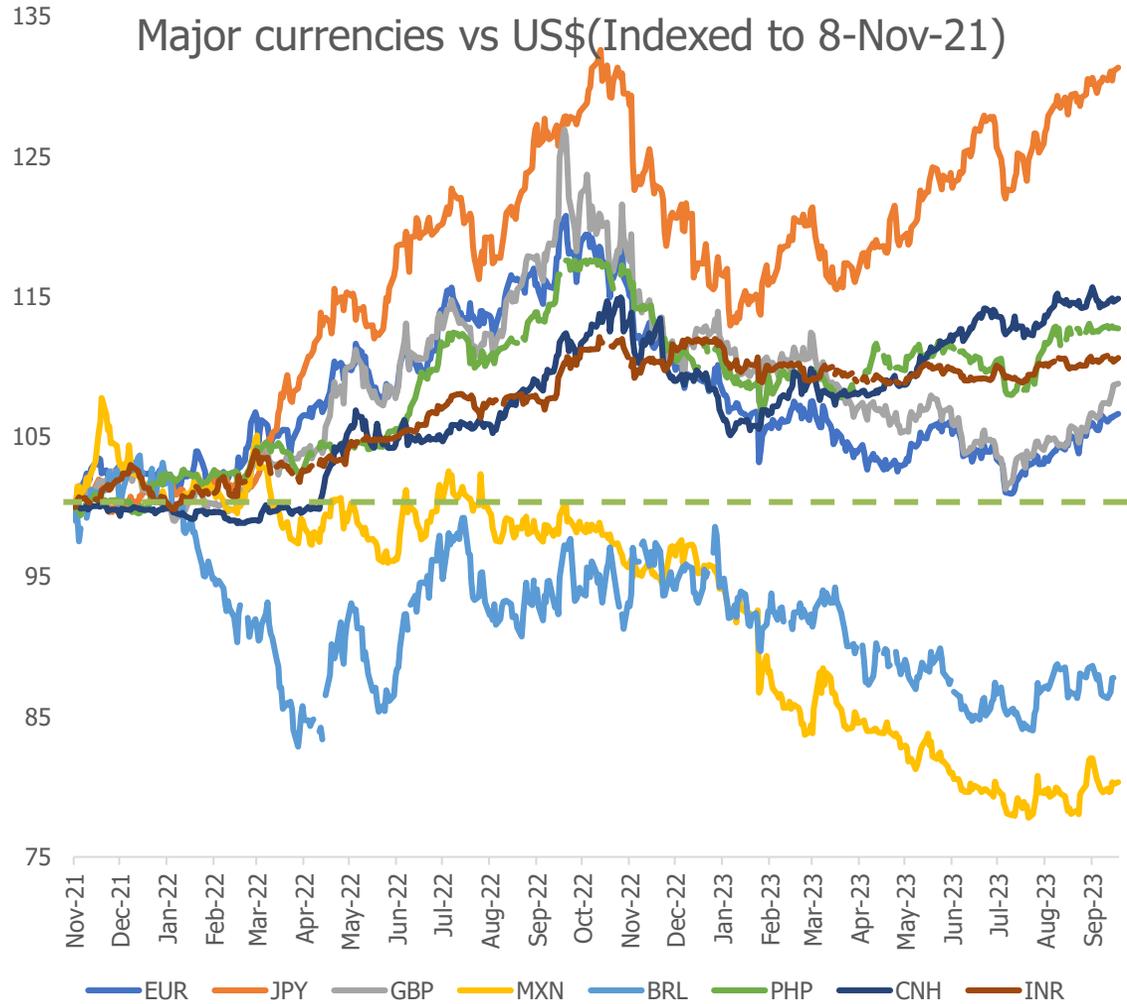


## EBIT as a percentage of revenues



Source: Bloomberg, Airline Credit Profiles and Ishka Calculations. Sample Size – 68 airlines. Sample size could vary by quarter marginally depending on airline disclosures.

But the two key drivers of strong performance are now reversing...



