

# World Aero Markets Overview

## Looking Up!

### (Too Bad About That Pesky Supply Chain)

#### World Aircraft Overview

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[www.tealgroup.com](http://www.tealgroup.com)

March 2024

# Aircraft Markets

## Uneven Recovery from the Big Drop

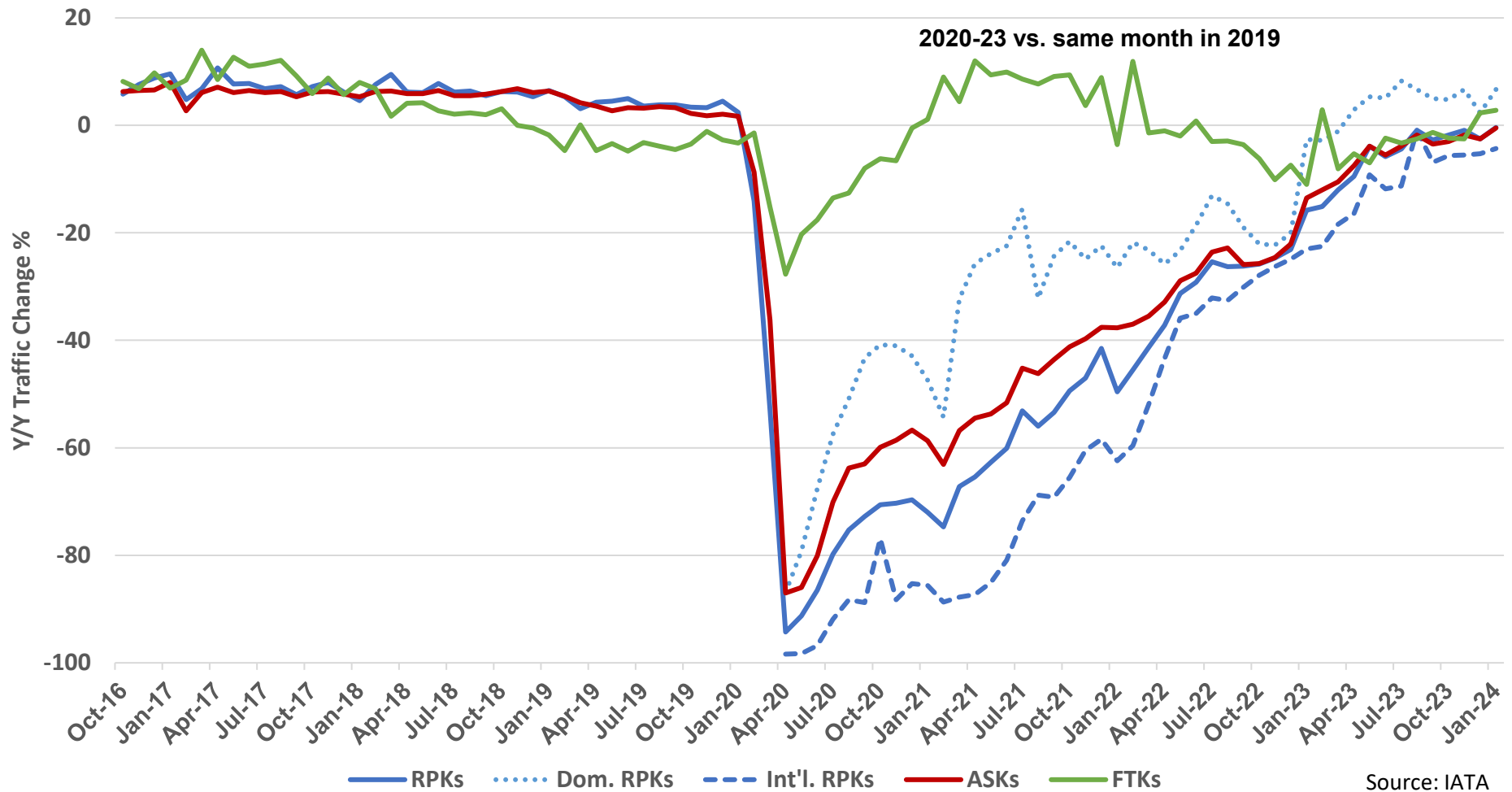
<u>World New Deliveries</u>	<u>CAGR</u>	<u>CAGR</u>	<u>Change</u>	<u>CAGR</u>	<u>Change</u>
<u>In 2023 (2024 \$)</u>	<u>'09-'14</u>	<u>'14-'19</u>	<u>'19/'20</u>	<u>'20-'22</u>	<u>'23/'22</u>
Jetliners-SA (\$61.2 b)	5.1%	-1.8%	-33.0%	33.3%	7.8%
Jetliners-TA (\$37.3 b)	13.8%	2.2%	-54.9%	-4.4%	27.1%
Regionals (\$3.9 b)	-3.1%	-4.1%	-42.1%	1.4%	1.9%
Business Aircraft (\$22.1 b)	1.9%	-0.6%	-14.5%	2.7%	-0.7%
Civil Rotorcraft (\$4.4 b)	0.3%	-8.1%	-10.4%	7.4%	8.6%
Military Rotorcraft (\$10.5 b)	6.4%	-7.1%	-16.5%	-3.9%	-4.2%
Military Transports (\$3.1 b)	-3.0%	-0.4%	-27.9%	2.6%	-33.9%
Fighters (\$18.3 b)	-0.9%	6.1%	-24.2%	5.1%	-12.5%
<u>All Civil</u> (\$129.3 b)	<u>6.7%</u>	<u>-0.2%</u>	<u>-39.9%</u>	<u>12.2%</u>	<u>11.0%</u>
<u>All Military</u> (\$36.0 b)	<u>1.7%</u>	<u>-0.2%</u>	<u>-19.5%</u>	<u>1.2%</u>	<u>-10.4%</u>
<u>Total</u> (\$165.4 b)	<u>5.3%</u>	<u>-0.2%</u>	<u>-35.0%</u>	<u>9.0%</u>	<u>5.5%</u>

# Aviation Segments By Pandemic Recovery

*Least to Most Annotated, 48 Months In*

Regionals	<p>Pilot shortages forcing grounding of existing fleets</p> <p>Mainline carriers prioritizing seats per departure over frequency</p> <p><b>Bleak prospects as pilot union hostility only gets stronger</b></p>
Twin Aisle Jetliners	<p>International traffic hit hardest and longest</p> <p>Already an overcapacity situation</p> <p>Shift towards longer-range single aisles already underway</p> <p><b>Recovery will lag for awhile</b></p>
Single Aisle Jetliners	<p>MAX is back (mostly)!</p> <p>China market uncertainty</p> <p>Domestic and Regional markets rebounding strongly</p> <p><b>Supply Chain issues limiting deliveries</b></p>
Business Jets	<p>Large cabin strongly correlated with oil prices</p> <p>Small/medium strongly correlated with corporate profits, equities indices</p> <p><b>2023 continued strong '21/'22 momentum, but for how long?</b></p>
Civil Rotorcraft	<p>Oil and gas segment picking up.</p> <p><b>Oil and Gas environment mixed, caught between Ukraine invasion and Climate Change.</b></p>
Military Programs	<p>Riding Ukraine and F-35 replacement waves</p> <p>Pure-play contractors in best shape; suppliers with most defense in best shape</p> <p><b>All good. In fact, better</b></p>

**Traffic: Domestic Leading The Recovery;  
International Lags; Freight Flat**  
2023 Total (vs 2019): RPKs -5.9; ASKs -5.6; FTKs -3.6  
2020 Total (vs 2019): RPKs -65.9%; ASKs -56.5%; FTKs -10.6%

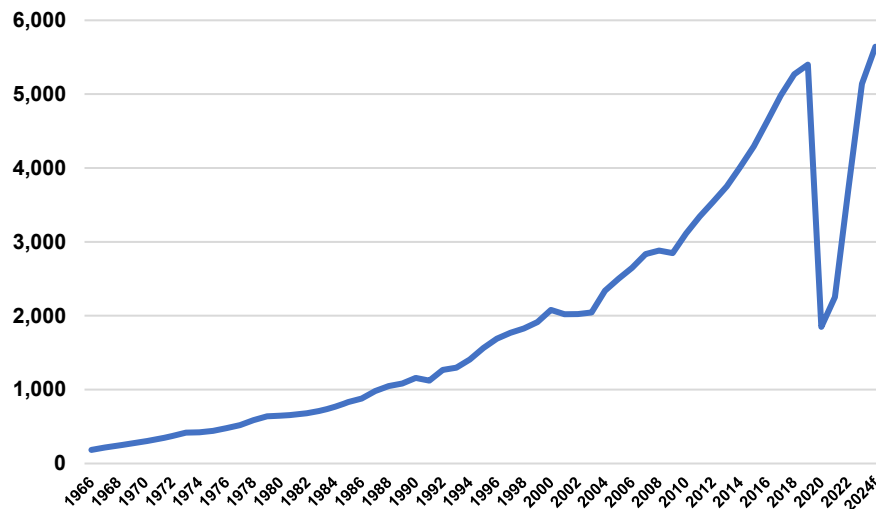


Source: IATA

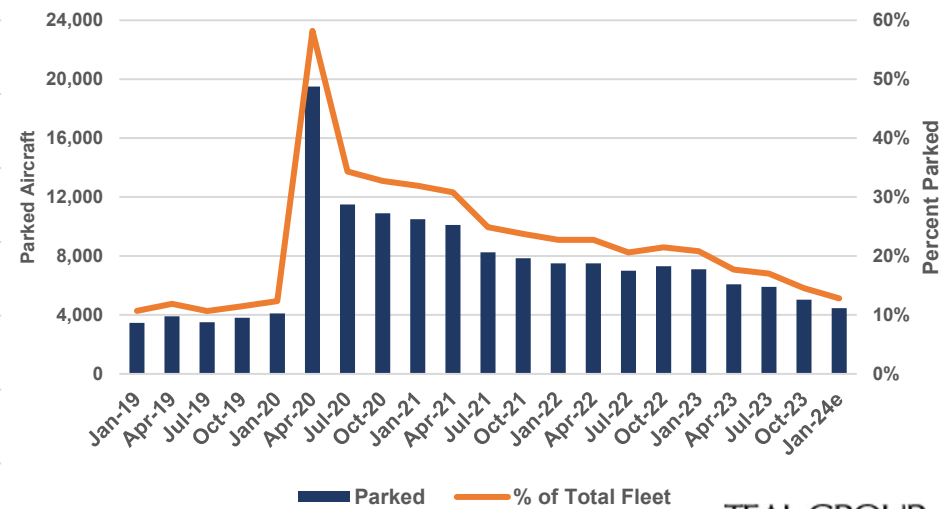
# Airlines Still Recovering

- **Traffic decline, parked fleet like no previous shock.**
  - Per Paul Krugman, reflect a world economy recovering from a “medically-induced coma.”
- **Backlogs keep growing, but production rates struggling to meet demand.**
  - Persistent supply chain issues exacerbated by labor and materiel shortages
  - 737MAX troubles further suppressing supply and airline growth
- **Percentage of world fleet stored remains above historical average**
  - Primarily twin aisles but many “permanently stored” aircraft are being brought back.
- **Aftermarket struggling to meet demand after a couple of years of subdued activity.**
  - New gen engines (GTF, Leap) are not holding up as well challenging capacity

World Air Traffic (RPM Bns)



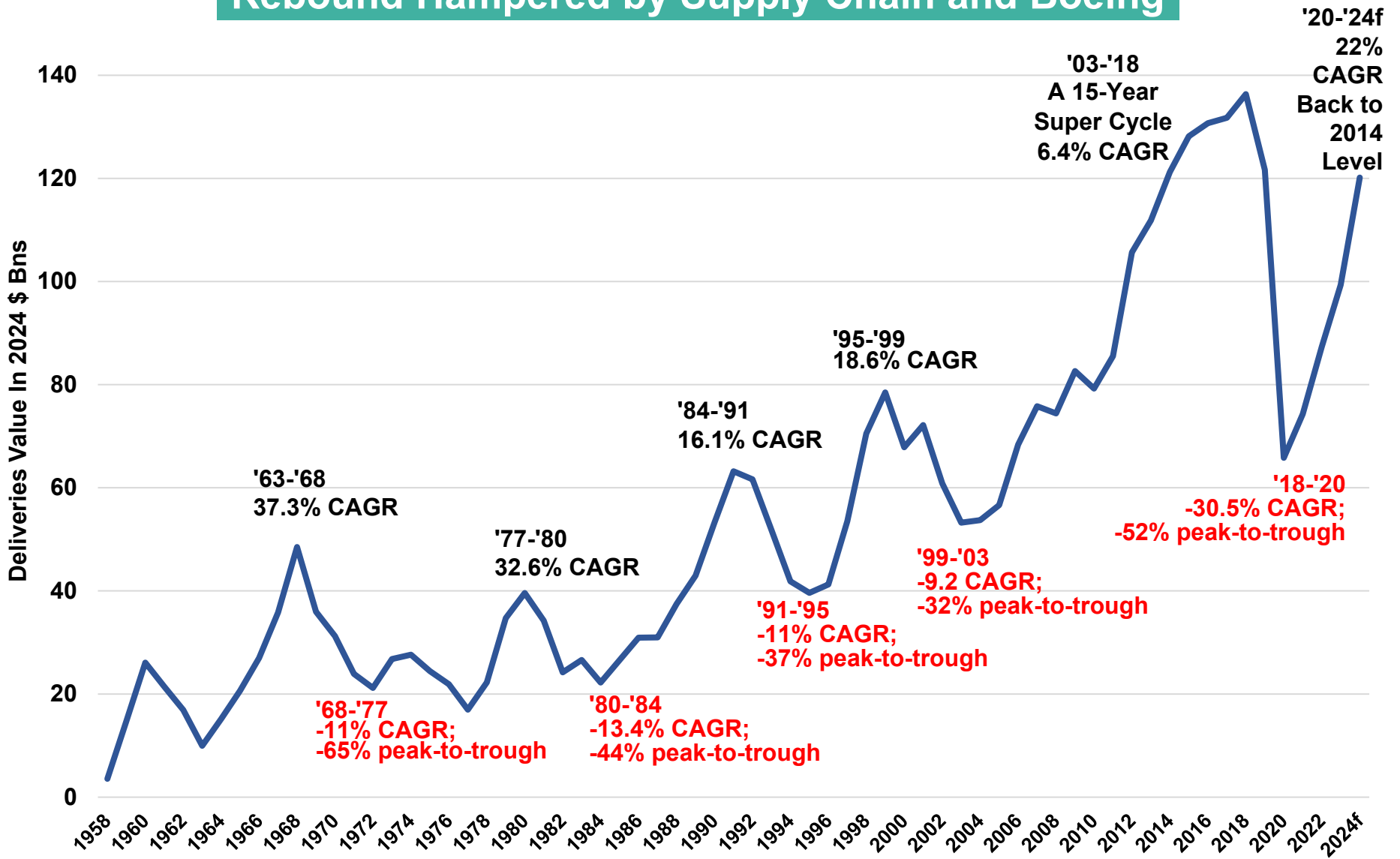
World Fleet: Down to ~13% Unemployed



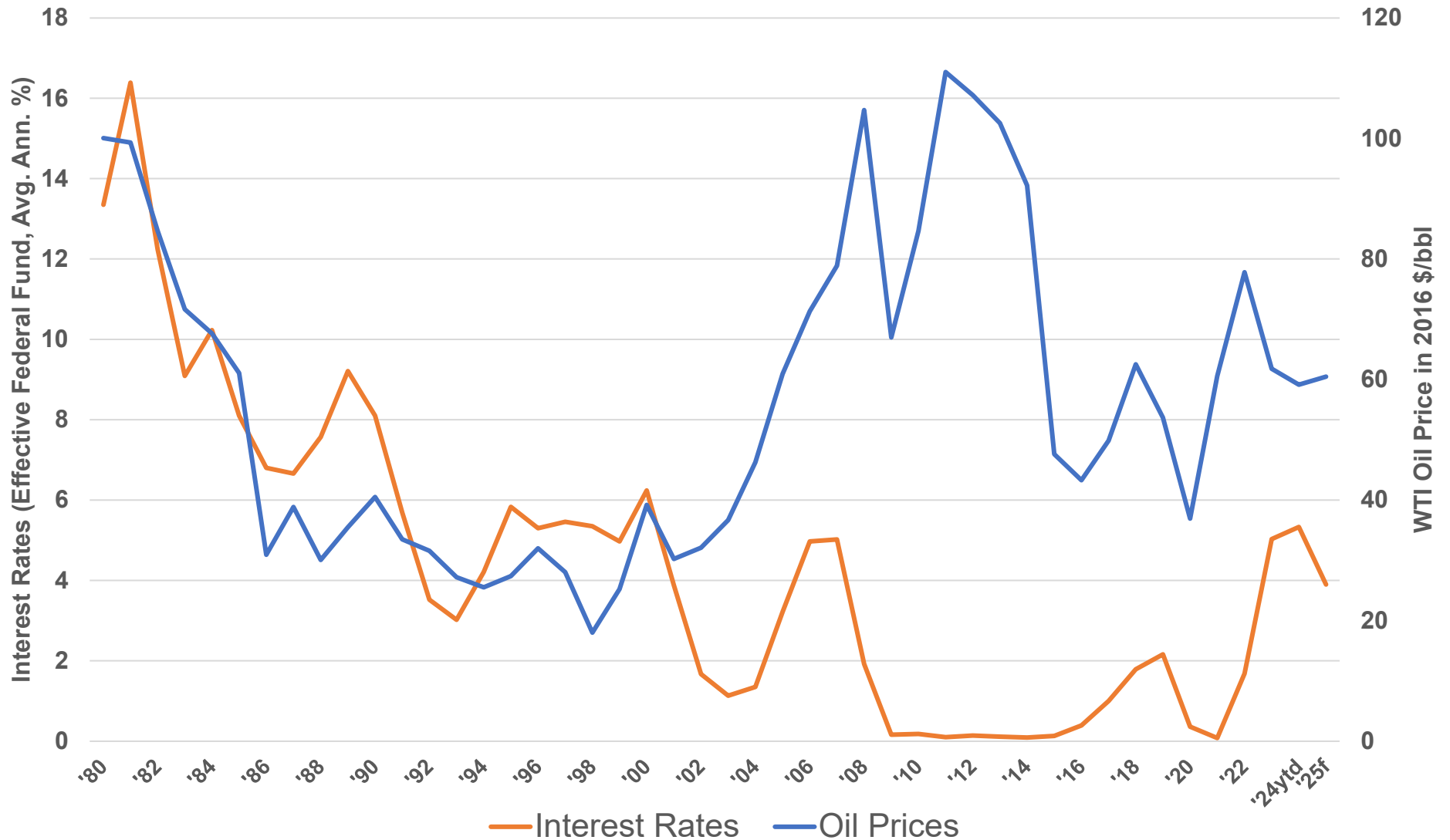
# Traffic Peak Recovery: Not As Good As It Looks