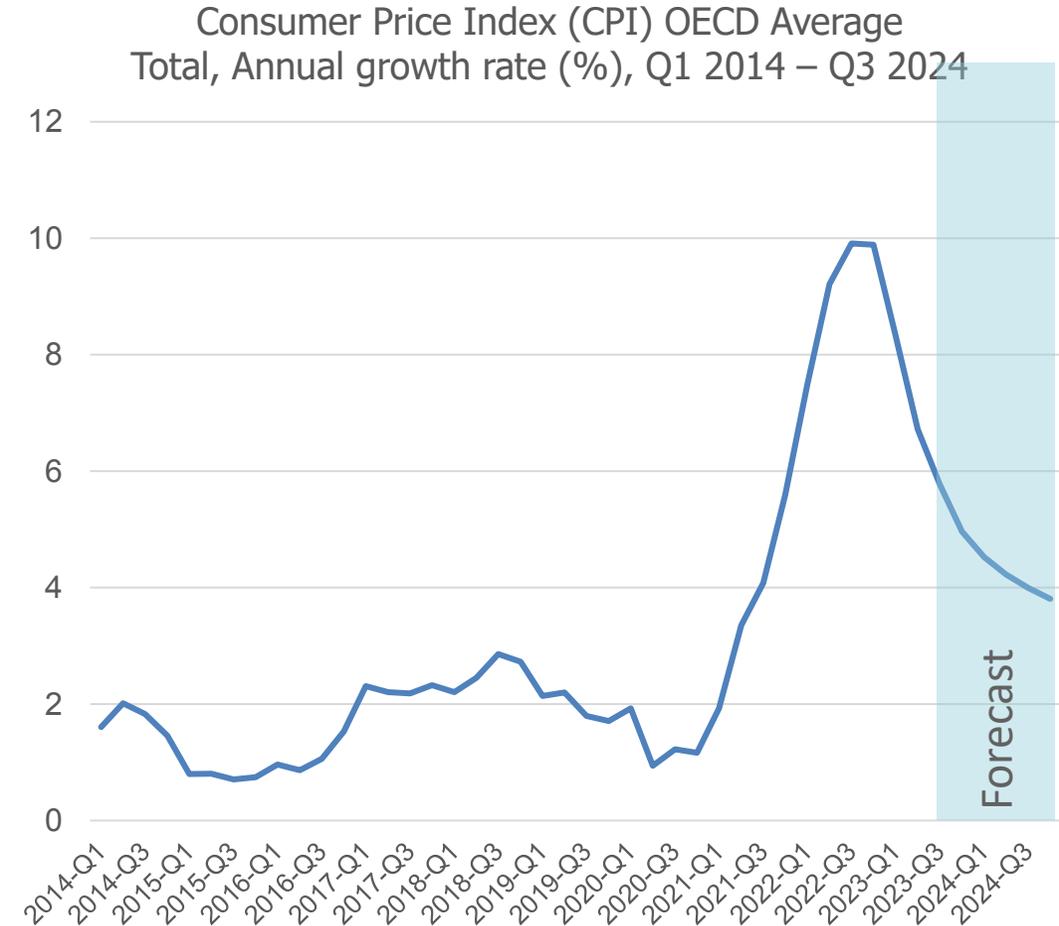
Source: Bloomberg

# Demand & Airfares



**What to make of recent downward revisions and profit warnings by some airlines?**

**Any implications on wider market at this stage?**



Source: OECD

# Key Takeaways



**Positive H1 2023 for most airlines**

**Balance sheets continue to improve**

**Airlines continue to report healthy booking trends for near-term**

**But uncertainties and downside risks remain**

**Macroeconomic and geopolitical concerns**

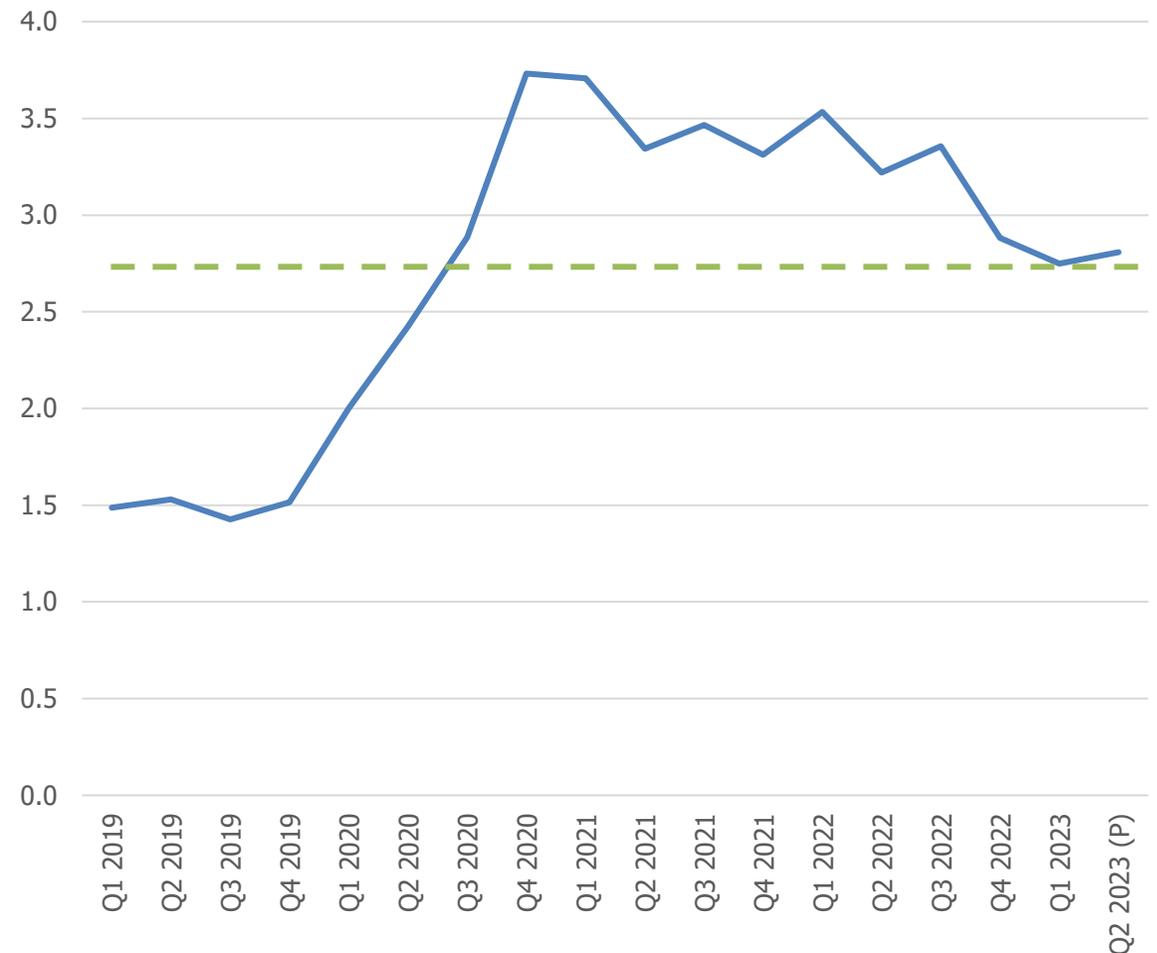
**Cost pressures rising**

**How elastic is demand for air travel?**

**Leverage remains elevated**

**Other challenges – labour shortages, engine issues**

Net Debt to Equity



Source: Bloomberg, Ishka Airline Credit Profiles and Ishka Calculations. Sample size – 68 airlines. Sample size could vary by quarter marginally depending on airline disclosures.



Stuart Flaye  
Senior Consultant

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## **Pratt & Whitney PW1100G-JM engine update**

(in relation to HPT 1st and 2nd Stage Hubs)

# Timeline of Events



Date	Event
18th March 2020	An A321-200 (with V2533-A5 engines) experienced an uncontained HPT 1st-stage disk failure that resulted in high-energy debris penetrating the engine cowling
21 <sup>st</sup> March 2020	US FAA issue an Emergency AD (AD 2020-07-51) based on a preliminary analysis of the event
13 <sup>th</sup> April 2020	Final rule published requiring the removal from service of certain HPT 1 <sup>st</sup> stage disks installed on all IAE V2500-A5 models of engine. A manufacturer investigation found that the failure of the HPT 1 <sup>st</sup> stage disk was a result of a material anomaly attributed to deficiencies in the manufacturing process.
June 2021	P&W expanded its root cause analysis to include a review of records for all other IAE and PW engines that contained parts of similar material
10 <sup>th</sup> September 2021	FAA issue a further AD (AD 2021-19-10), as P&W identified a different population of HPT 1st-and 2 <sup>nd</sup> stage disks that are subject to the same unsafe condition identified in AD 2020-07-51. This required the removal from service of certain HPT 1 <sup>st</sup> and 2 <sup>nd</sup> stage disks installed on PW11xxG-JM variants of engine.
13 <sup>th</sup> September 2021	P&W issue original Service Bulletin, to do an angled ultrasonic inspection of HPT 1 <sup>st</sup> and 2 <sup>nd</sup> stage hubs for an anomaly
8 <sup>th</sup> July 2022	P&W issue revision of above SB
3 <sup>rd</sup> October 2022	FAA issue AD 2022-19-15 (corrected 24 <sup>th</sup> Oct) which required performing a USI of the HPT 1st-stage disk and HPT 2 <sup>nd</sup> stage disk and, depending on the results of the inspections, replacement of the HPT 1 <sup>st</sup> stage disk or HPT 2nd-stage disk installed on PW11xxG-JM variants of engine. This was due to P&W identifying another sub-population of HPT 1 <sup>st</sup> and 2 <sup>nd</sup> stage disks that, because of their susceptibility to the same material anomaly, require inspection and possible removal from service.

# Timeline (cont.)



Date	Event
24th December 2022	An A320neo with PW1127GA-JM engines experienced an HPC Integrally Bladed Rotor IBR-7 failure that resulted in engine shutdown and aborted take-off. Following this event, the manufacturer conducted a records review of production and field-returned parts, and re-evaluated their engineering analysis methodology. The new analysis identified HPT 1st and 2nd Stage hubs that were susceptible to failure much earlier than previously determined.
25th July 2023	RTX announce accelerated removal of PW1100G-JM engines for inspections within the next nine to twelve months, including approximately 200 accelerated removals by mid-September 2023.
4th August 2023	P&W issued service information (Special Instruction (No. 149F-23) (SI) instructing operators to conduct a USI to detect cracks and prevent premature failure. The new service information necessitated action much earlier than the timing mandated in AD 2022-19-15. The manufacturer's updated analysis also identified PW1400G series engines that contain HPT 1st stage hubs and HPT 2nd stage hubs that are also subject to this vulnerability and therefore need immediate inspection.
22nd August 2023	FAA issue updated analysis following 24th Dec. event. This AD requires performing an ultrasonic inspection (USI) of the HPT 1st stage hub and HPT 2nd stage hub for cracks and, depending on the results of the inspections, replacing these parts.
11th September 2023	RTX provide update on GTF fleet, providing details of a fleet management plan
15th September 2023	Removal from service (if 'on-wing') of an initial batch of PW1100G engines and to carry out an angle ultrasonic scan inspection (AUSI) to determine serviceability as prescribed in the SI.

# Affected Parts



Currently affecting: PW1100G (A320neo family)

PW1400G

V2500 series

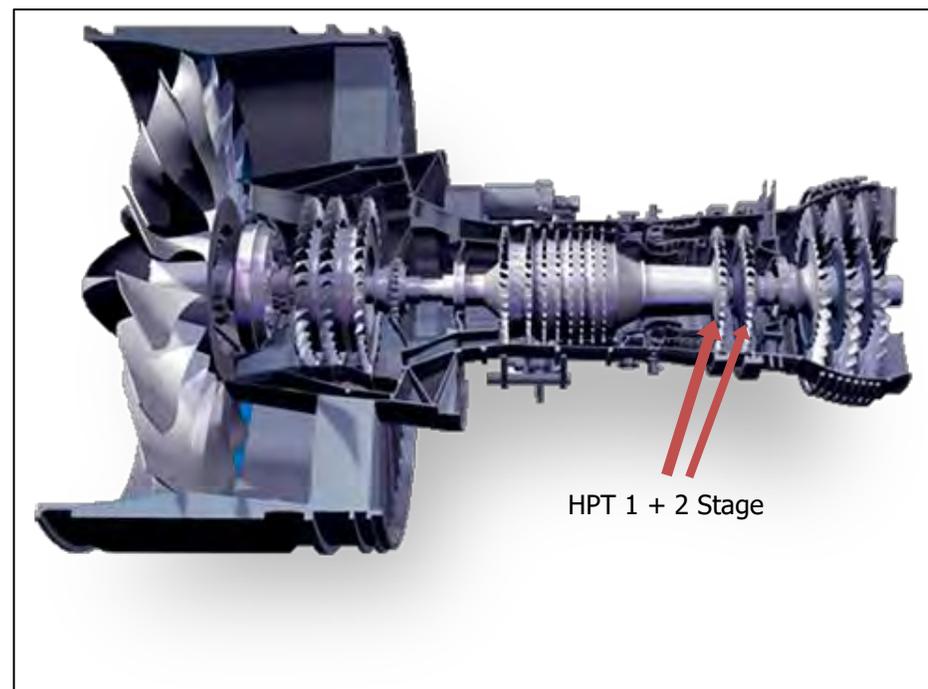
Other models PW1500 (A220) and PW1900 (Embraer E2) currently being analysed, but P&W indicate other engine models are expected to be far less impacted.

For disks manufactured between circa. Q4 2015 and Q3 2021

HPT 1 <sup>st</sup> Stage Hub P/N	HPT 2 <sup>nd</sup> Stage Hub P/N
30G4201	30G3902
30G6201	30G5502
30G7301	30G6602

Originally, 1,200 engines. Precise number unclear

15<sup>th</sup> Sept. directive covered ~200 engines – either on/off wing, plus 185 parts not assigned to an ESN



Engine S/N P772648 and up are compliant with the SB at time of production

# What's happening?



- P&W has created a fleet management plan to deal with this issue, through the means of an SB (or multiple) which is due to be published within the next ~45 days
- Approximately 600 to 700 'incremental' engines will be removed for shop visits between 2023 and 2026 beyond P&W's shop visit forecast entering 2023
- Roughly two-thirds of these incremental engine removals required by the fleet management plan will occur between now and early 2024
- Repetitive inspection protocol for the HPT and HPC disks set at between approximately 2,800 and 3,800 cycles, dependent on the engine thrust rating.
- The parts under investigation have a reduced life limit of between approximately 5,000 and 7,000 cycles (both HPT disks and HPC disks)
- P&W is expanding maintenance capacity, increasing part output and taking other action to mitigate impact to the GTF fleet. In 2Q 2023, P&W had 12 shops globally that could handle GTF work, and had plans to add seven more by 2025
- The accelerated removals and incremental shop visits will result in a higher AOG situation

# Airline Impact



Could have repercussions on ~45 airlines

Biggest operators: IndiGo / Wizz Air / Spirit Airlines / Air China / (Go Air) / Sichuan Airlines / Volaris / Lufthansa

Airline	Remarks
Wizz Air	49 affected aircraft engines would be inspected throughout the remainder of 2023 and into 2024, likely causing the grounding of some of its aircraft. initial estimates indicating a potential capacity reduction of 10% for 2H FY24
Air New Zealand	Expected the inspections to significantly impact its schedules from early 2024
Singapore Airlines Group	At least four of its aircraft are impacted, potentially resulting in some future scheduling changes.
Lufthansa	Expects on average, around twenty A320neo family aircraft will be grounded on any day in 2024. Looking into several mitigating measures, such as extending operations of existing A320 family aircraft, wet leases and sourcing additional spare engines. Projects it will need to wet-lease an additional 40-50 aircraft next summer.
IndiGo	Has a lot of GTF engines out of service already. Near-term there is little impact. Eleven out of fifteen engines requiring removal by 15 <sup>th</sup> September where already off-wing.
Hawaiian	Making adjustments to schedule. A key daily flight service had already been suspended in August, and more routes will experience interruptions, with the impact possibly lasting through next year
Spirit	Has 13 affected engines. Will have to ground seven aircraft in September through the end of the year.