- **Traffic Should be ~25% higher than it is**
  - 4 years at 6% lost (avg. 2015-'19)
- **Business Travel still lagging**
- **China recovery is incomplete**
  - Domestic surging and no longer held back by “zero-Covid”
  - Long-Haul suppressed by geopolitical tensions, primarily trans-pacific
  - Risk of long-term slower economic growth
- **Persistent challenges limit growth potential**
  - Aircraft Delivery Delays
  - GTF groundings
  - Pilot Shortages
    - Especially Regionals
    - Big airplanes are back in vogue (A380)
- **Need several year of higher than trend growth for real recovery**
  - IATA forecasting 10% growth in 2024
  - Still lots of pent up demand
  - Skyrocketing airline costs (esp. labor) affecting affordability

# The "Super Cycle" had a Super Downside Rebound Hampered by Supply Chain and Boeing

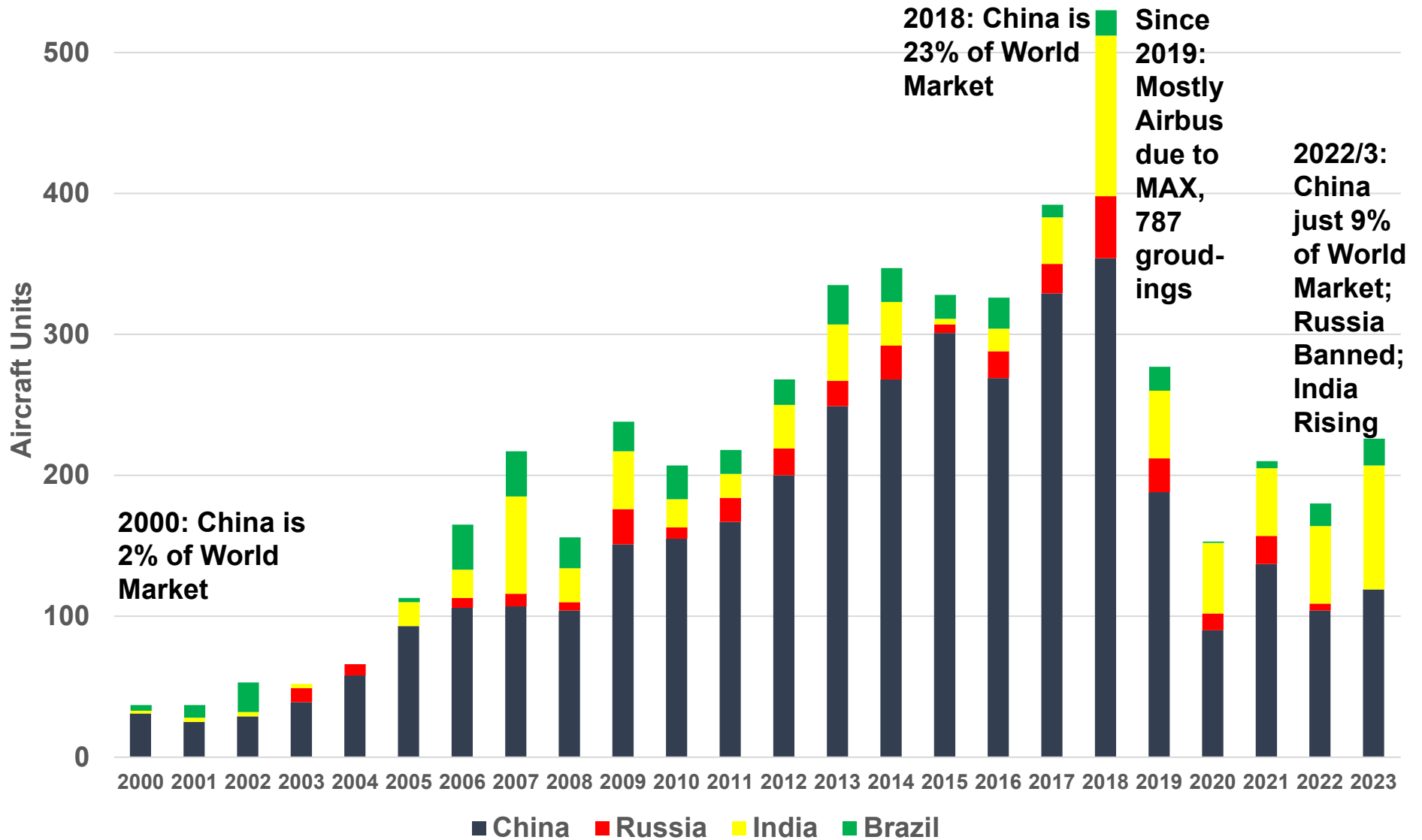


# Interest Rates and Oil Prices: Less than 4% and \$50-85/bbl, ideally; But the Ratio Matters Most



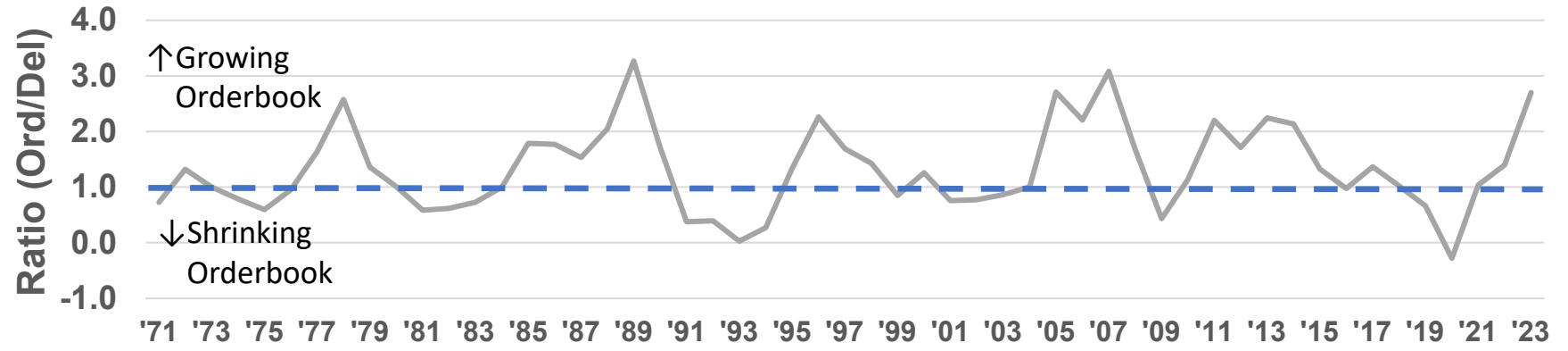
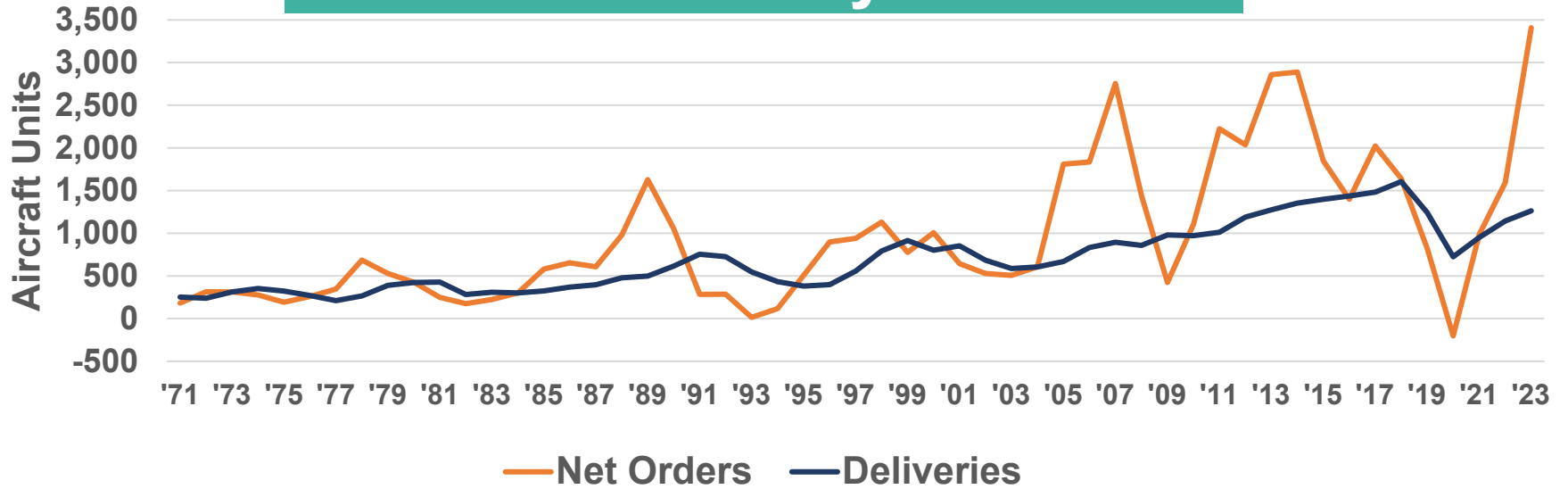


# B(R)IC Deliveries: All About China?



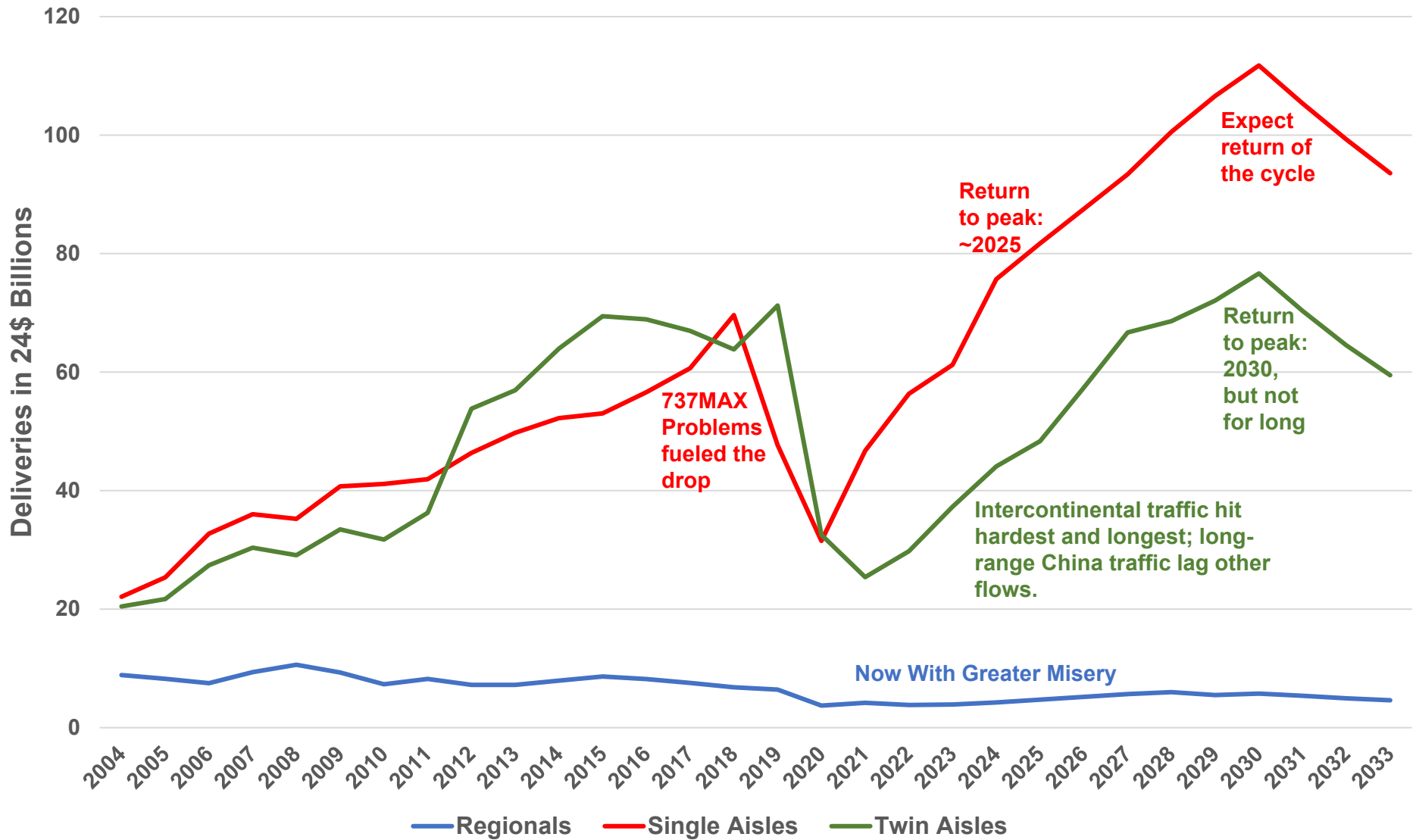
# Jetliner Orders and Deliveries

## Book-to-Bill Way Over 1:1

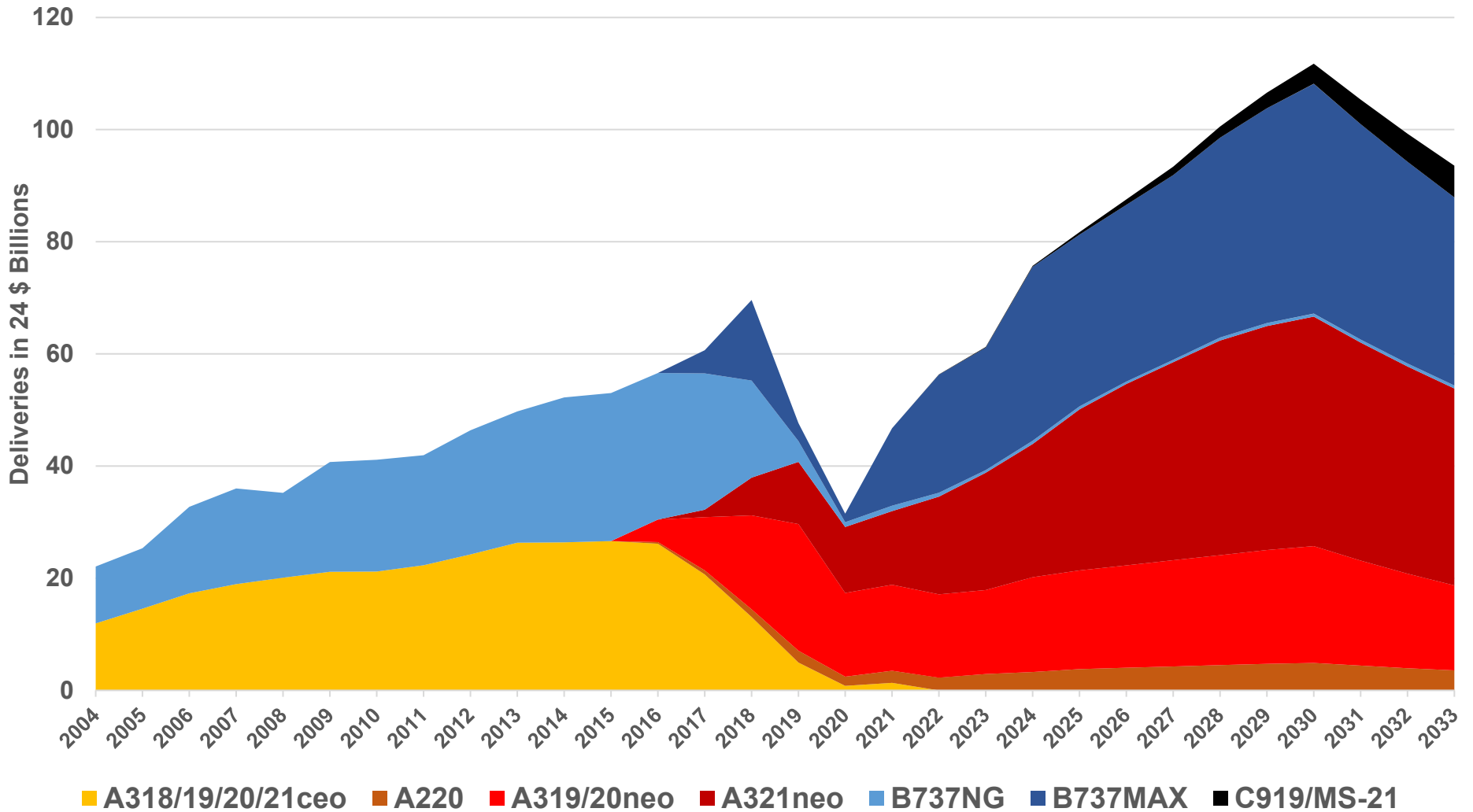


# The Air Transport Market By Segment

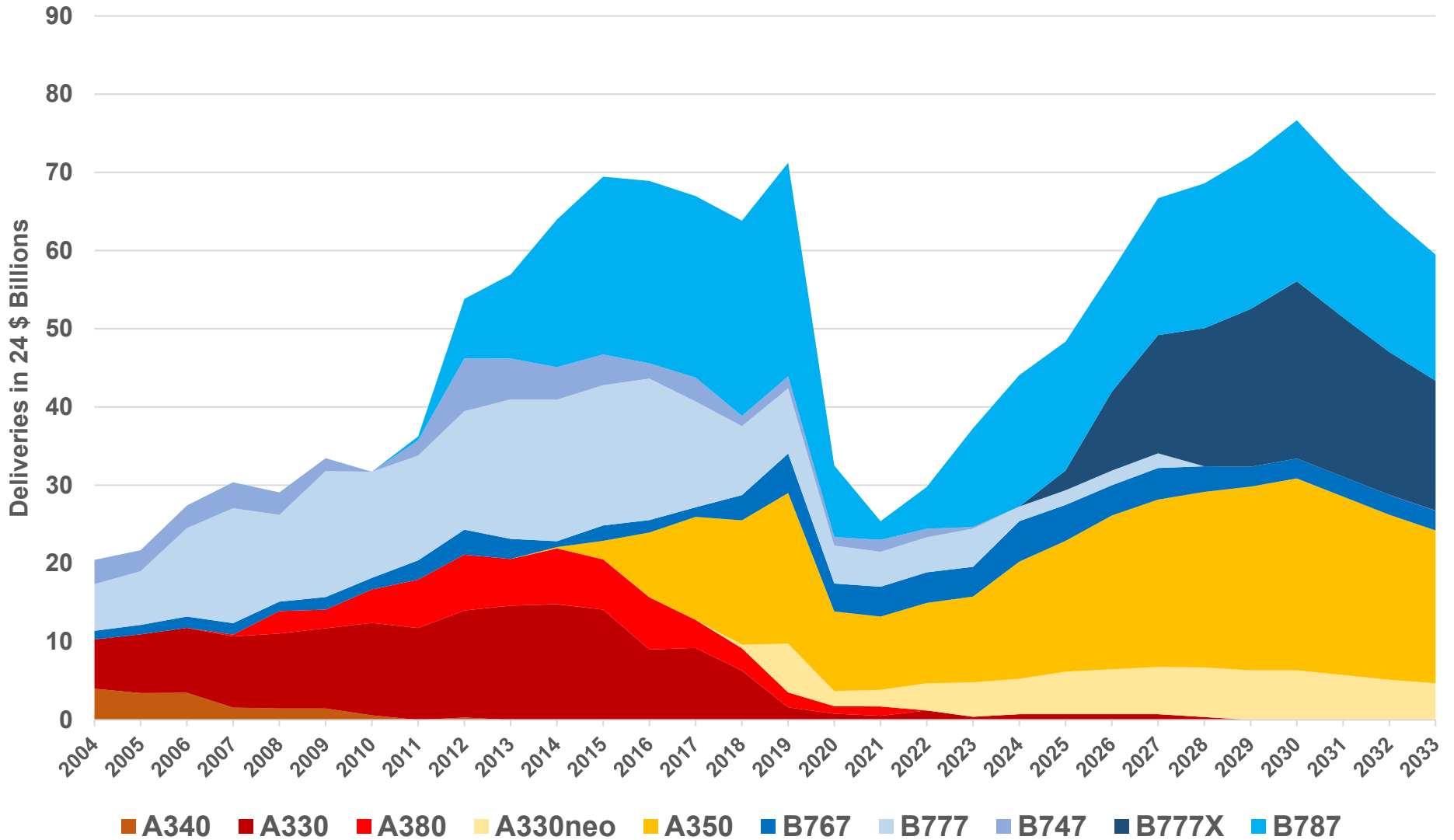
## Single Aisles Surge; Twin Aisles Lag



# Single Aisle Deliveries: MAX Returns, Shift To The "Middle" (Large Single Aisles) From Above (Twin Aisles) and Below (Smaller Single Aisles)



# Twin Aisles: Slow Recovery; Quad Jets are History



# Twin Aisles Have Been Here Before

- We're forecasting a meaningful shift towards single aisles, with profound consequences for primes, suppliers, and jetliner financing. But twin aisles have been in dire straits several times before.
- Twins may bounce back:
  - Belly cargo (Asia/Mideast connectors)
  - Range (Asia/Mideast connectors)
  - Post-fragmentation route thickening (legacies gaining, International LCCs losing).