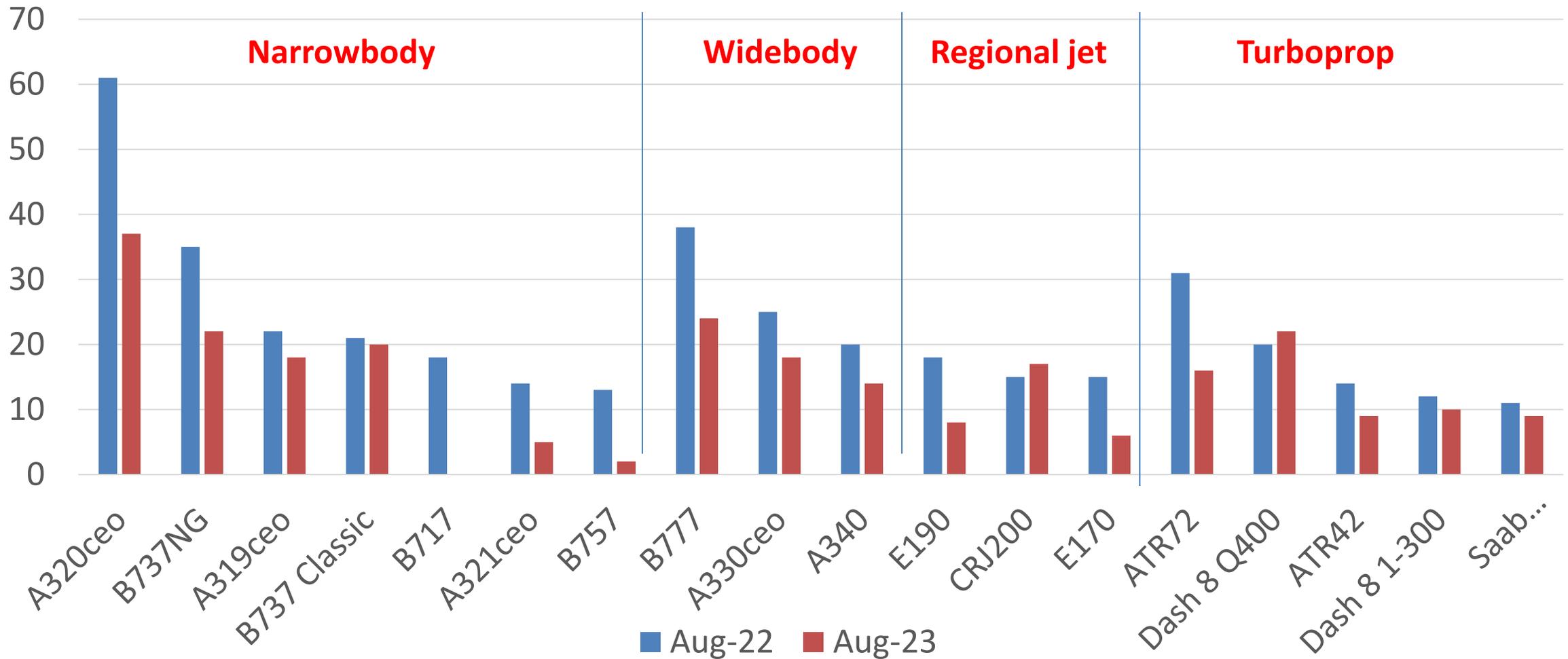


Paul O'Driscoll  
Head of Ishka Advisory  
Americas  
Certified ISTAT Appraiser

# Demand is soaking up 'serviceable' used inventory



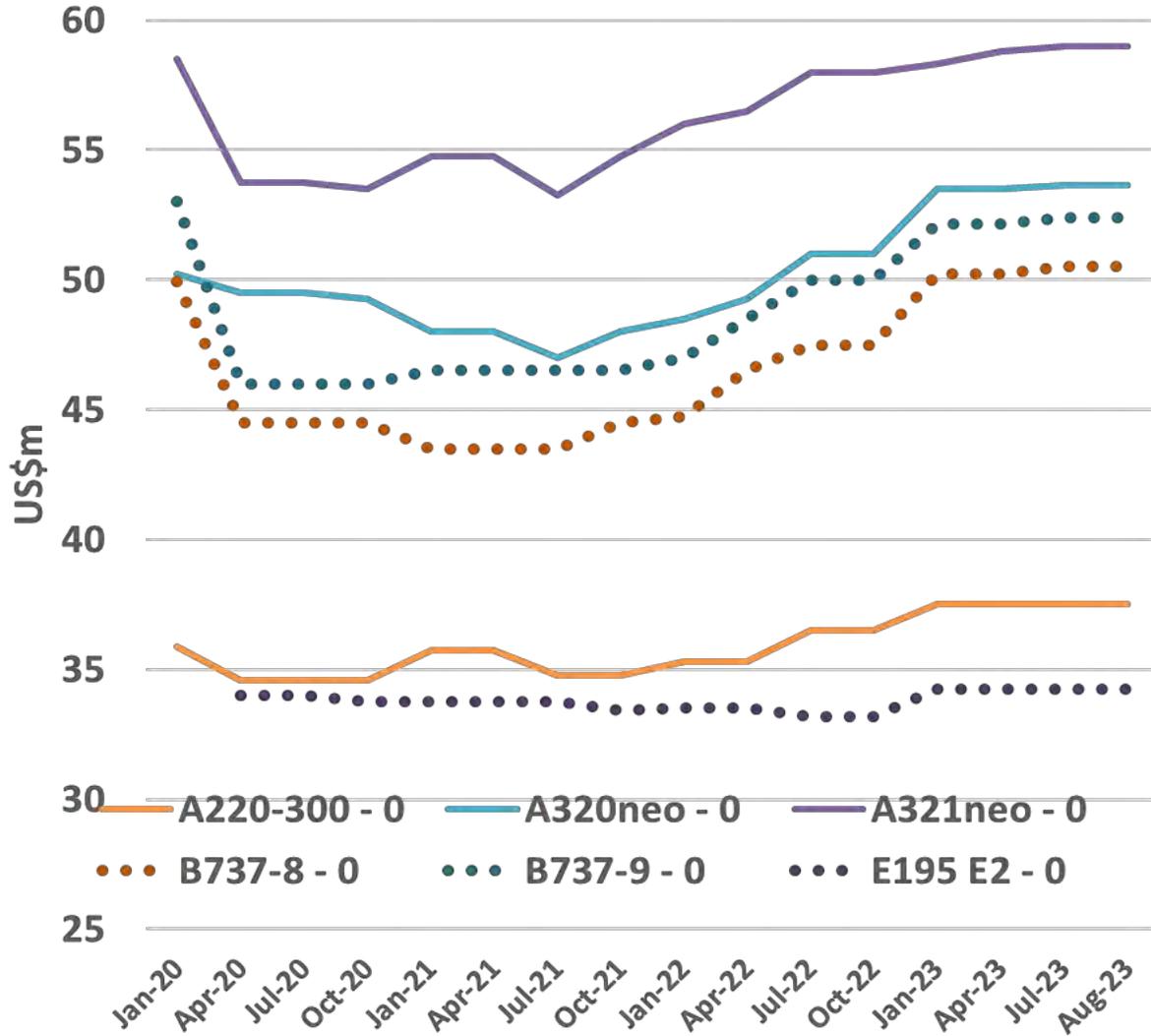
No. of Aircraft Actively Remarketed



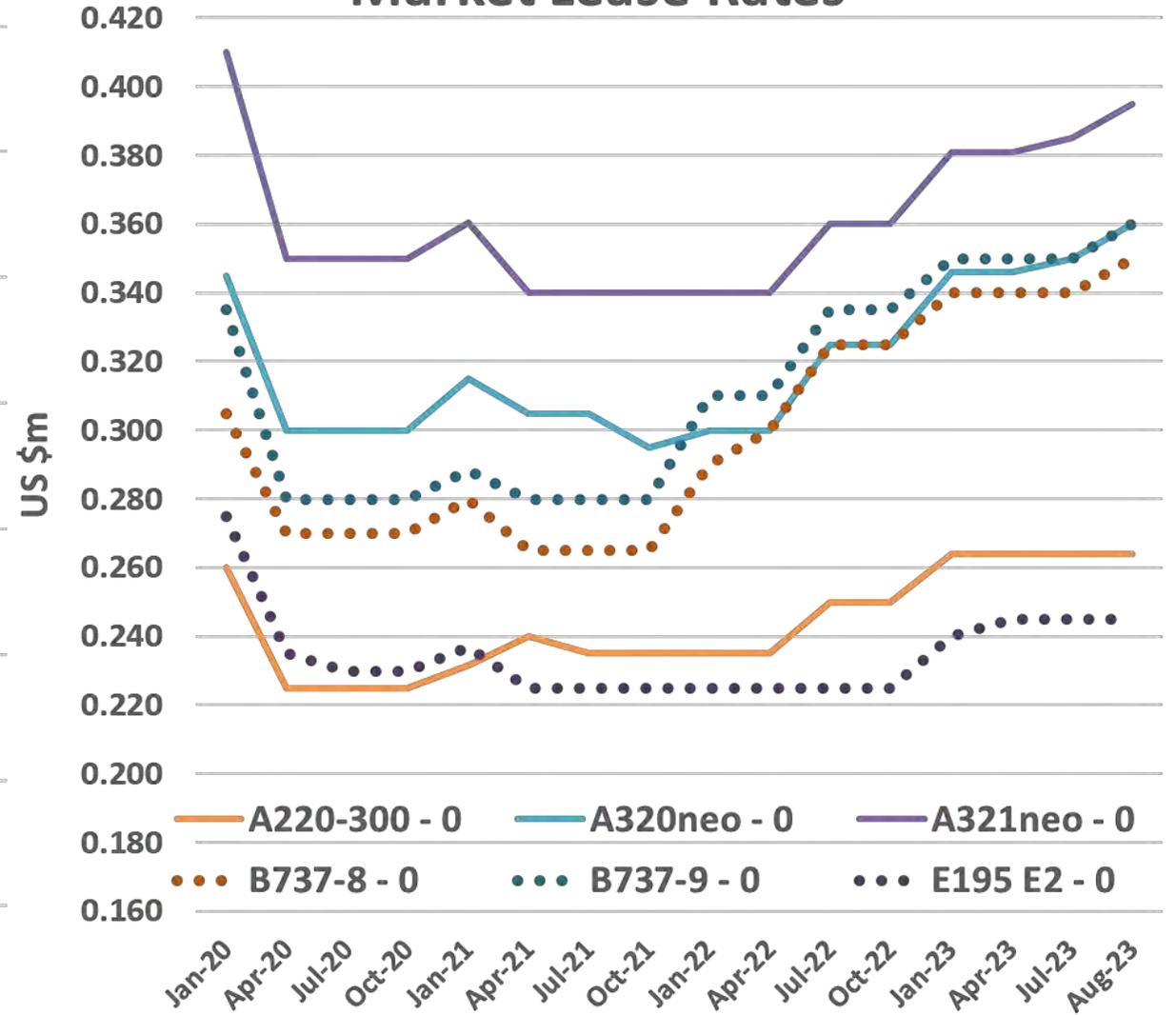
# New Builds benefit from production disruption