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### Market Comment

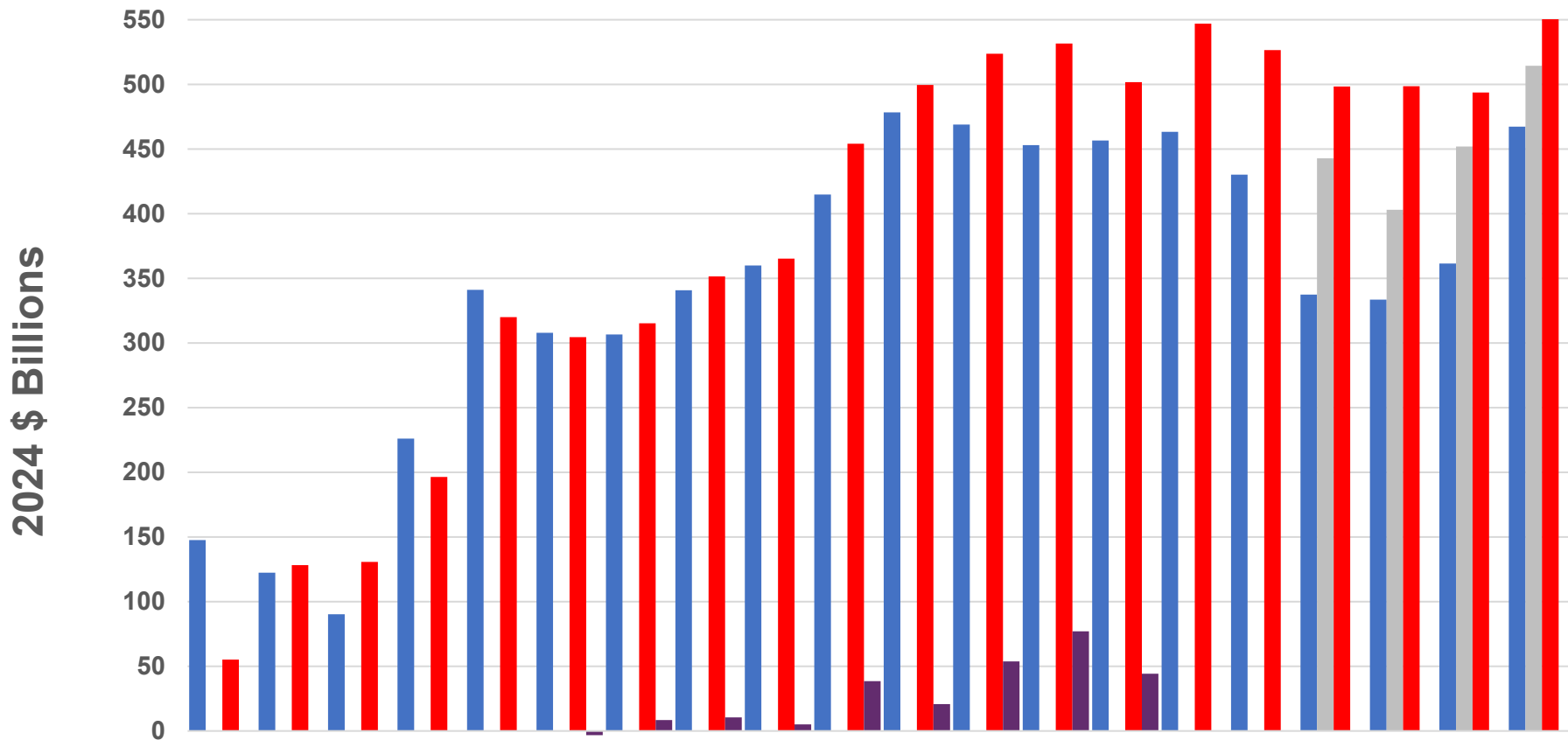
**The World is Awash in Widebodies.** Thanks to the Asian economic crisis and a flood of deliveries, the number of widebody aircraft available for sale or lease have grown at an astronomical rate. Currently, Airfax lists some 186 aircraft on the market, certainly less than the number available in the early 1990s, but almost three times the number on the market during the comparable peak periods of the late '80s.

Aircraft Type	No. on the Market
B-747-400M	4
B-747-300M	5
B-747-300	13
B-747-200C	12
B-747-200B	12
B-747-100C	3
B-747-100	12
B-747SP	12
B-747SR	3
B-767	12
B-777	3
A300B4-1/200	21
A300B4-600	4
A310-2/300	11
A340	5

The number of widebodies available is unusual for three reasons. First, barring the economic problems in Asia, most of the world's airlines and the economies of most other major countries are holding up well, with yields at respectable levels and load factors at all time highs. Second, the number of narrowbody aircraft on the market is relatively stable, varying only 10 to 20 units month to month for the past several years. This is vastly different from the early 1990's when all types of aircraft were available in record numbers. Third, the number of brand new or new-generation airplanes on the market is significant. The number of new technology narrowbodies on the market have remained fairly constant but the number of newer model widebodies has risen from 16 in January 1998, to 60 in December. Further, the new widebodies offered for sale and leaseback is not reflected in the numbers on the left. Asian carriers have continued to take delivery of new equipment (much to the relief of Airbus and Boeing), but are using them to garner hard currency to fund on-going operations.

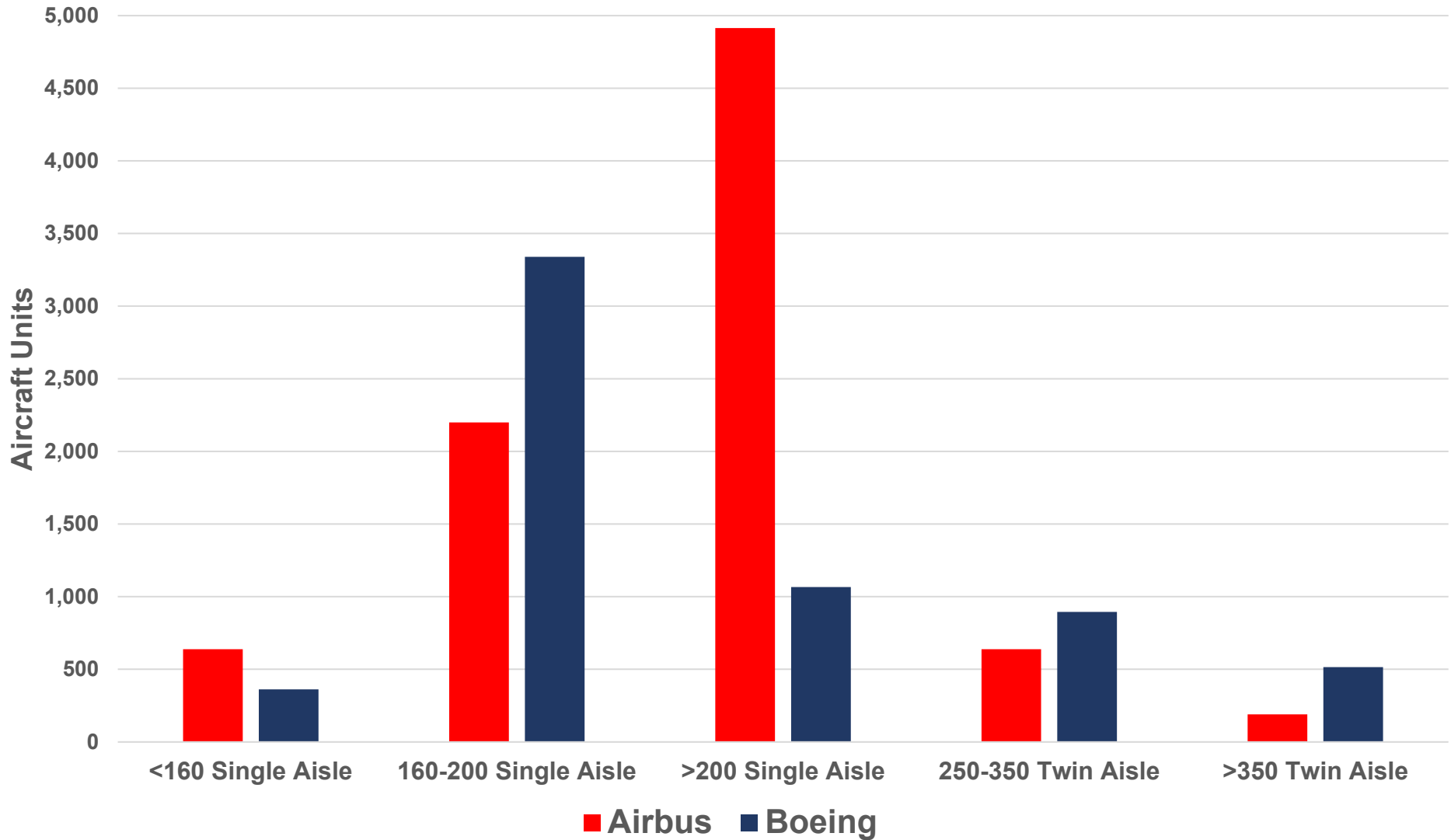
All of these factors will have an adverse affect on prices for all types of widebody equipment and...

## Firm Order Backlog Values: Strong Growth in 2023 Boeing Clawing Back; Airbus Maintaining Its Lead



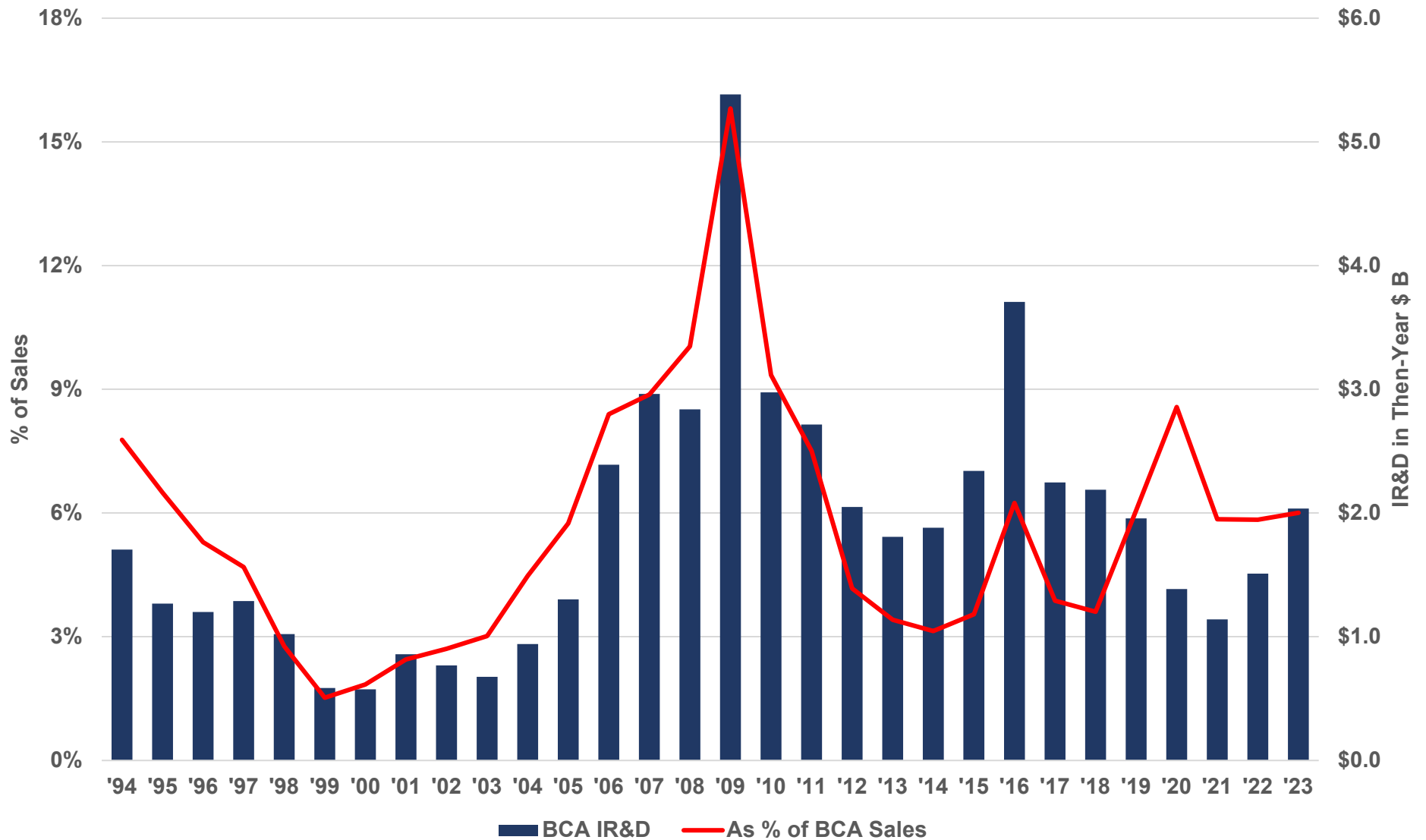
	1h 1997	1h 2001	End 2004	End 2006	End 2008	End 2009	End 2010	End 2011	End 2012	End 2013	End 2014	End 2015	End 2016	End 2017	End 2018	End 2019	End 2020	End 2021	End 2022	End 2023
■ Boeing	147.6	122.4	90.3	226.1	341.1	307.9	306.6	340.8	360.0	414.8	478.3	468.9	453.0	456.6	463.3	430.2	337.4	333.6	361.4	467.2
■ Without ASC 606																	442.9	403.0	452.0	514.3
■ Airbus	55.2	128.2	130.7	196.5	320.0	304.6	315.2	351.5	365.2	454.1	499.5	523.7	531.6	501.7	546.9	526.5	498.4	498.6	493.7	599.7
■ Bombardier						-3.2	8.5	10.5	5.1	38.5	20.8	53.8	77.1	44.2						

# Airbus, Boeing Jetliner Backlogs (Feb. '24)



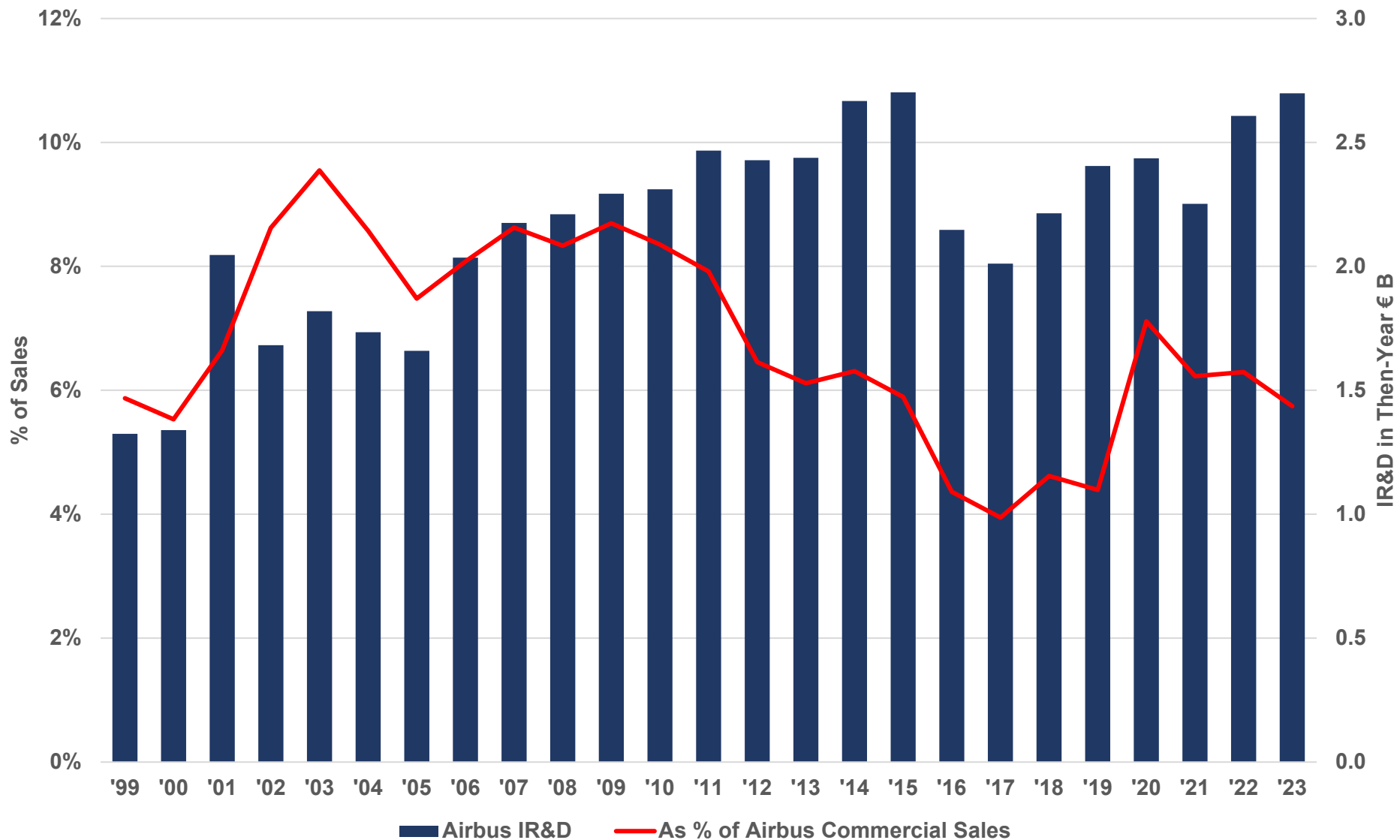


# Boeing Commercial IR&D: Lags Airbus but Heading Higher on 777X, MAX 7/10; Then What?



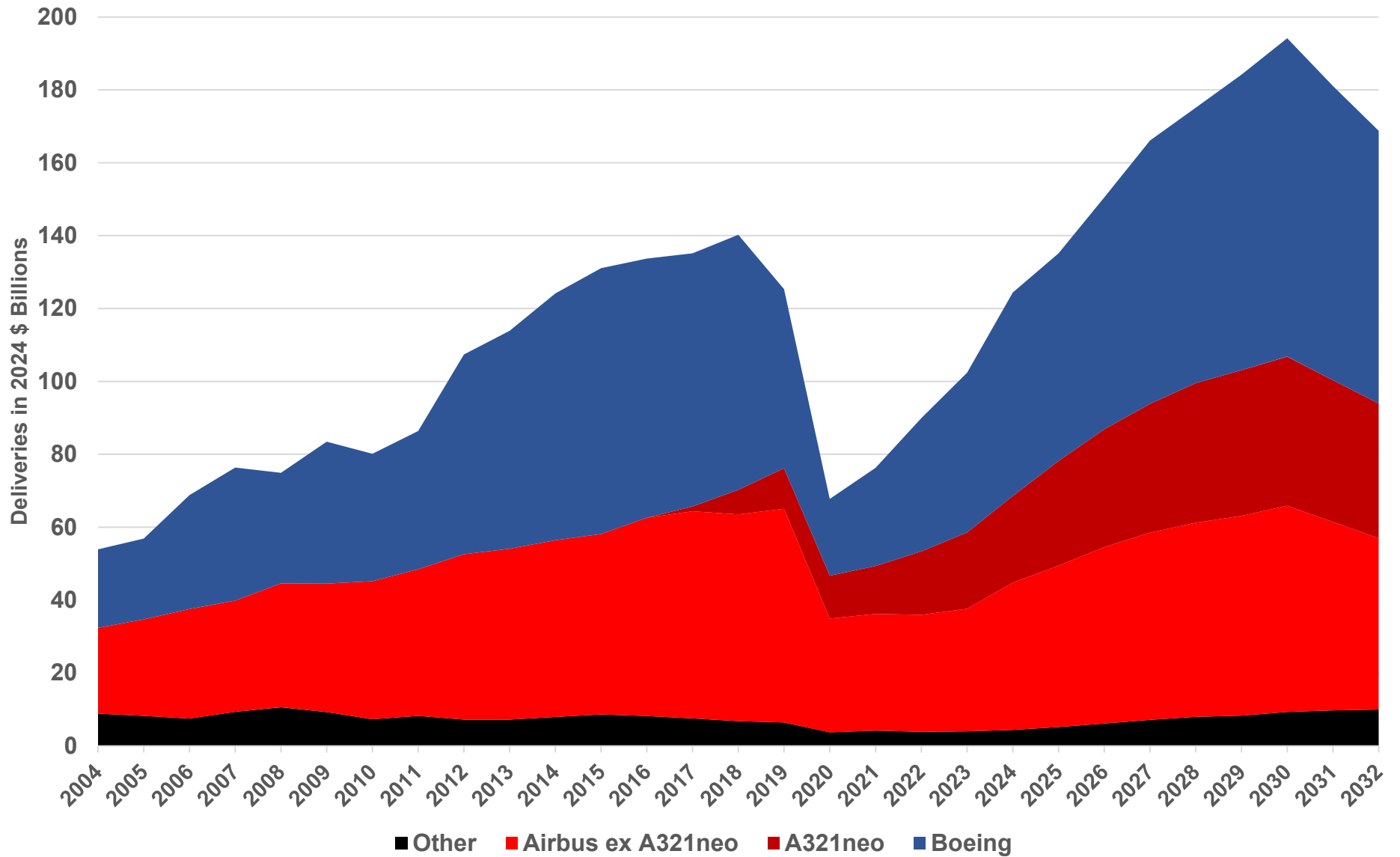
# Airbus Commercial IR&D

## More Spend, Less Discipline...Until 2016



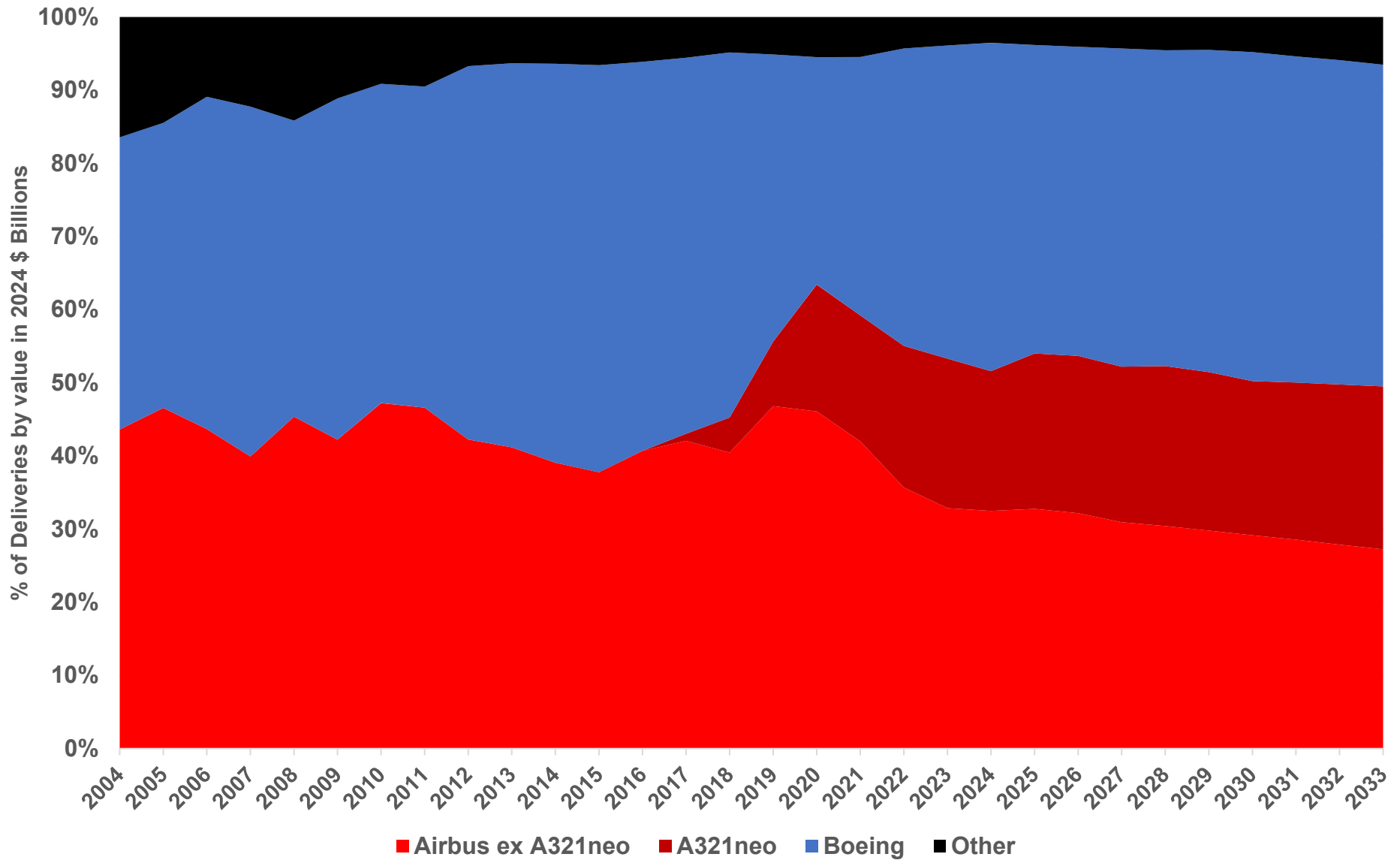
# Jetliner OEM Market Shares by Deliveries