## Market Values



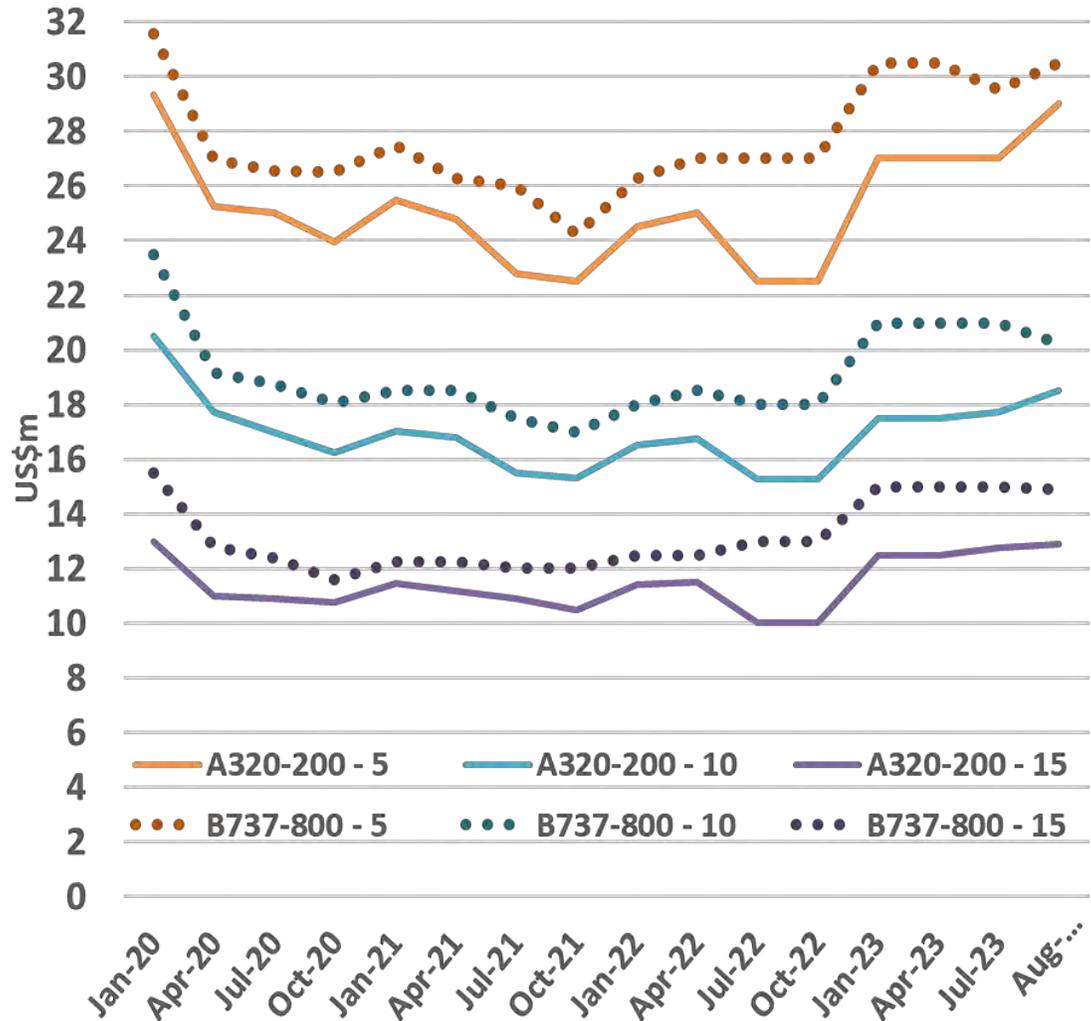
## Market Lease Rates



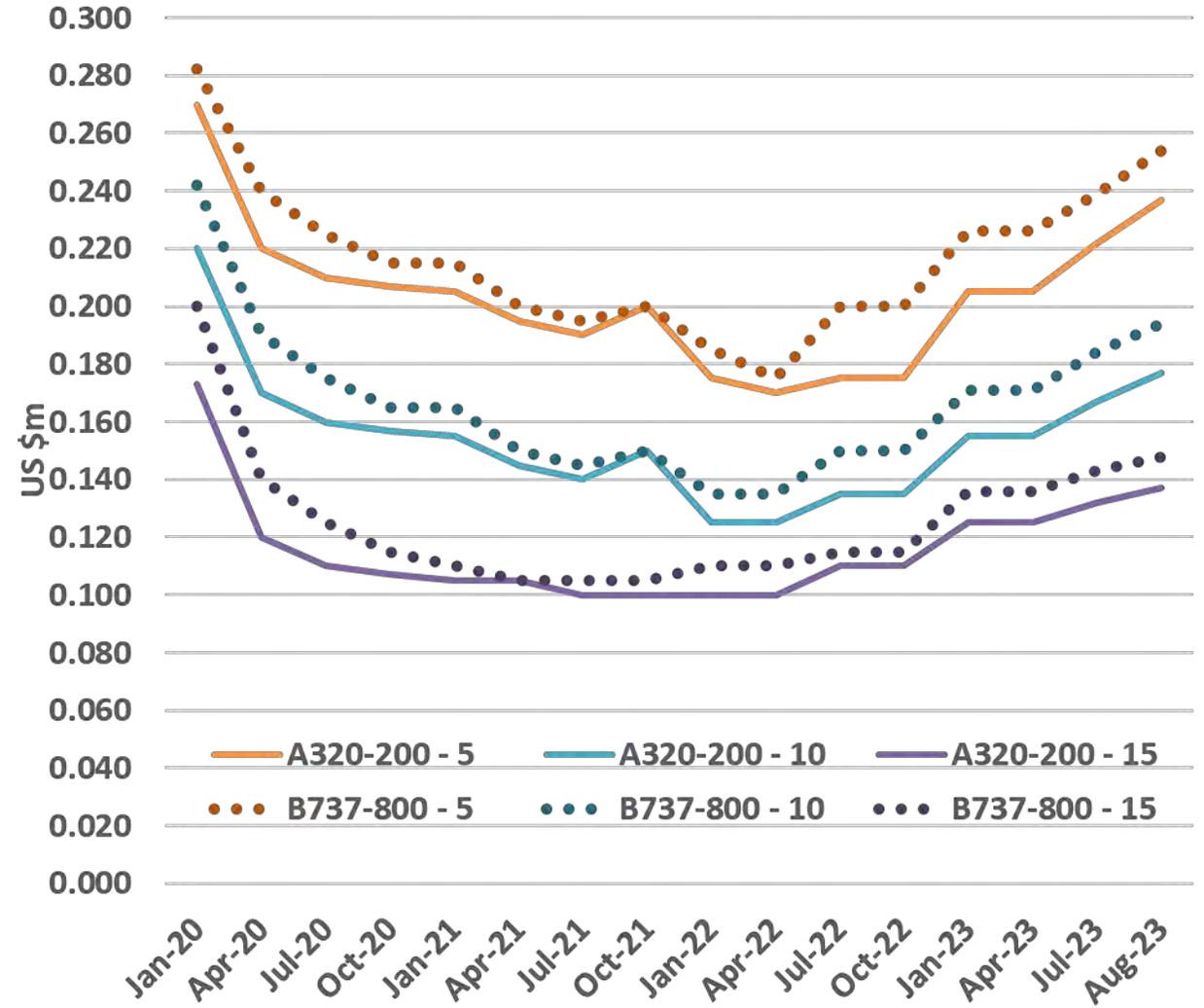