## A321neo Gives Airbus The Advantage

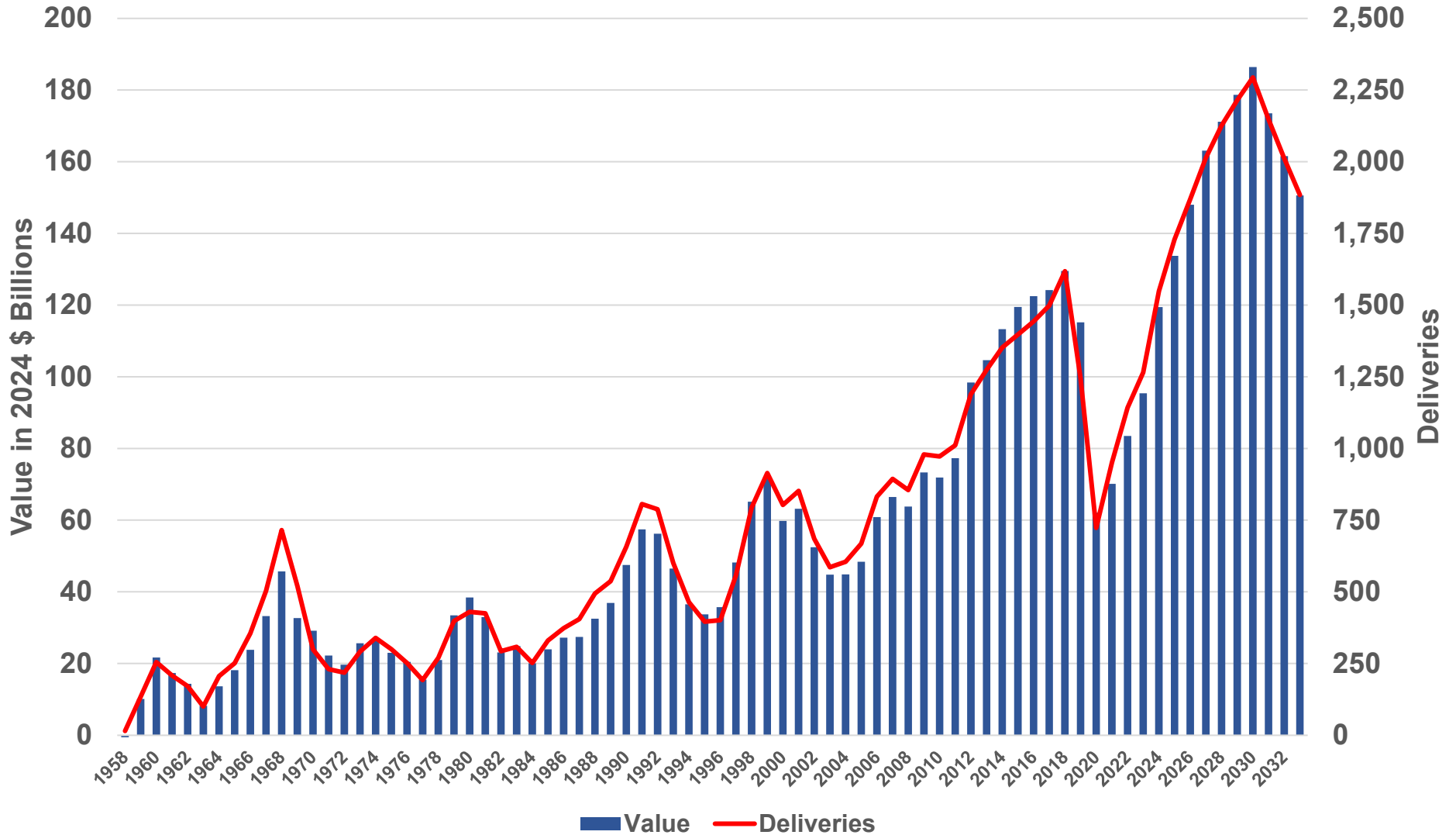


# Jetliner OEM Market Shares by Deliveries

## Despite Boeing's Hiccup, The Duopoly Endures

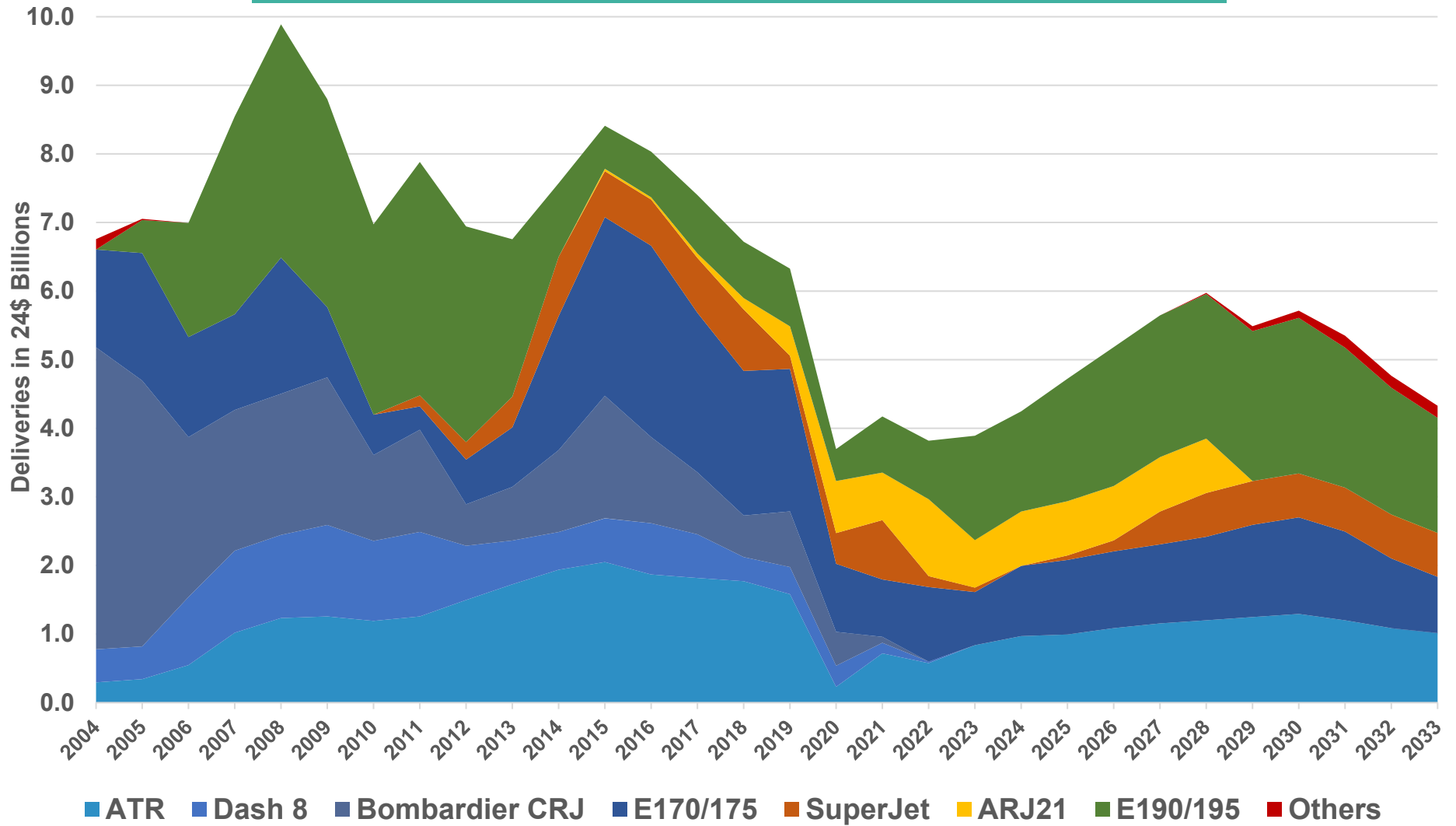


# Deliveries Bouncing Back But The Cycle Has Not Been Vanquished

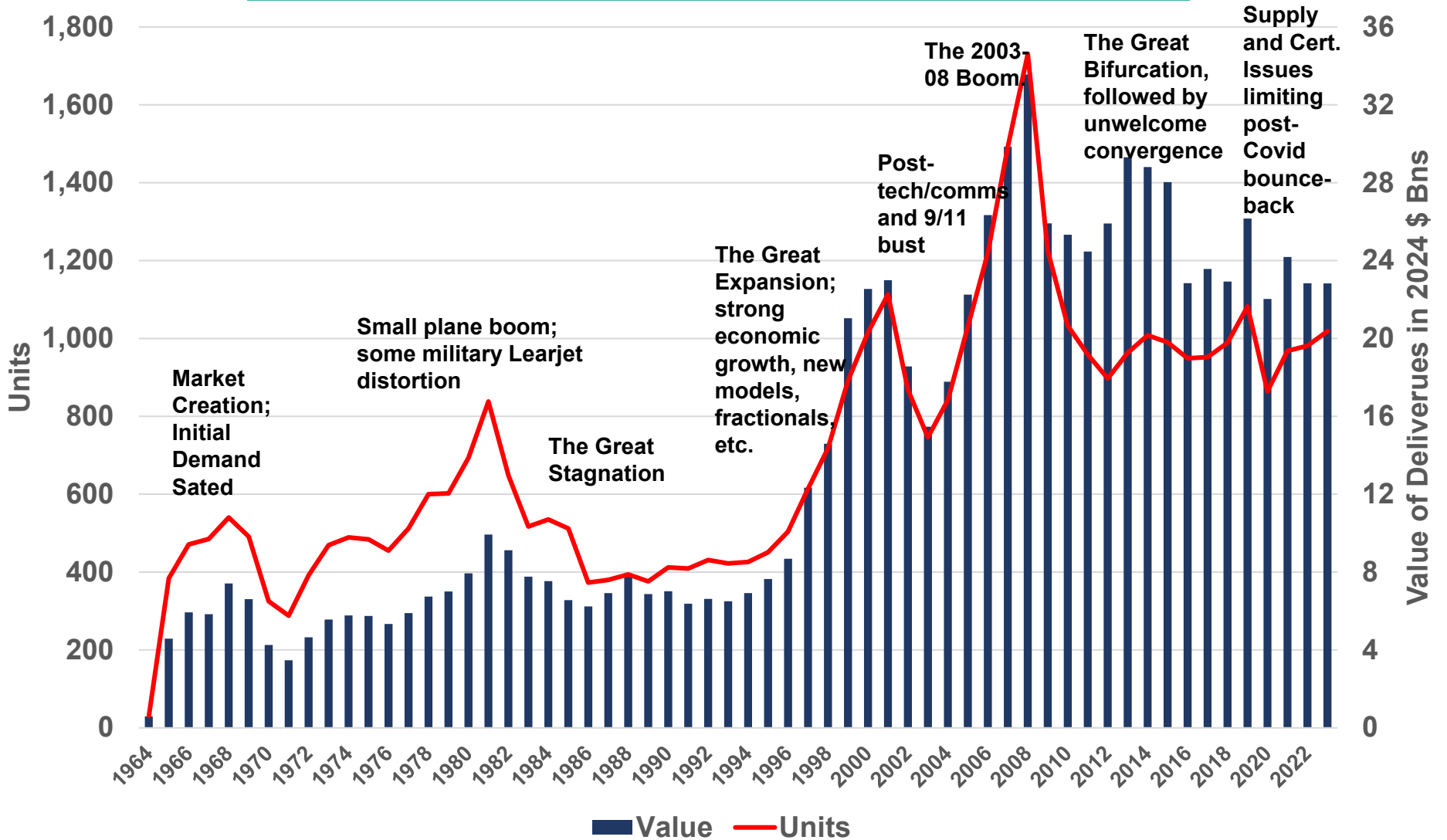


# Regional Aircraft Deliveries (Value)

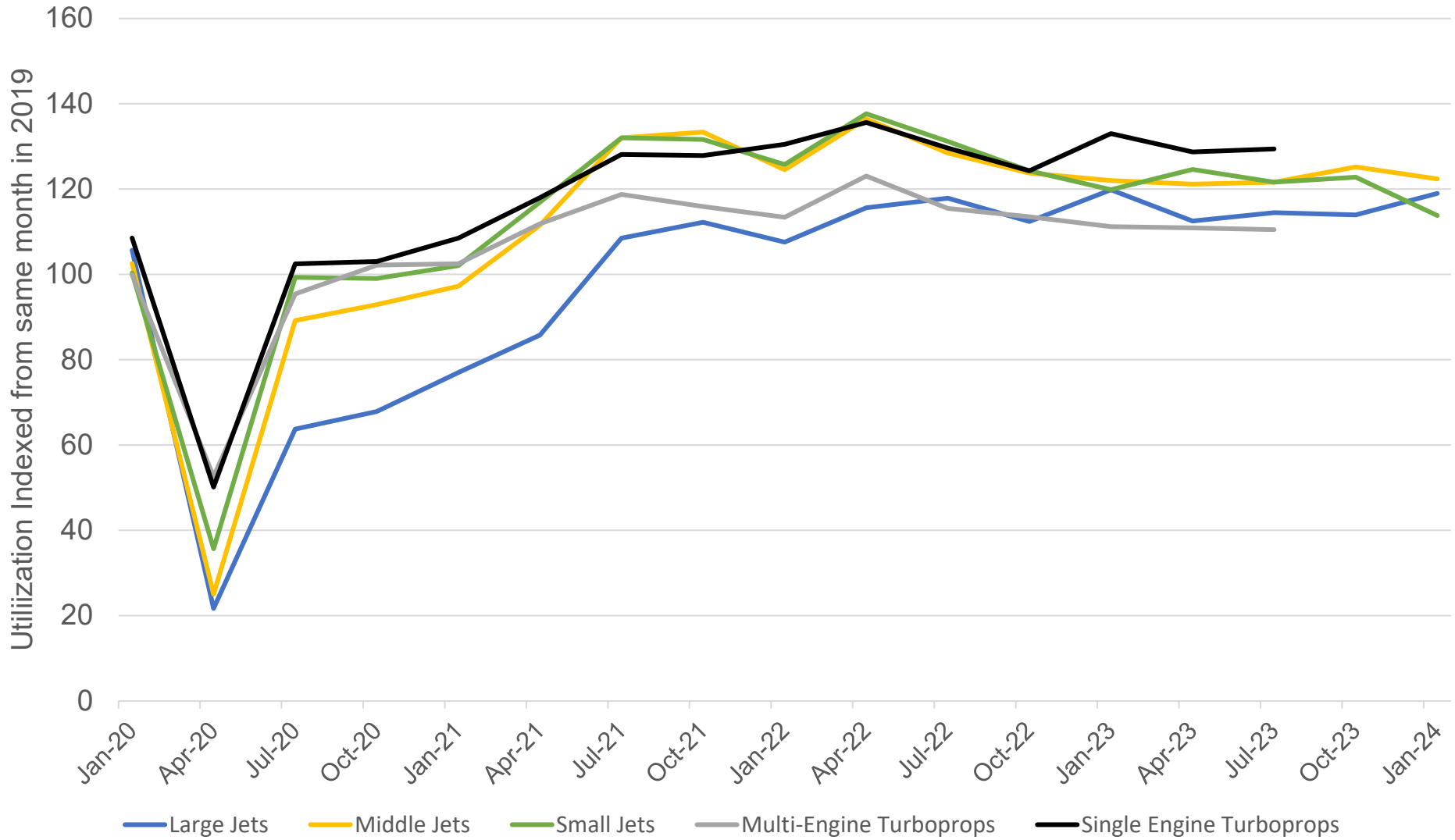
A Shadow Of Its Former Self  
Larger "Crossover" Jets Predominate



# Business Aircraft Delivery History (w/jetliners, RJs, turboprops)

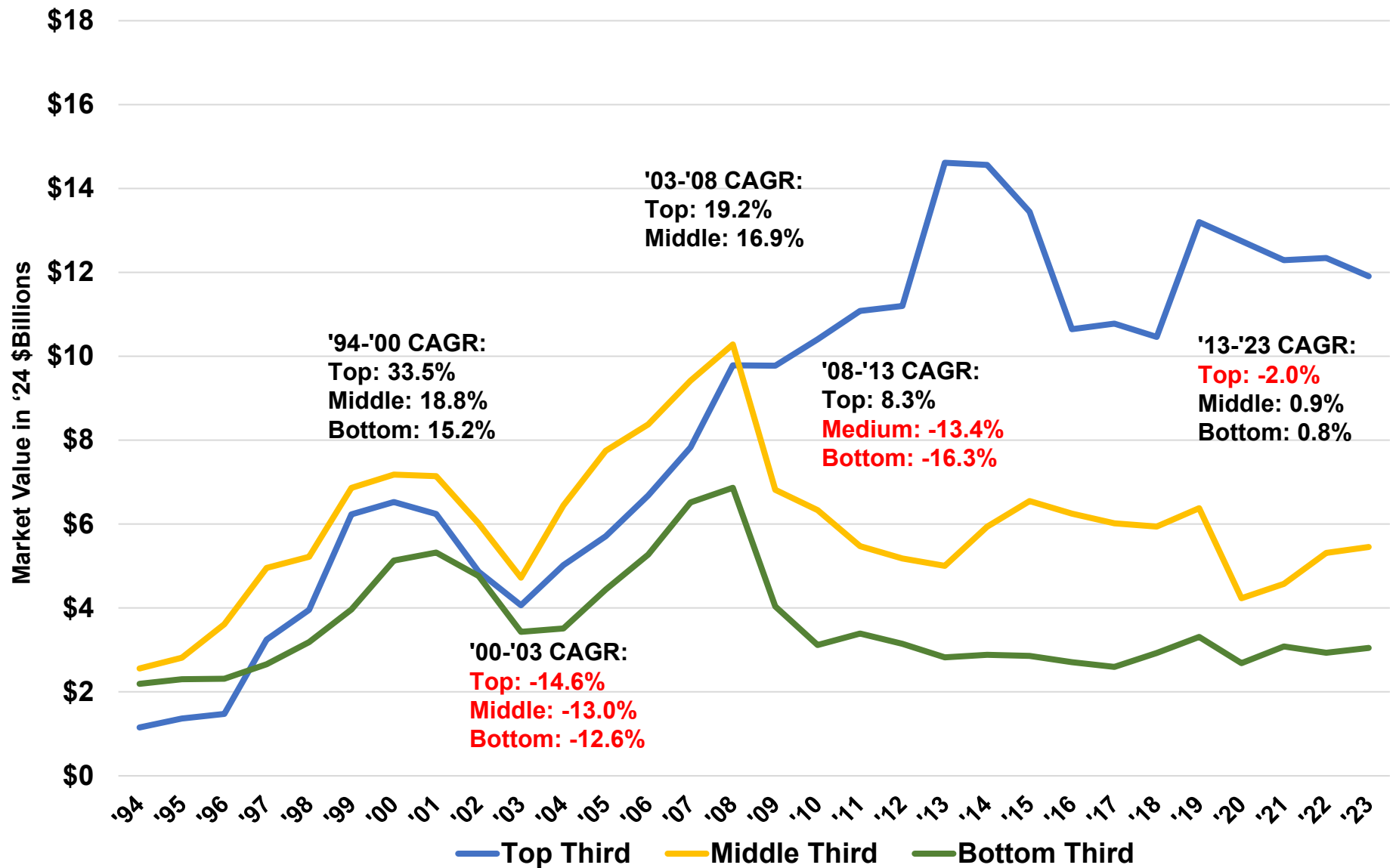


# Business Aircraft Utilization Recovered, But Plateauing?



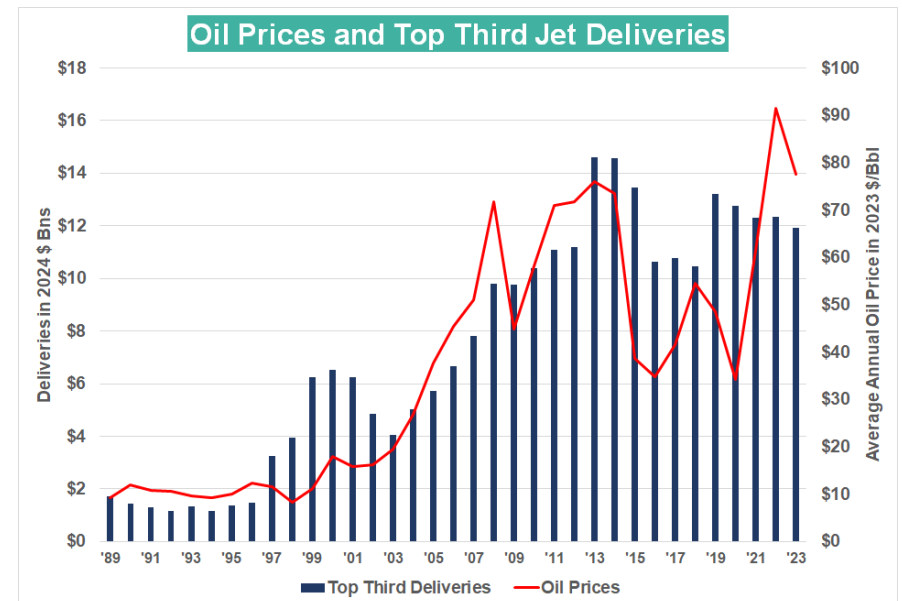


# Bizjet Segment Comparison

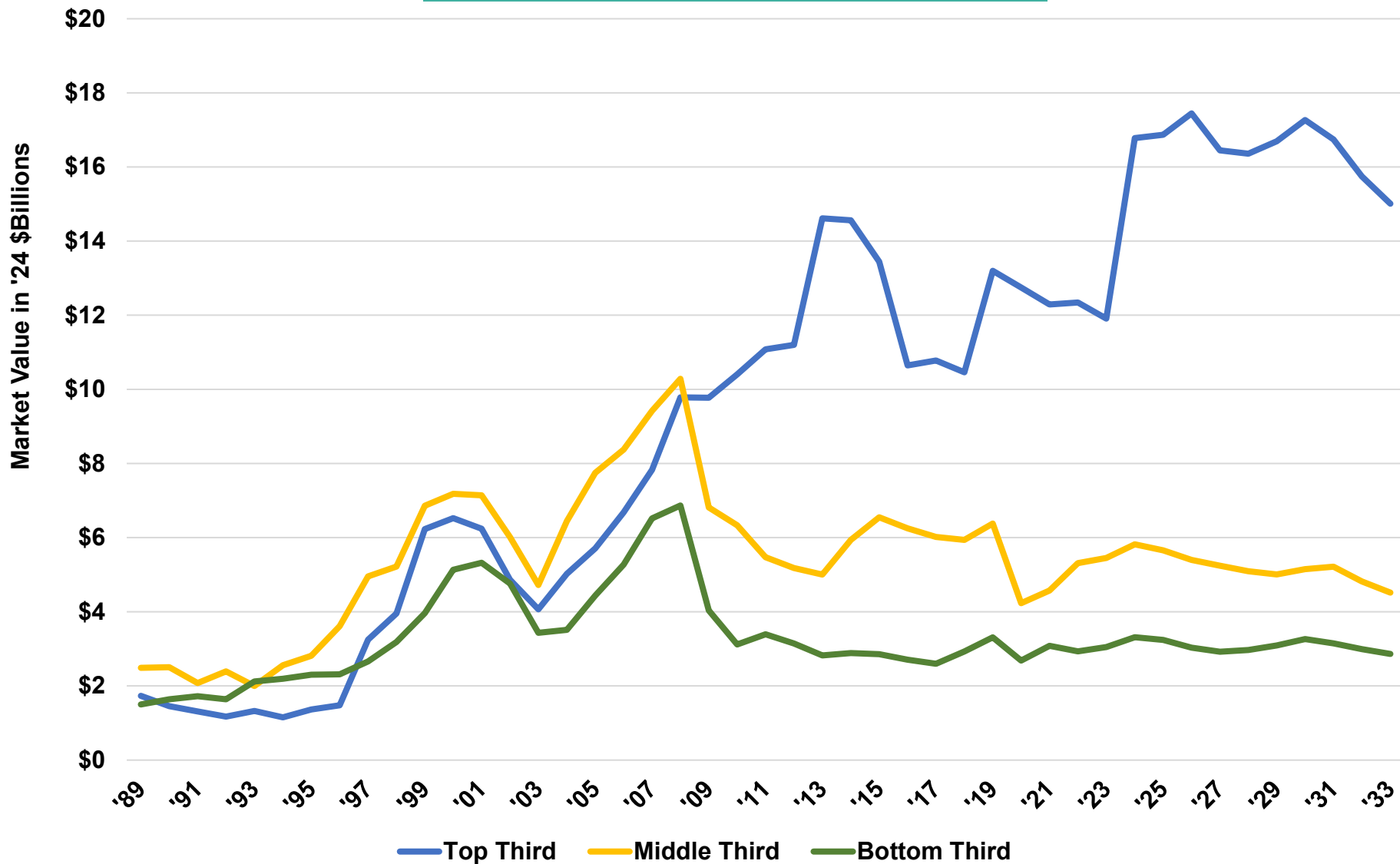


# Eight Contradictory Bizav Indicators (and two unknowns to worry about)

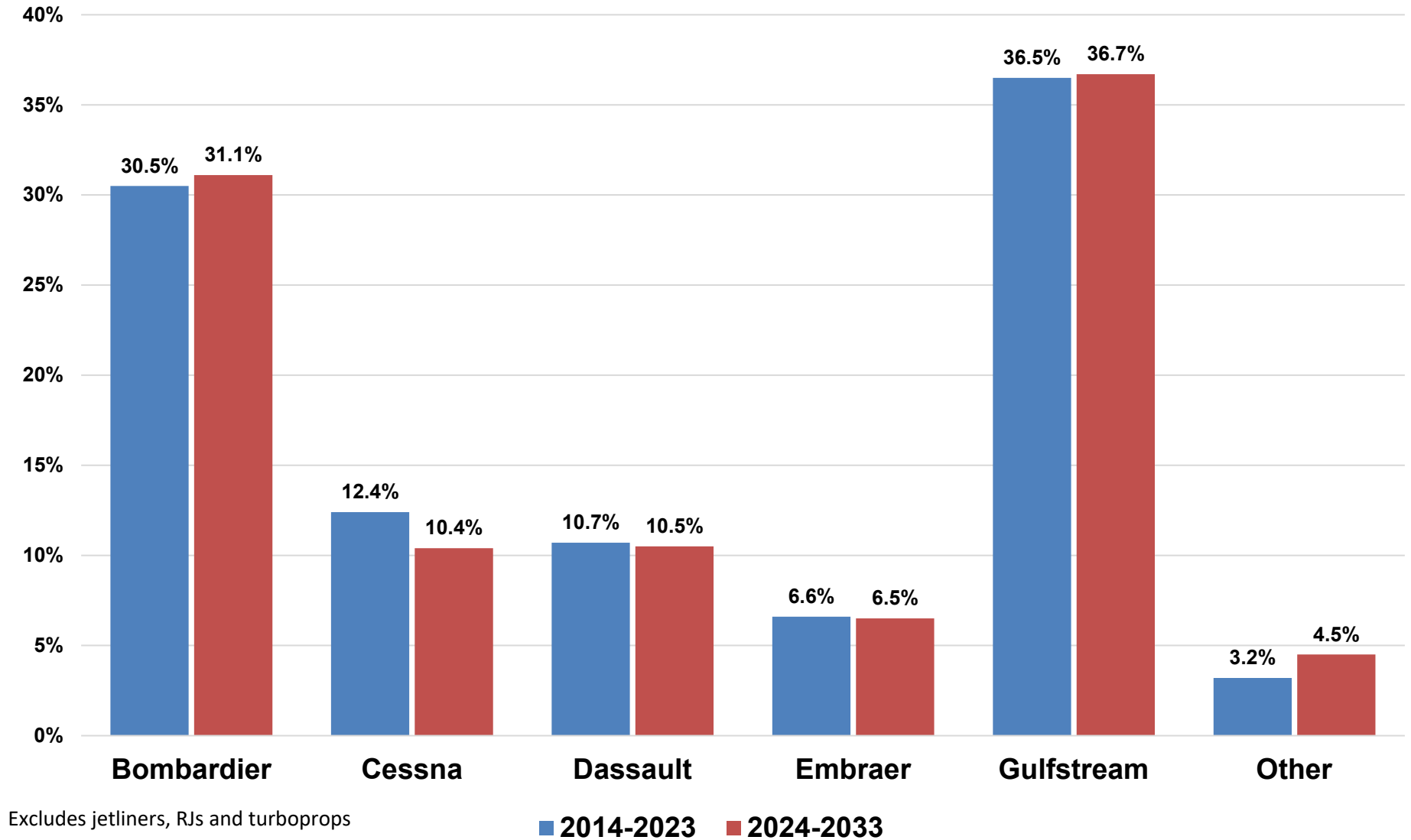
- **Three Leading Market Indicators:**
  - Corporate profits (stable, but uncertain)
  - Equities markets (uneven)
  - Oil prices (elevated but stable)
- **Five Immediate Market Health Indicators:**
  - Deliveries (rebounding slowly)
  - Aircraft available for sale (tight, but easing)
  - Aircraft prices (historically high)
  - Labor Market (struggling to find talent)
  - Utilization (Holding up, but pockets of softness)
- **Two Unknowns**
  - Increasing Hostility (public, regulation)
  - Sustainability



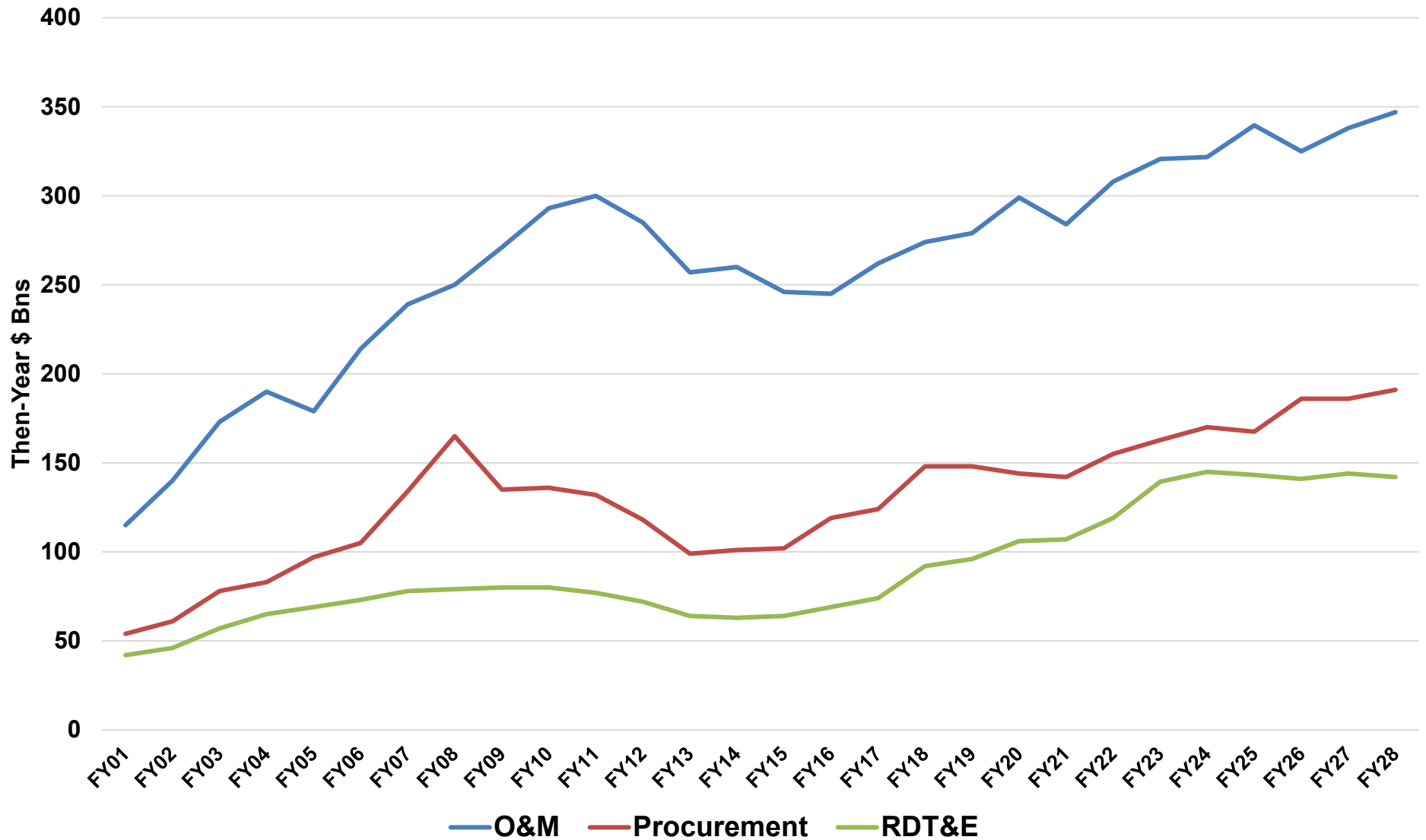
# Bizjet Segment Deliveries History and Forecast



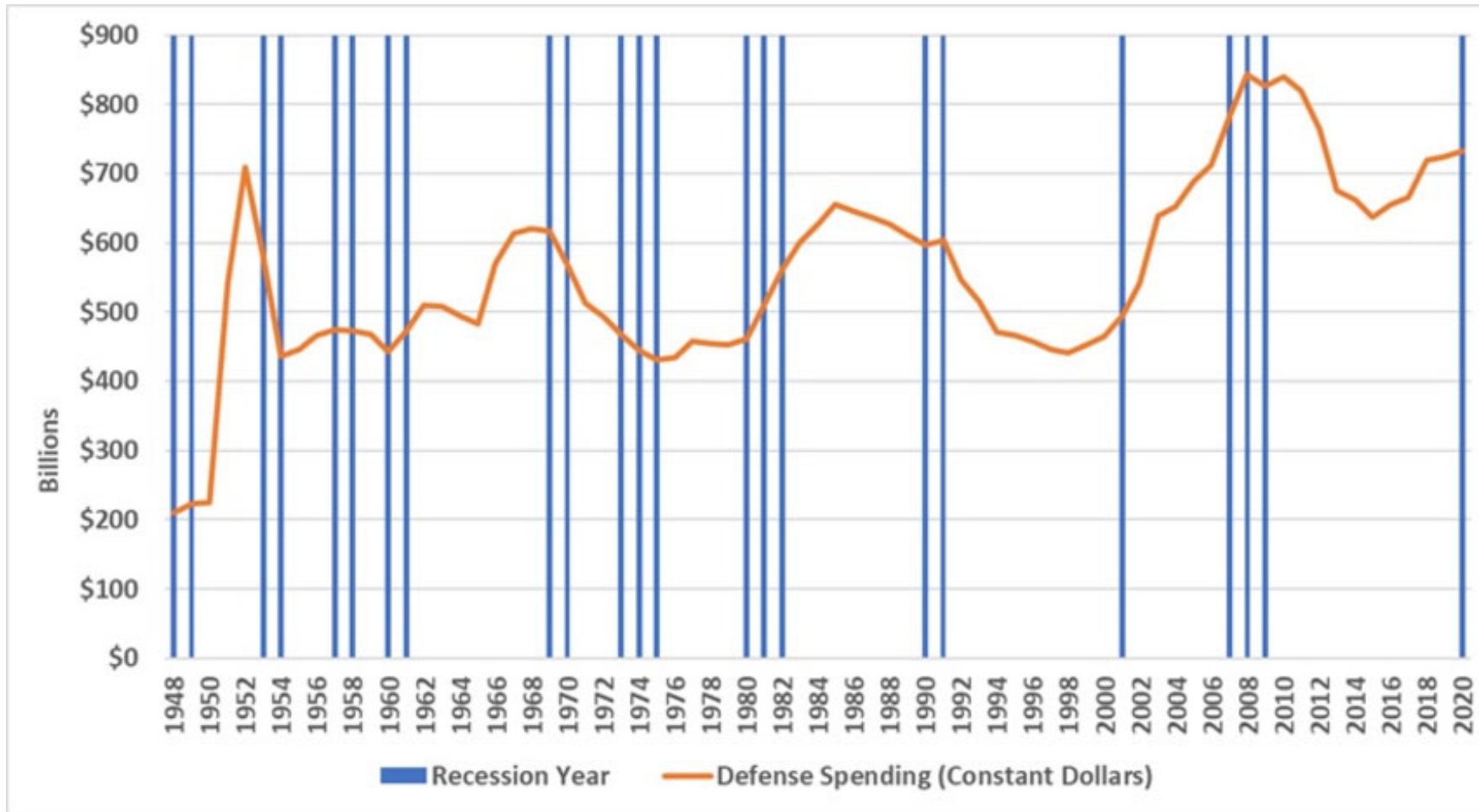
# Business Jet Manufacturer Market Shares By Deliveries Value, 2014-2023 vs. 2024-2033



# DoD Investment: Much Better Than In The Last Jetliner Downturn

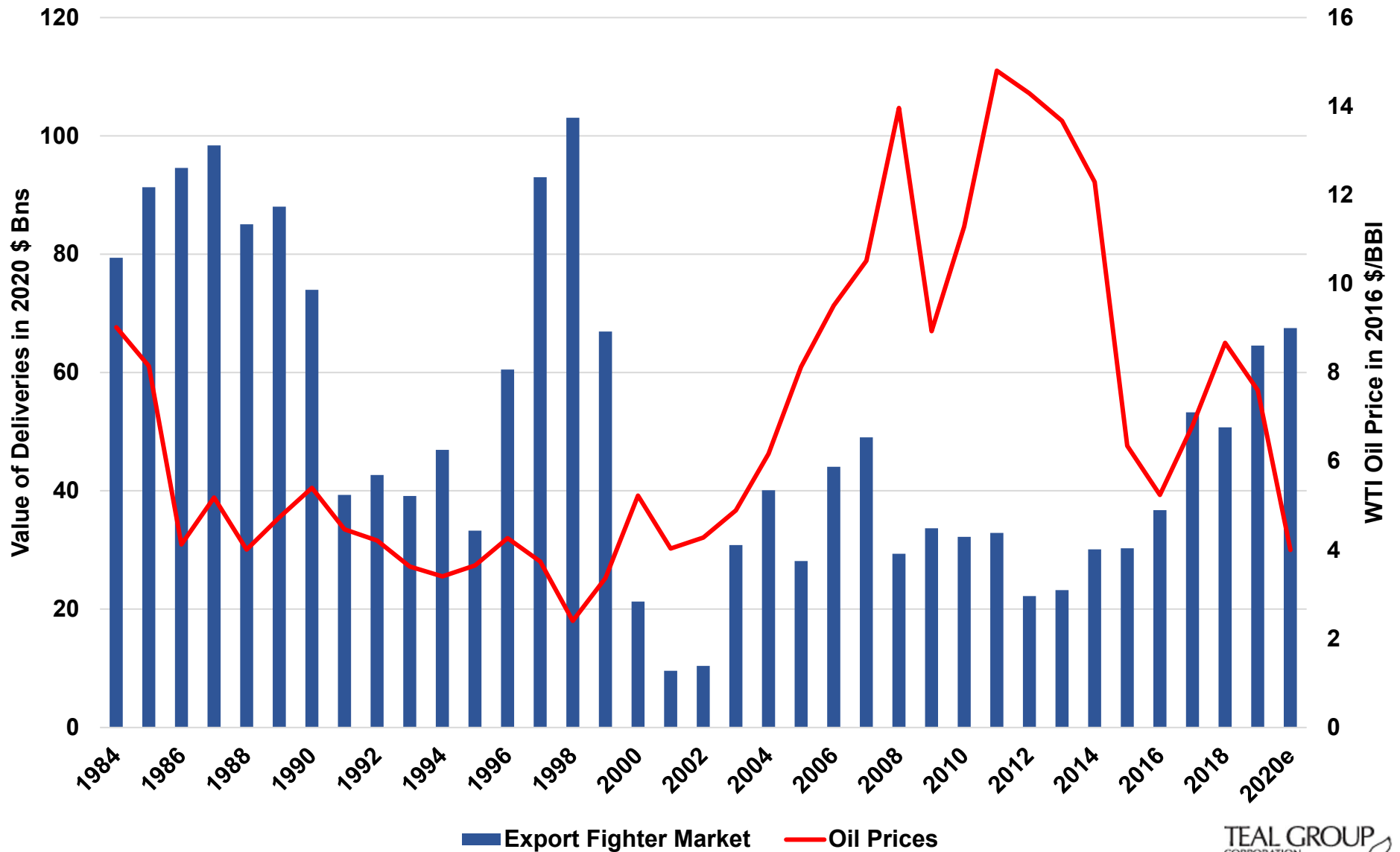


# No Clear Relationship Between US Defense Spending, Economy



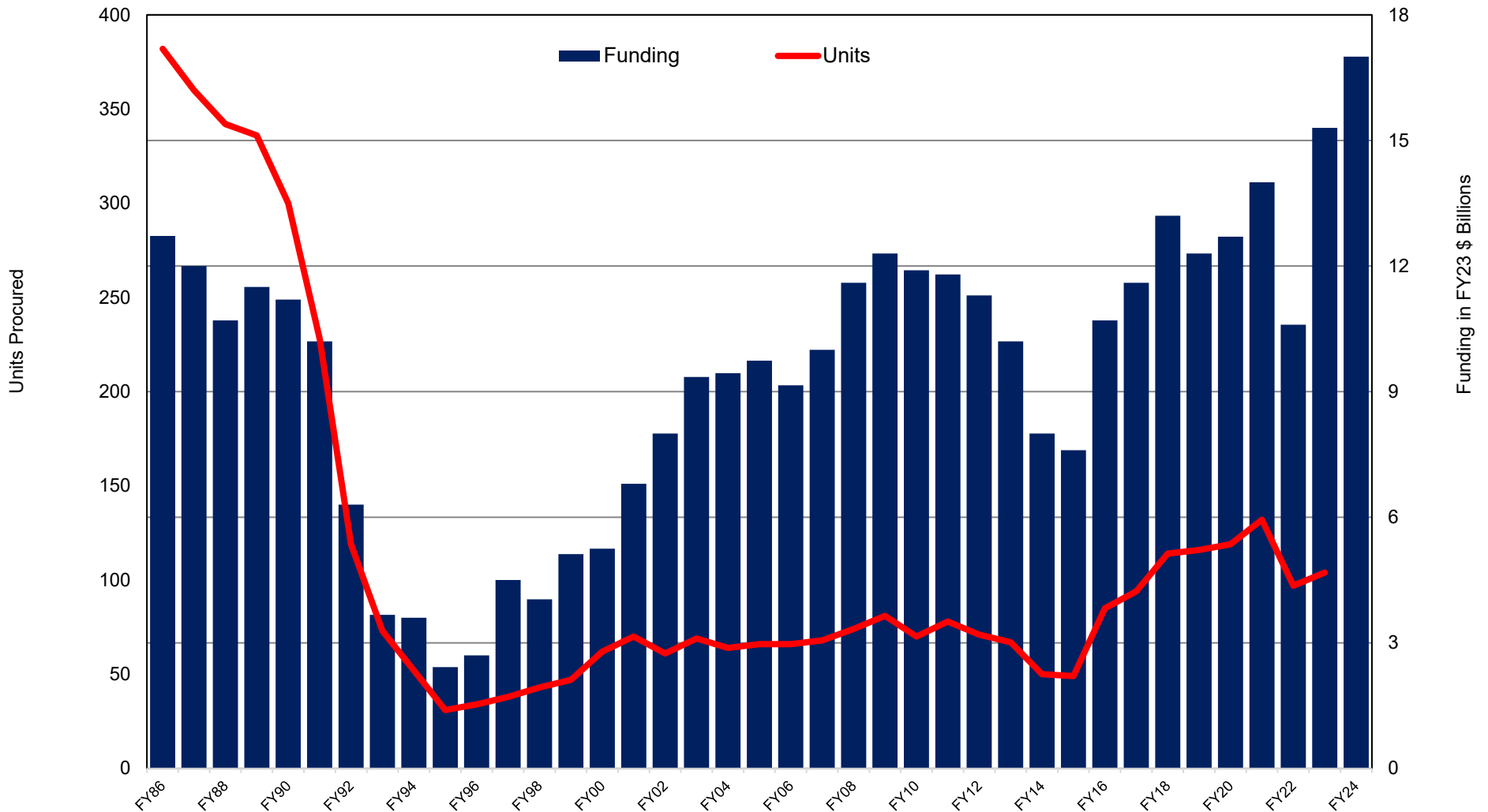
# Also No Clear Relationship Between Export Markets, Resource Prices

(Or any other economic indicator)



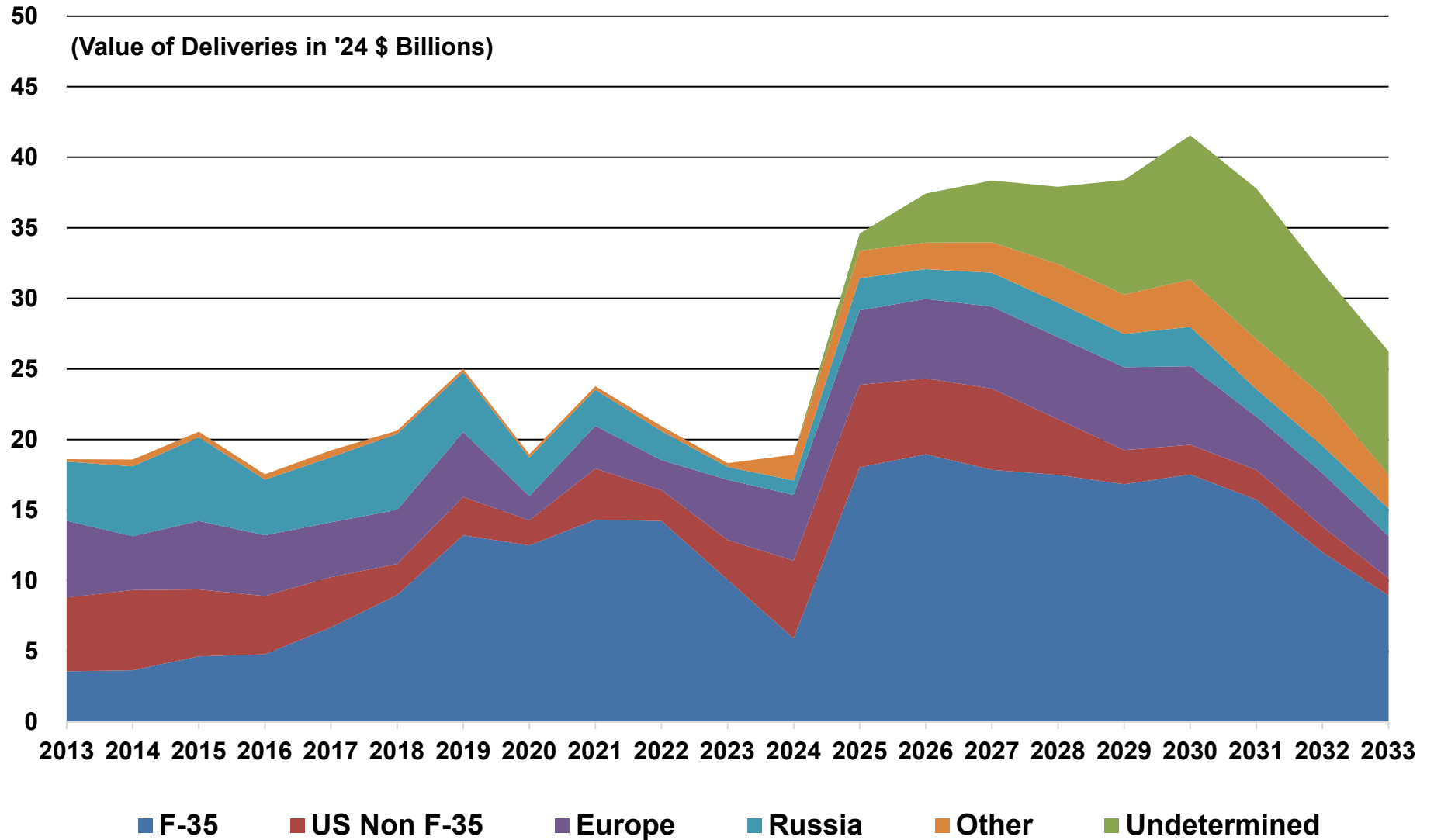
# DoD Tactical Aircraft Procurement FY86-FY24