# Narrowbody Values and Lease Rates Recovery



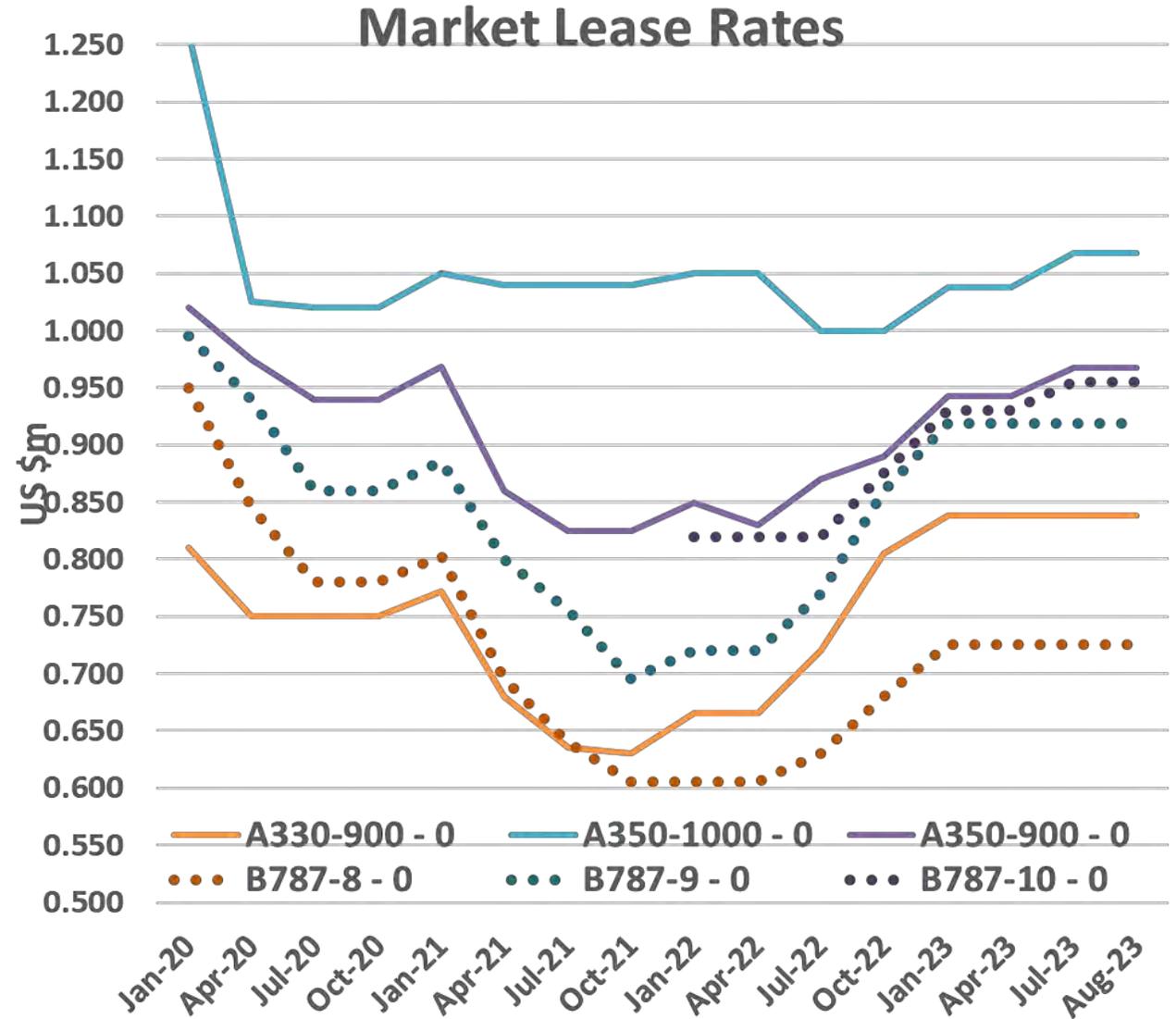
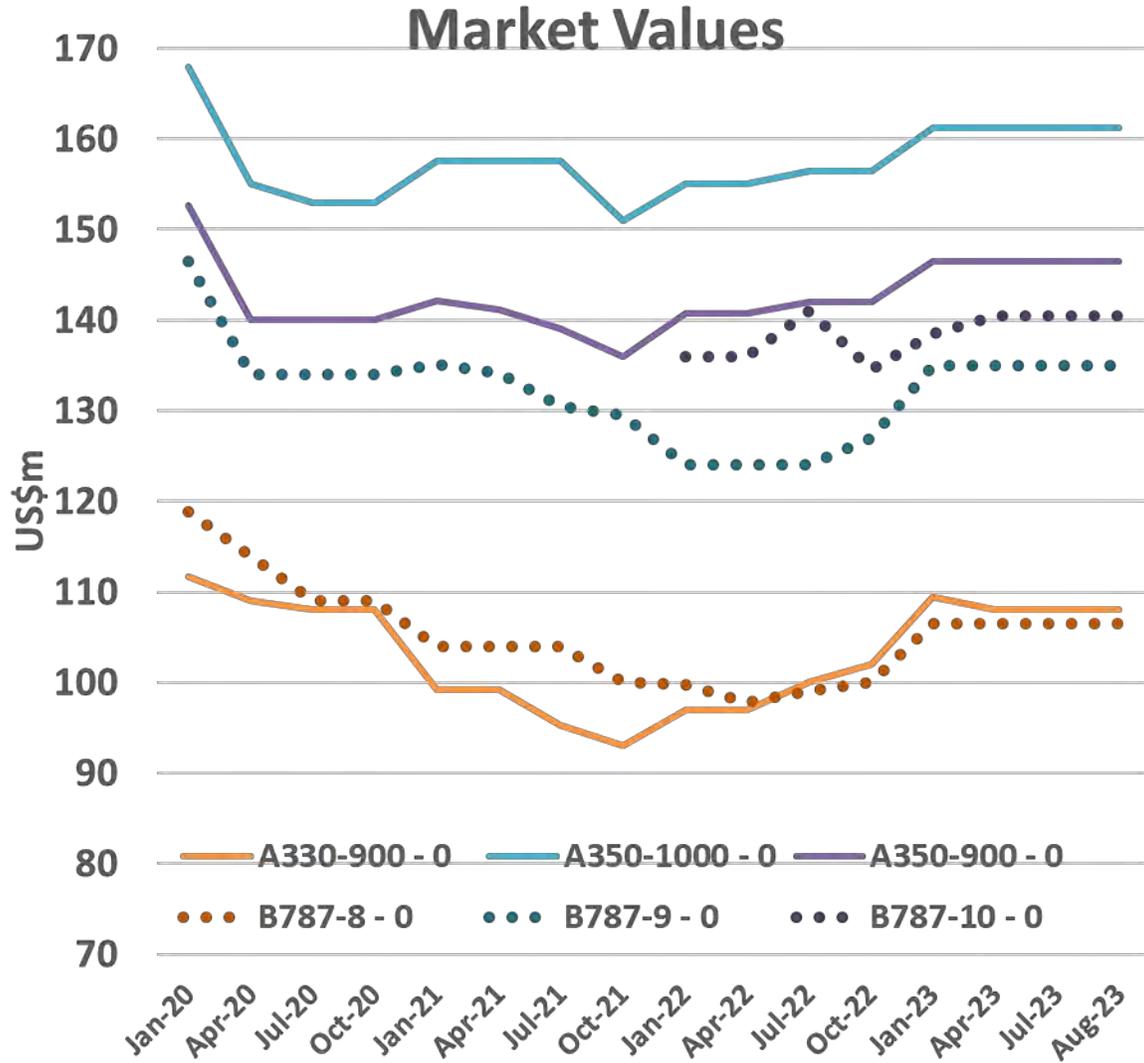
## Market Values