## A Return to the Peak, But Fundamental Problems Remain



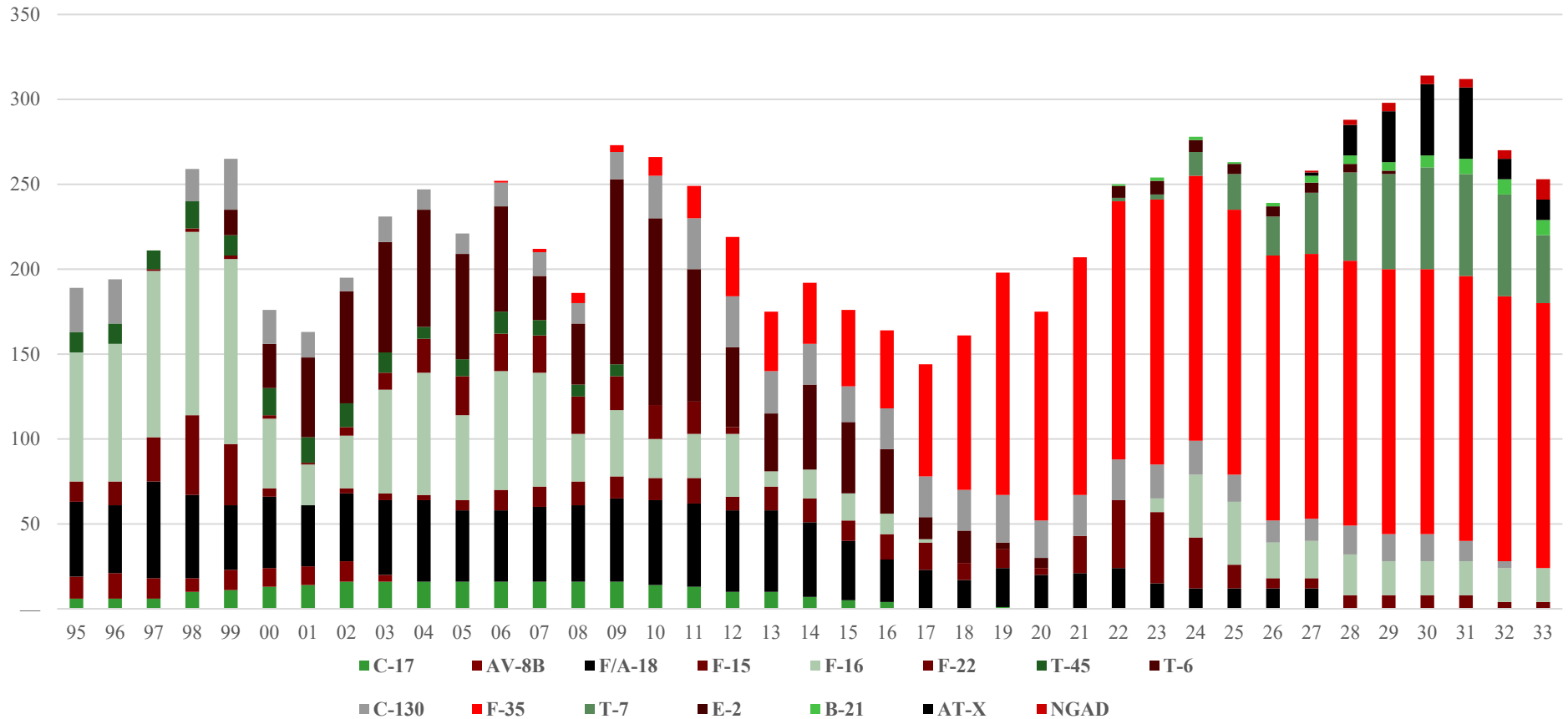


# World Fighter Production Shares



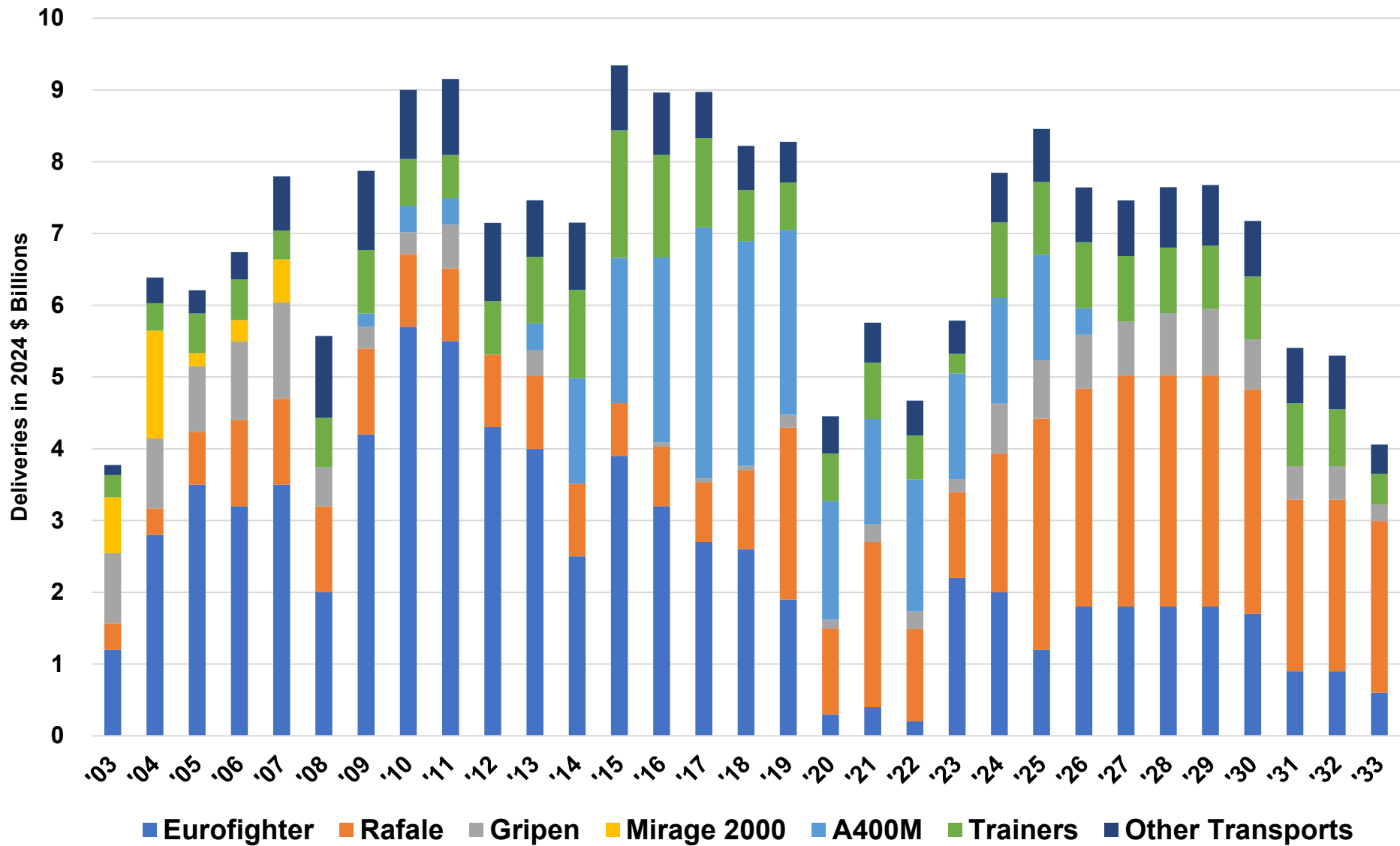
# U.S. Fixed-Wing Military Aircraft Deliveries