## Market Lease Rates



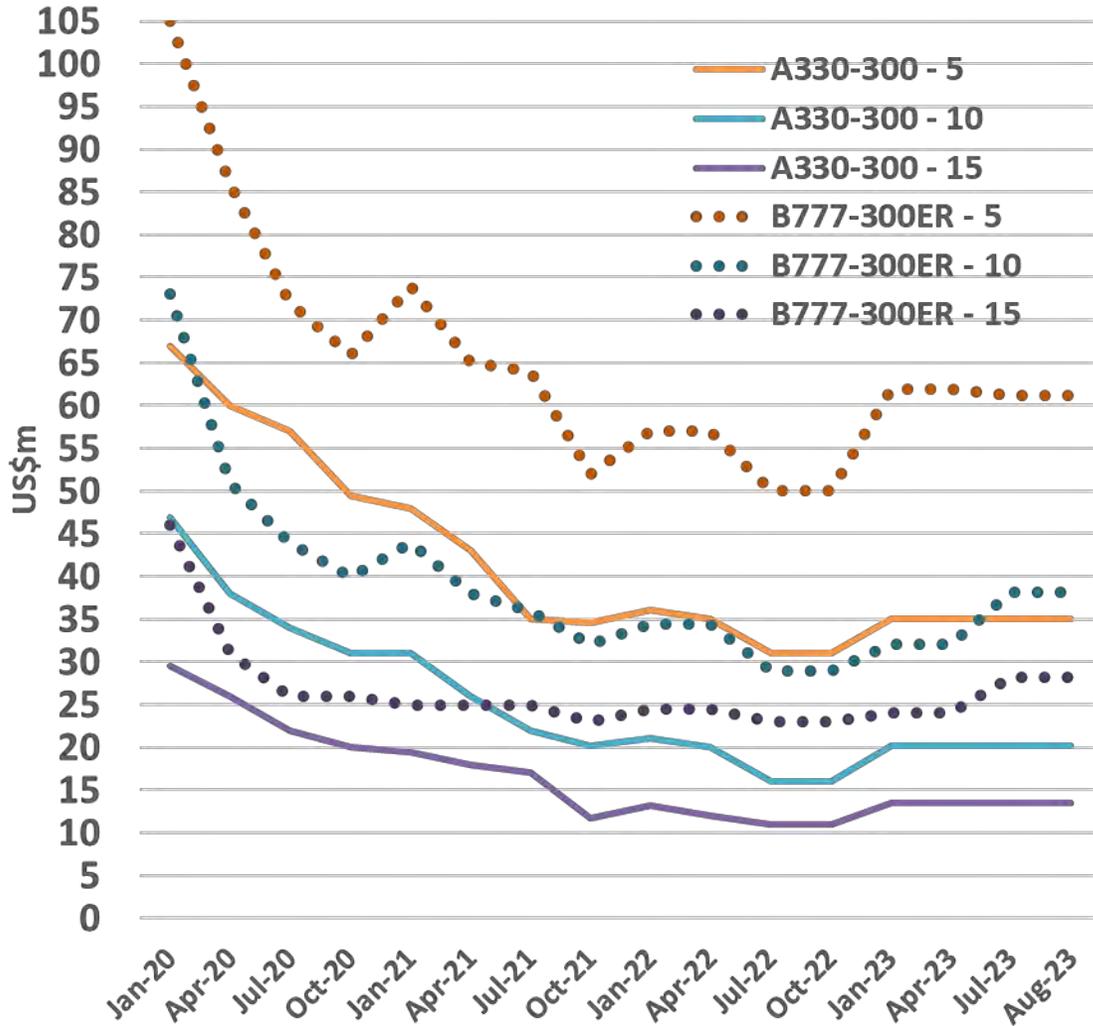
# New Build Widebody – recovery ongoing



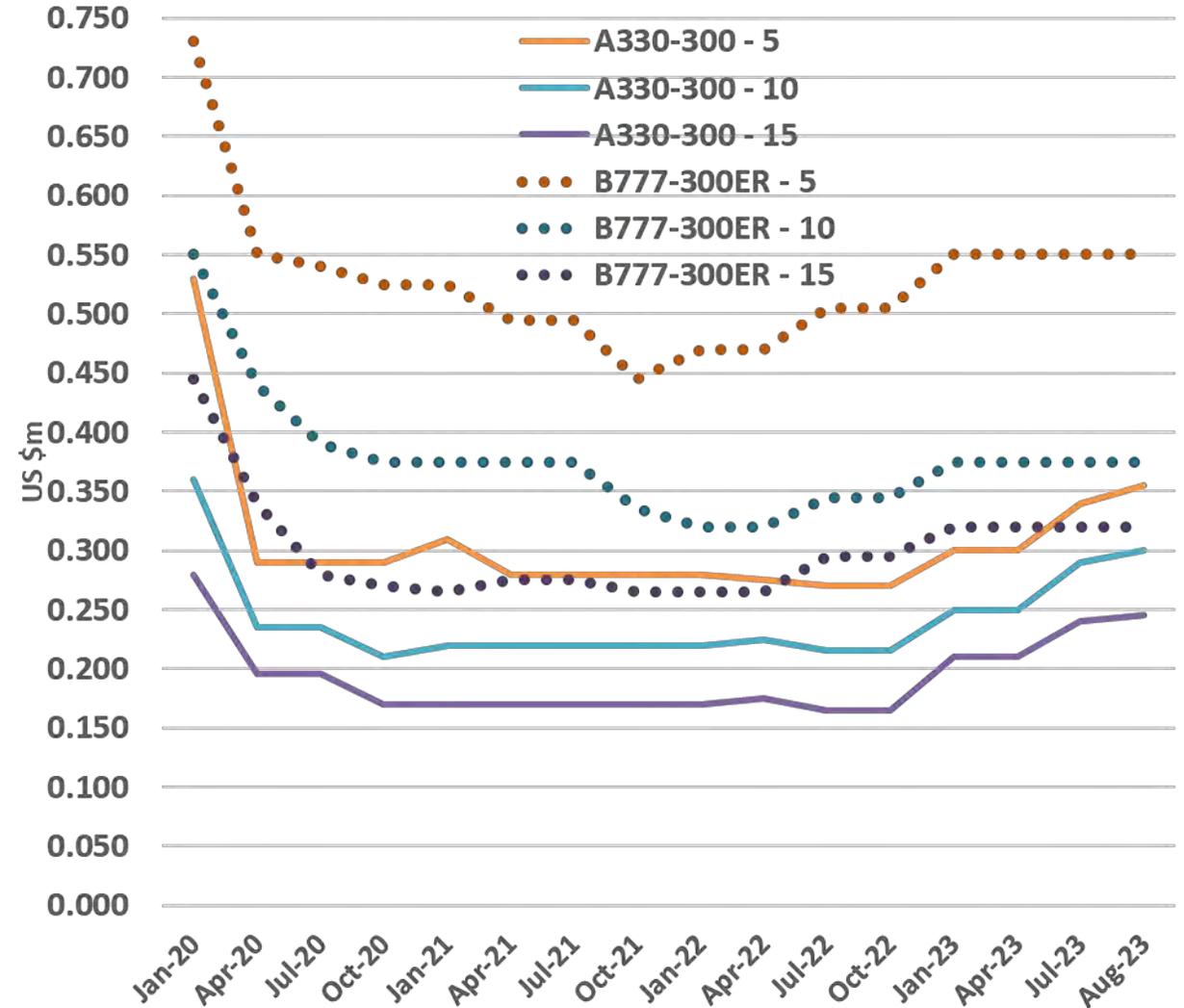
# Widebody Recovery lagging but improving



## Market Values



## Market Lease Rates



# The Future is Fragmented



Macro-  
economic  
uncoupling

- Regions will have diverging macro-economic paths
  - US Pilots cost up → need larger gauge aircraft now
  - Europe → carbon tax coming, need fuel efficient aircraft now
  - China is Japanifying: US near-shoring, demographic doom
  - India growing, demographic boom – but what's the right aircraft?
  - Latin America's "Goldilocks Moment" – will it last?

Aircraft/operator  
fit will be all  
important

- Higher finance costs, ESG and new engine durability issues will de-homogenize the business case for new tech aircraft
- Flying the aircraft type and vintage best aligned with the operator business plan and capabilities will be crucial

# The Future is Fragmented



## Pre-COVID World

- Money is cheap
- Credit risk is compressed
- Engines are reliable
- Engine Mx clearly understood
- New tech aircraft is always the operator's preferred aircraft option



## Post-COVID World

- Money is expensive
- Credit risk spreads widen
- Operating environment matters for engines
- How much is Engine Mx cost really?
- Optimal aircraft type depends on the operators financial and environmental conditions

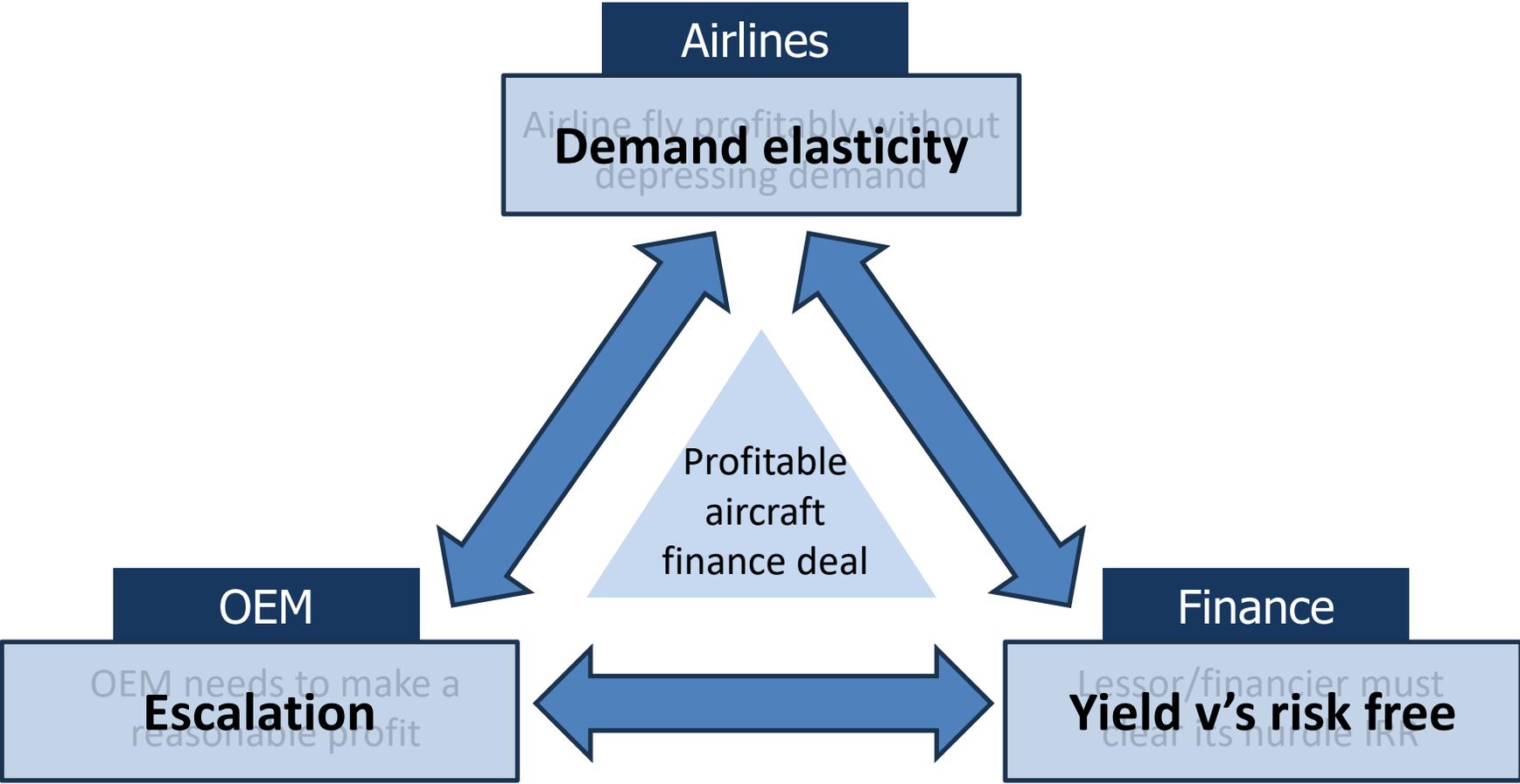


**Two factors to successful aircraft lease deals are:**

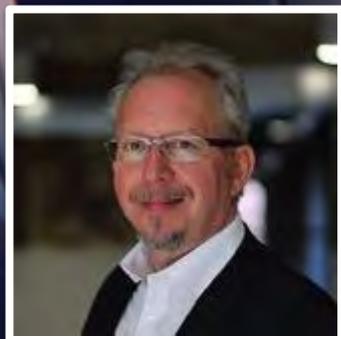
**1. Pricing airline credit risk**

**2. Understanding the asset / operator fit (and pricing accordingly)**

# Aircraft pricing: something's got to give...



...which of these factors is most flexible?



Eddy Pieniazek  
Head of Ishka Advisory

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What does it mean for Investors and the Industry?