*(Does not include commercial derivatives)*



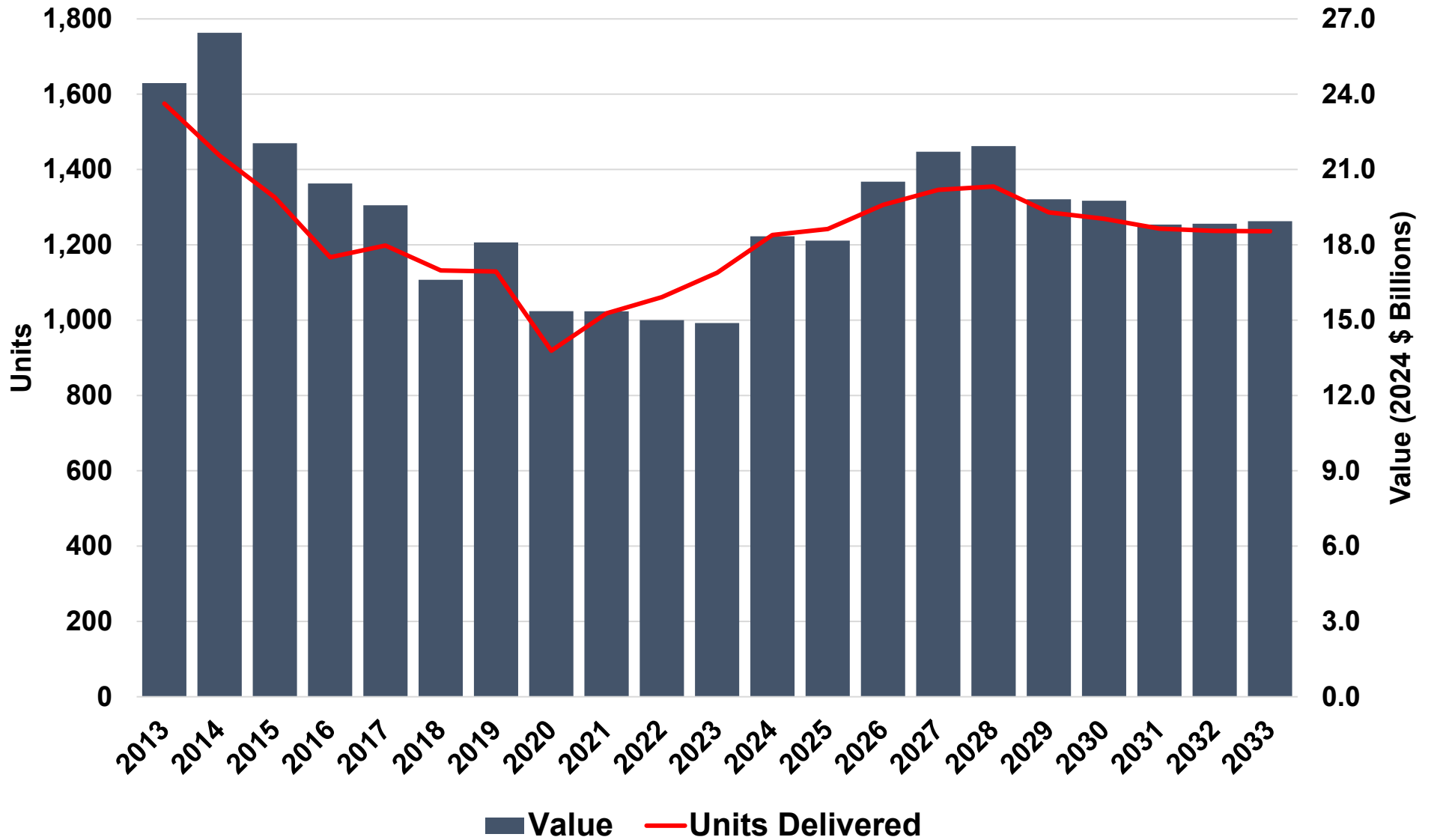
# European Military Aircraft Deliveries

## Coping Without F-35...To A Point

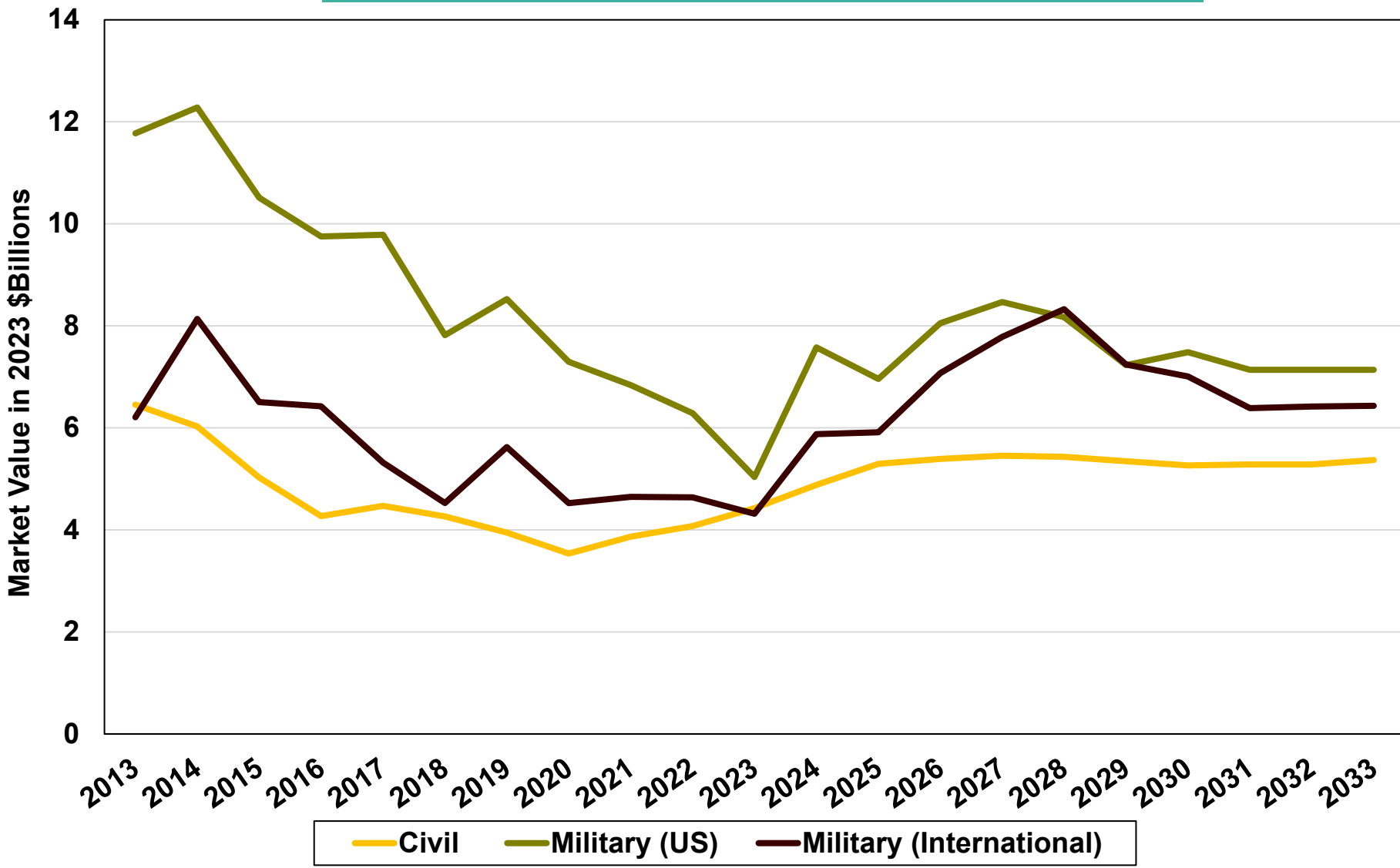


# The World Rotorcraft Market

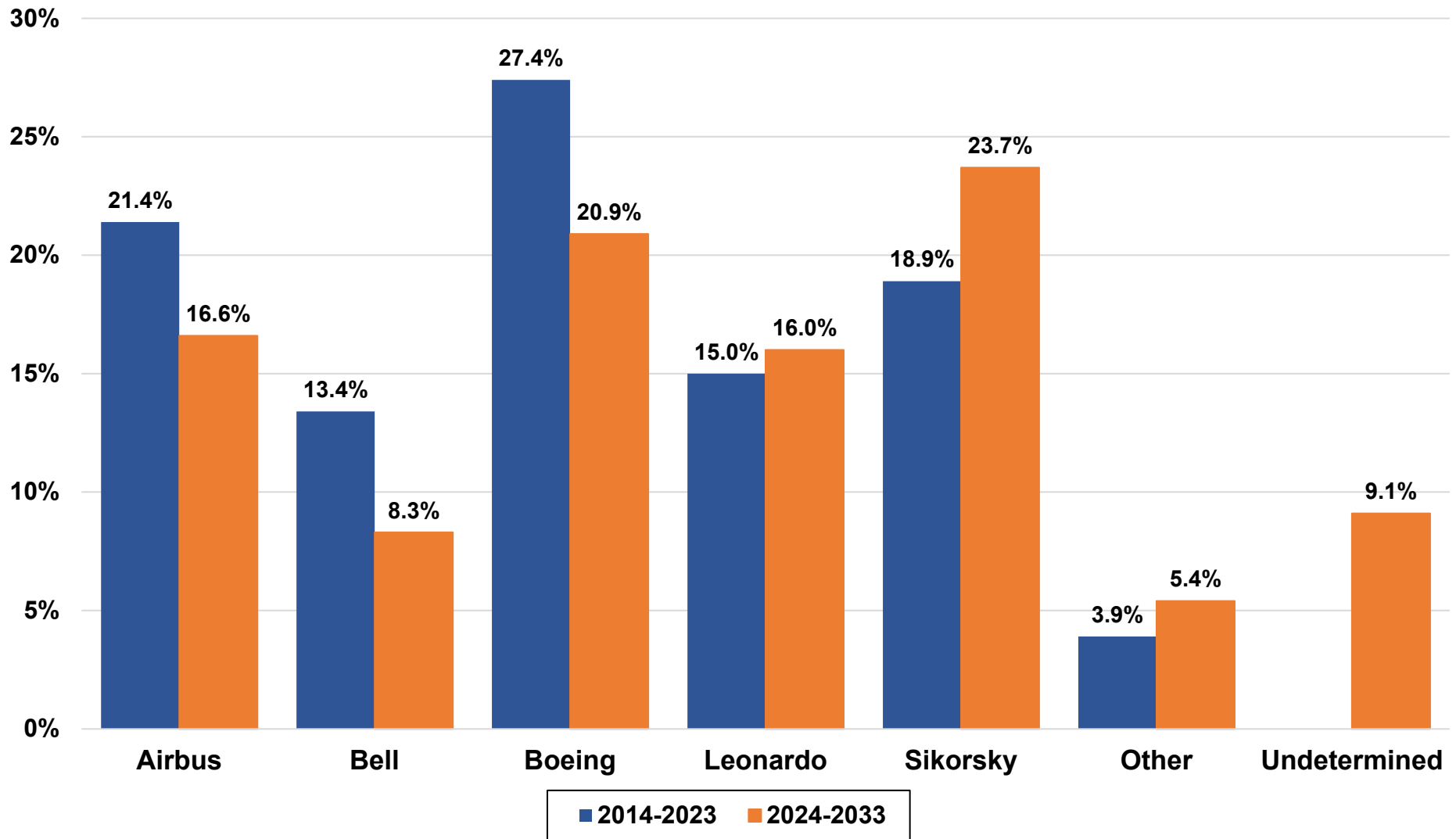
## The Age of Diminished Expectations



# US Military Rotorcraft Market Falling; International Military, Civil Stable



# Rotorcraft Manufacturer Market Shares 2024-2033 vs 2014-2023

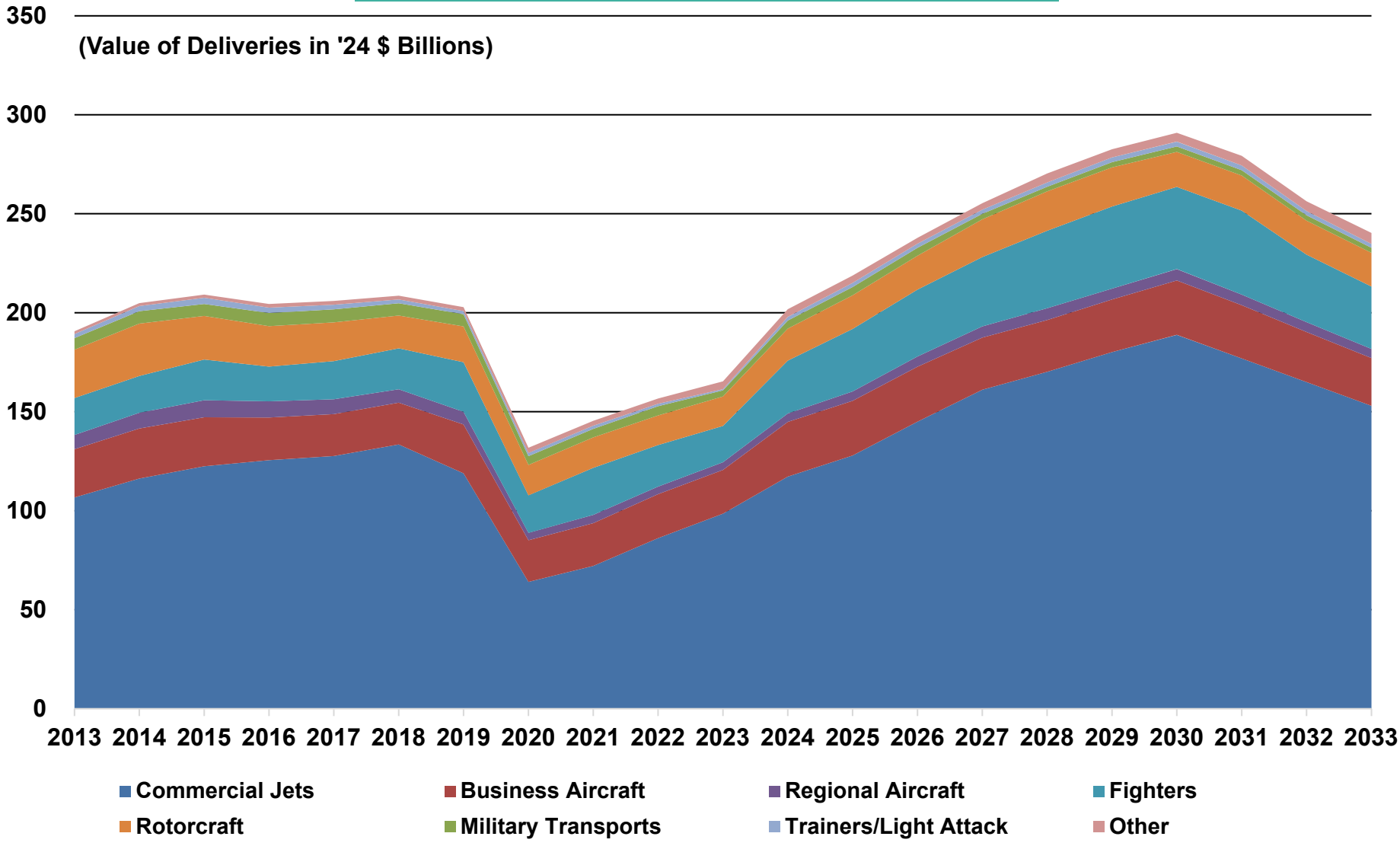


# Global Market Outlook on One Page

## (Deliveries, not Production)

<u>Segment</u>	<u>'24/'23</u>	<u>'25/'24</u>	<u>Risk</u>	<u>Elevator Comment</u>
Jetliners-SA	28.1%	8.8%		Steady growth with return of MAX deliveries, constrained by supply chain issues.
Jetliners-TA	51.5%	9.6%		2024 recovery primarily from 787 deliveries
Regionals	11.2%	11.2%		Embraer E-2 deliveries increasing. Pilot shortages easing but supply chain issues are ongoing risks.
Business Aircraft	24.3%	0.1%		23 delays pushing '24 deliveries up. Orderbooks remain strong; supply-chain issues persist.
Civil Rotorcraft	19.8%	8.5%		Oil/Gas exploration up fueling demand for larger models. Other sectors remain strong.
Military Rotorcraft	23.2%	-4.3%		Programs end/slow; no risk of accelerated downturn; FVL beyond forecast, exc FLRAA.
Military Transports	-5.7%	-4.5%		A seriously underperforming market. KC-390 emerging star.
Fighters	-9.7%	82.8%		We like this market. F-35 (after COVID disruption); Ukraine replacements/transfers add unexpected boost.
<u>All Civil</u>	<u>19.3%</u>	<u>7.5%</u>		SAJetliner snapback due to MAX, but weakness in TA; supply chain risks impeding recovery.
<u>All Military</u>	<u>11.8%</u>	<u>36.5%</u>		Vladimir Putin is Salesman of the Year, bringing countries off the sidelines. Special mission (ISR, B-21) also boosts topline.
<u>Total Industry</u>	<u>17.7%</u>	<u>13.5%</u>		<u>Back to peak in 2025</u>

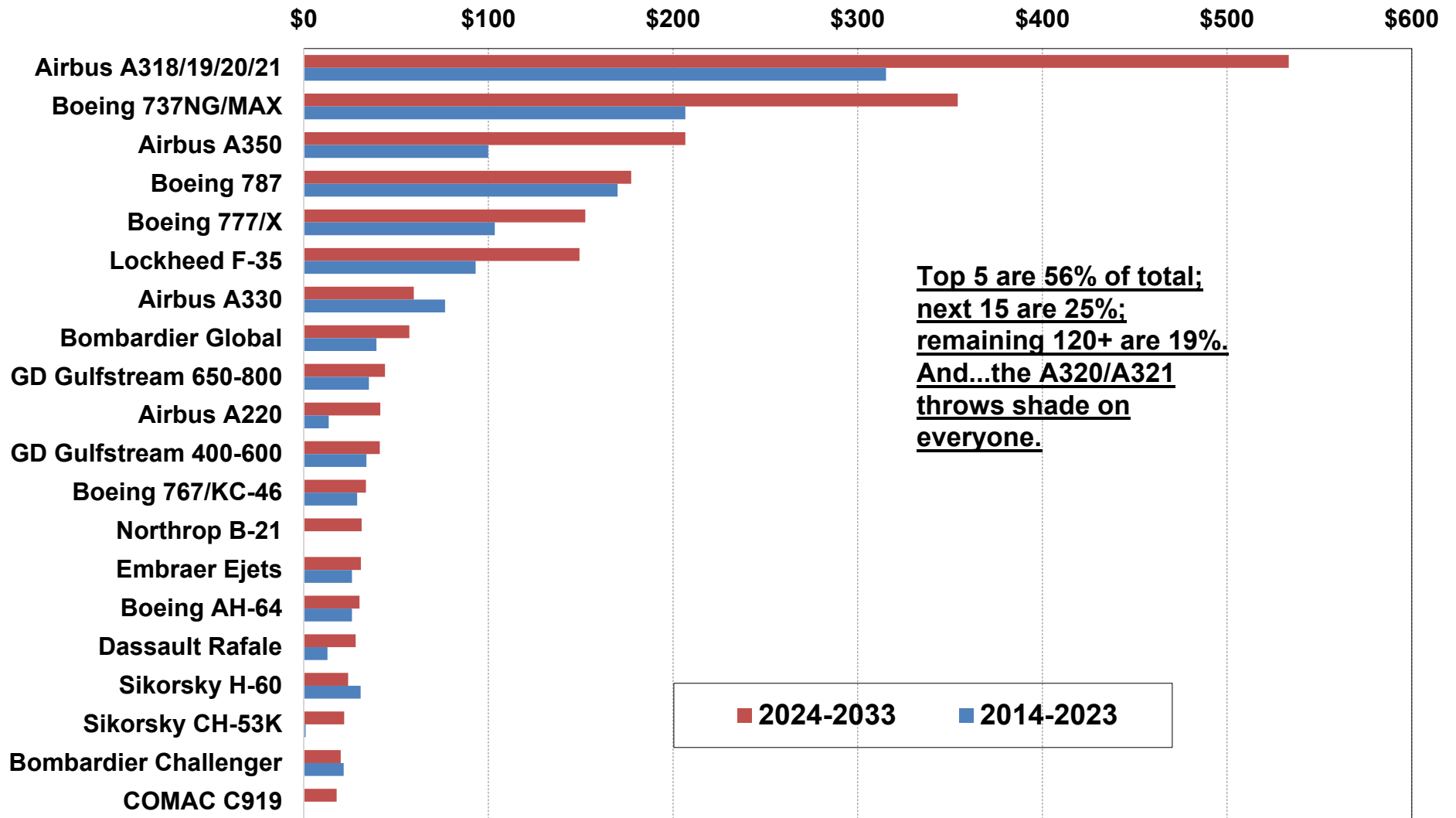
# World Aircraft Production History & Forecast



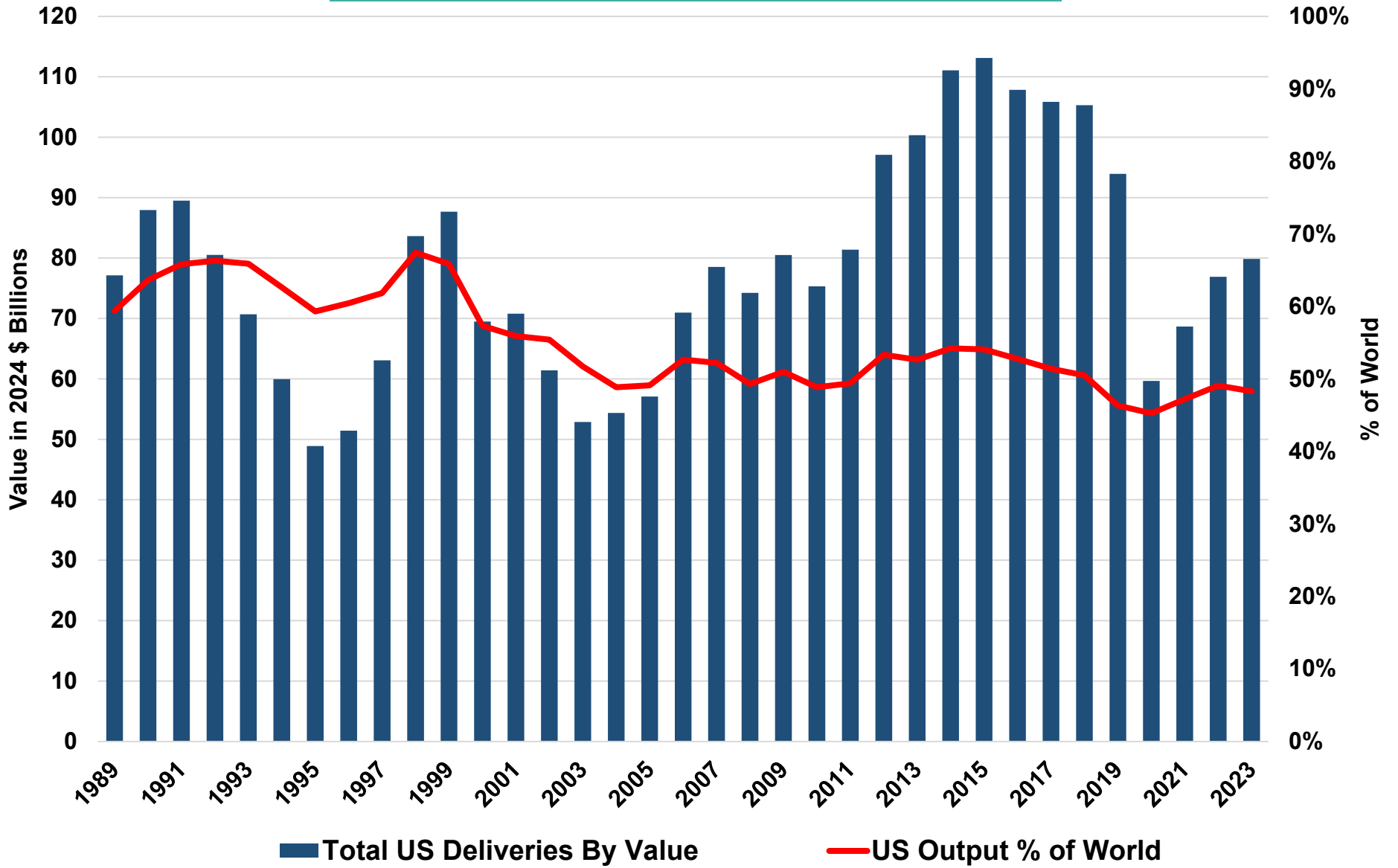


# Top 20 Aviation Programs; Volume Matters

Cumulative 10-year Deliveries Value in '24 \$ Bns



# US Aircraft Industry Output



# The Trends We're Watching

- **Geo-Political:** rising illiberal democracies/autocracies; conflict escalation (Ukraine, Gaza, Sudan); rising climate activism; China/Western tension
- **Macroeconomic:** Moderating inflation; higher interest rates; pandemic stimuli ending; stable fuel; reduced China growth; next recession
- **Industry:**
  - Boeing in chaos; Airbus On Top – but Duopoly survives!
  - Supplier rationalization, particularly 3/4<sup>th</sup> tier; re-aggregation
  - Growing importance of large single aisles
  - End of quadjets, marginalization of all larger jets
  - Regional Aircraft in doldrums
  - Growing reliance on third party jetliner finance
  - End of jetliner price deflation?
  - New product funding drought
  - China/Russia indigenous substitute product development
  - New Tech Engine durability issues: Rolls-Royce, P&W, even CFM
  - OEMs and airlines: strong get stronger, weak get weaker.
  - Uncertain search for various alternative propulsion/fuel concepts

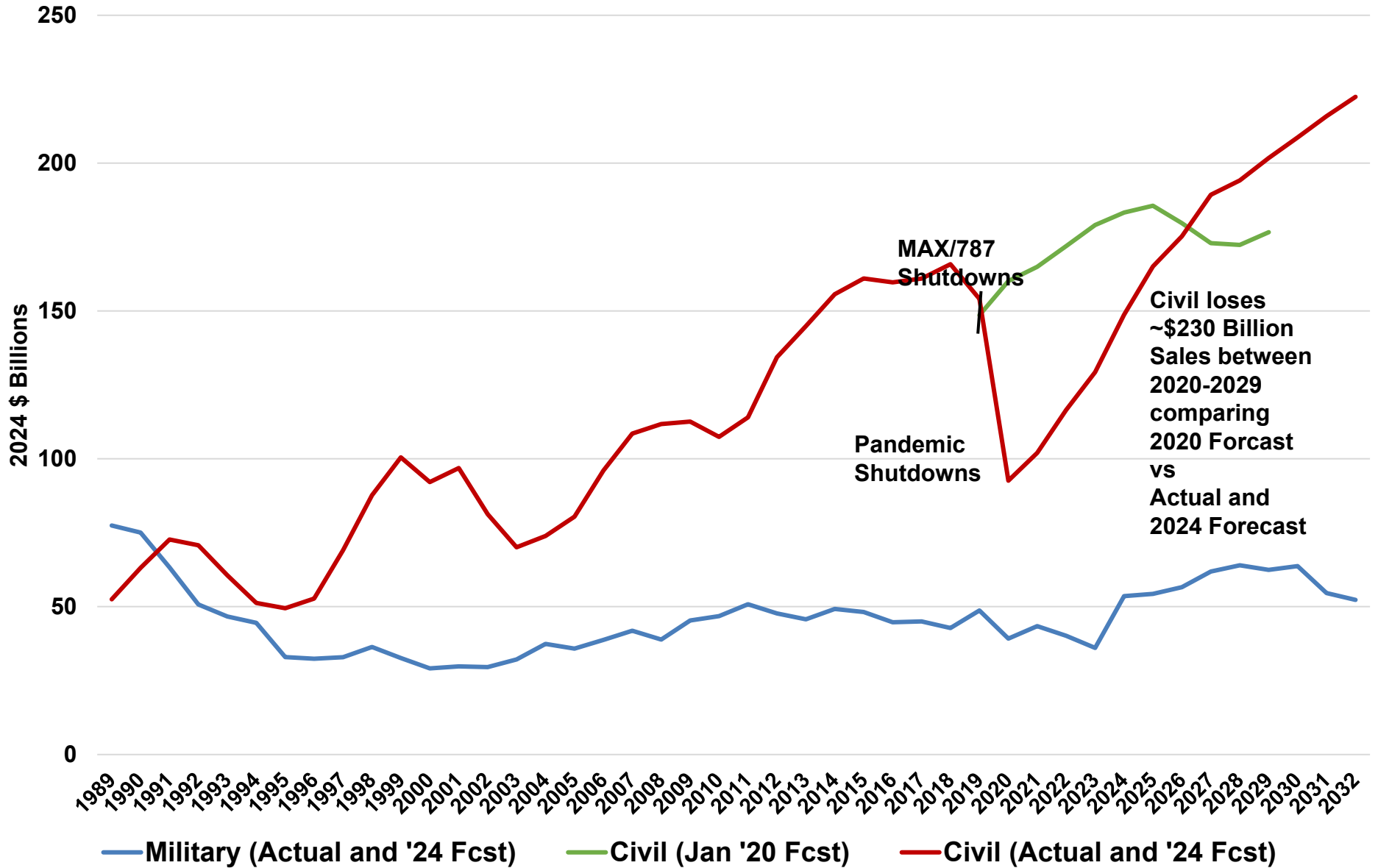
# New Cold War Impact On Aviation

- **Russian Invasion of Ukraine**
  - Two year old suspension of all commercial and business flights between Russia and “the West” remains in effect – about 1.5% of world traffic
  - Russian airspace closed to “unfriendly” countries
  - Domestic Russia and Middle East and Asia flights continue
  - Aircraft deliveries and support services to Russian entities suspended – minor hit to backlogs
  - Russian confiscation of over 500 foreign leased aircraft in retaliation of economic sanctions – bad, but manageable for lessors
  - NATO members closer together and ramping up defense spending
  - Western military aid to Ukraine will require additional spending to replace depleted reserves
- **China’s Increasing Isolation**
  - Zero-Covid policies lifted but international traffic, especially trans-Pacific, remains restrained
  - Refusal of Beijing to condemn Russia’s invasion strains relations with “the West”
  - Businesses looking to diversify supply chains out of China
  - Uncertain business environment scaring away investors
  - India’s opportunity?

# Concluding Observations, and *A Few Consolations*

- **Airline traffic is rebounding from its very steep fall**
  - *Domestic now above pre-pandemic levels*
  - *Long-haul Asian traffic is taking longer to recover*
- **Boeing doesn't seem too fazed by its mid market challenge**
- **For companies, all about the work portfolio**
- **Airline costs are on the rise – are customers going to pay?**
  - *Aircraft prices indexed to inflation; high interest makes it worse*
  - *Unprecedented labor agreements*
  - *Russia and Saudi Arabia oil curbs keeping oil price elevated*
  - *High yield business travel slow to recover*
  - *Full Service Carriers seem to be doing better than their low-cost peers*
- **In addition to the jetliner recovery, a few other bright spots**
  - *Defense: budgets, export demand, industrial support – all good*
  - *Less business jet frothiness*
  - *Financial sector stronger this time (“2008 was worse; you couldn't print money.”). Good for jetliners and for suppliers.*

# World Aircraft Deliveries By Value, 1989-2033



# Divergent Delivery Recovery Paths

## Twin Aisles and Regionals Are Taking Longer