# Delivery Forecast – falling short of targets?

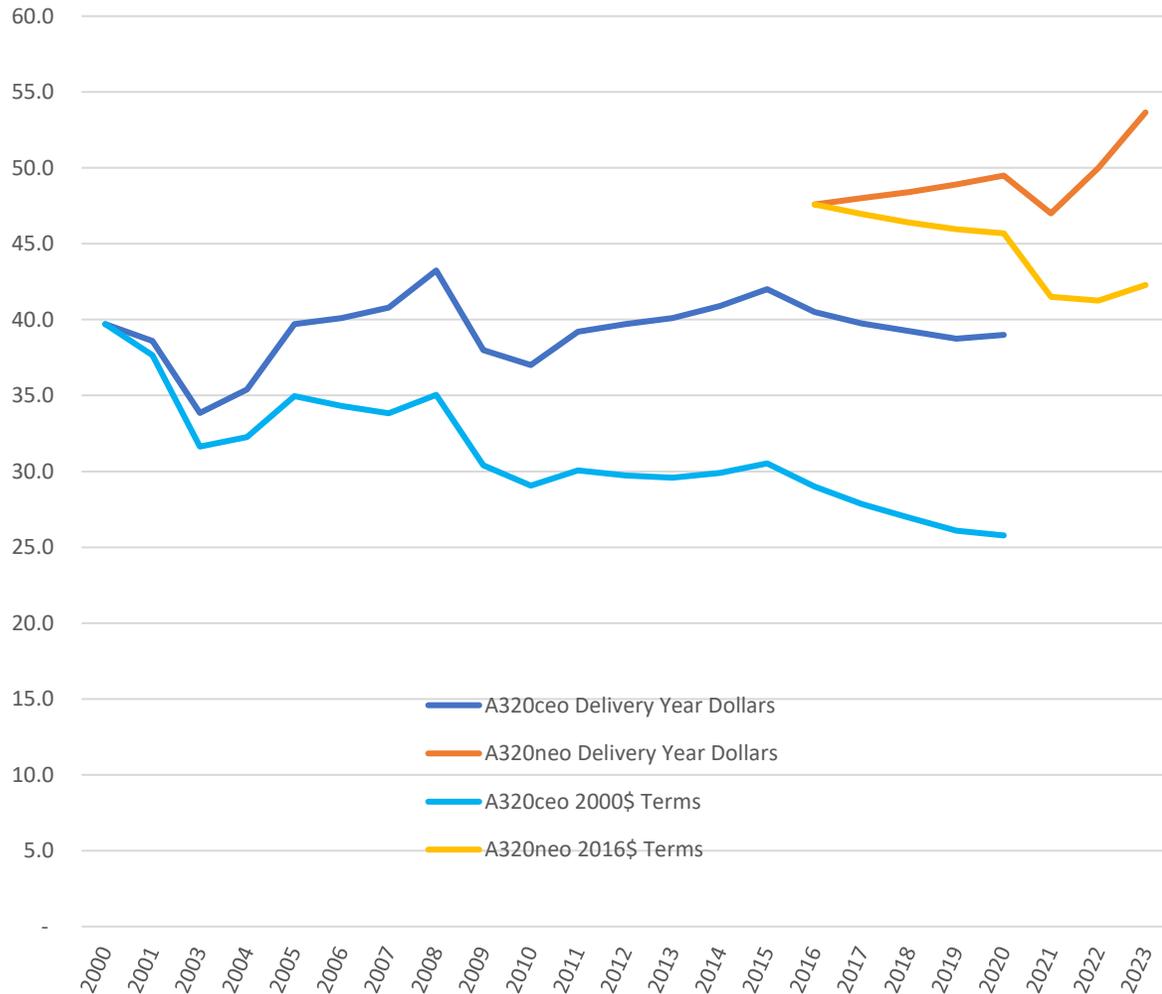


	2022 Actual	2022 Approx. Market Value	2023 original Delivery prediction	2023 Approx. Market Value	Remarks
<b>Airbus</b>					
A220	53	\$1,872m	70	\$2,540m	On course
A320 family	516	\$29,246m	620	\$35,420m	Target is now 550
A330	27	\$2,754m	34	£3,672m	On course
A350	62	\$9705m	72	\$10,864m	?
<b>Total</b>	<b>658</b>	<b>\$43,576m</b>	<b>796</b>	<b>\$52,496m</b>	<b>720 estimate</b>
<b>Boeing</b>					
737	374	\$16,994m	408	\$20,536m	May fall short
747	5	\$978m	1	\$159m	Delivered
767	18	\$1,122m	19	\$1,254m	On course
777	24	\$3,550m	26	\$3,822m	On course
787	31	\$3,800m	84	\$11,000m	Ambitious
<b>Total</b>	<b>452</b>	<b>\$26,444m</b>	<b>538</b>	<b>\$36,771m</b>	
<b>Embraer</b>					
ATR	54	\$1,856m	68	\$2,262m	May fall short
DHC	22	\$533m	48	\$976m	Revised to 40
	4	\$72m	0	0	-
<b>Overall Total</b>	<b>1,190</b>	<b>\$72,481m</b>	<b>1,450</b>	<b>\$92,505m</b>	

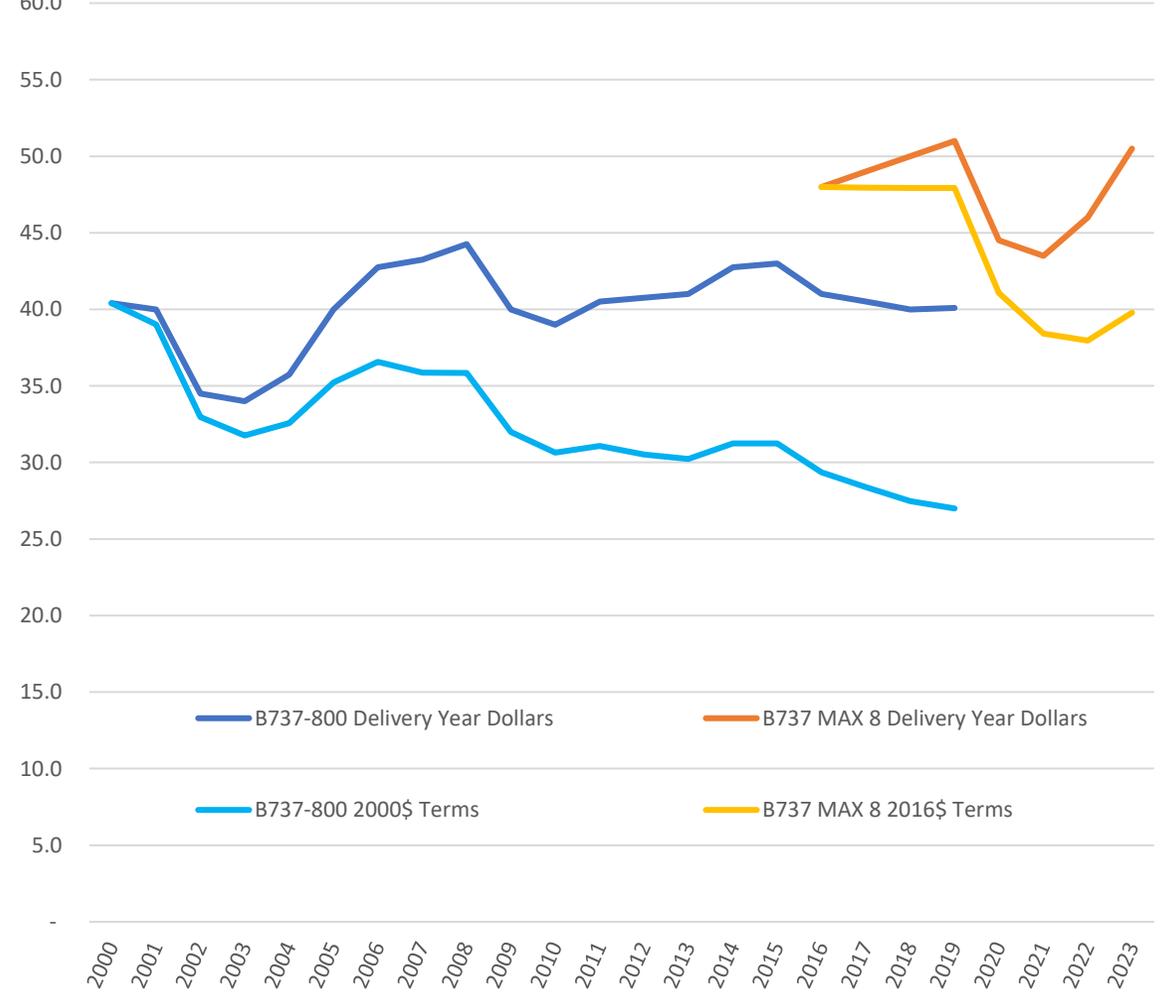
# Step Change in Delivery Value exhibiting 'stickiness'



New Build Value Progression A320



New Build Value Progression B737



# Living with the New World

## Market

**Market/Airlines** - How much further can costs rise and be passed on to the passenger before traffic / demand is disrupted. Assessing airline credit risk is of increasing importance to investors / lessors / financiers. Is it time for European consolidation?

## Metal – Special Focus

Not a quick fix, not a cheap one either. Operators will have to live with near term disruption. OEMs will insist on getting all their scheduled new engines on time, so that market share/deliveries can be maintained.

## Money

Used Aircraft Values and Lease Rates responding to supply shortages  
New deliveries likely to miss targets again  
Step Change in new aircraft costs appear to be sticking  
Competitive SLB market still, for the better credits  
OEMs, Lessors and Airlines can still make money when working together...



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