

World Aero Markets Overview

Looking Up!

(Too Bad About That Pesky Supply Chain)

World Aircraft Overview

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Aircraft Markets, In Good And Bad Years

(last year was a little less worse)

<u>World New Deliveries</u>	<u>CAGR</u>	<u>CAGR</u>	<u>CAGR</u>	<u>Change</u>	<u>Change</u>
<u>In 2022 (2023 \$)</u>	<u>'04-'09</u>	<u>'09-'14</u>	<u>'14-'19</u>	<u>'21/'19</u>	<u>'22/'19</u>
Jetliners-SA (\$50.0 b)	11.7%	5.2%	-3.0%	-2.1%	19.1%
Jetliners-TA (\$27.1 b)	8.9%	13.3%	2.1%	-64.2%	-58.6%
Regionals (\$3.5 b)	0.0%	-0.8%	-5.9%	-36.6%	-42.3%
Business Aircraft (\$21.5 b)	6.7%	1.8%	-0.6%	-12.3%	-9.7%
Civil Rotorcraft (\$3.9 b)	13.1%	0.0%	-7.9%	-2.0%	3.3%
Military Rotorcraft (\$10.4 b)	14.8%	6.4%	-7.1%	-19.5%	-22.3%
Military Transports (\$4.2 b)	5.3%	-2.7%	-0.2%	-32.2%	-32.2%
Fighters (\$23.0 b)	-2.0%	-0.8%	6.2%	-6.7%	-6.7%
<u>All Civil</u> (\$106.3 b)	<u>8.6%</u>	<u>6.6%</u>	<u>-0.7%</u>	<u>-34.1%</u>	<u>-24.8%</u>
<u>All Military</u> (\$43.8 b)	<u>4.1%</u>	<u>1.7%</u>	<u>-0.1%</u>	<u>-12.0%</u>	<u>-12.6%</u>
<u>Total</u> (\$147.8 b)	<u>7.1%</u>	<u>5.3%</u>	<u>-0.5%</u>	<u>-28.5%</u>	<u>-21.7%</u>

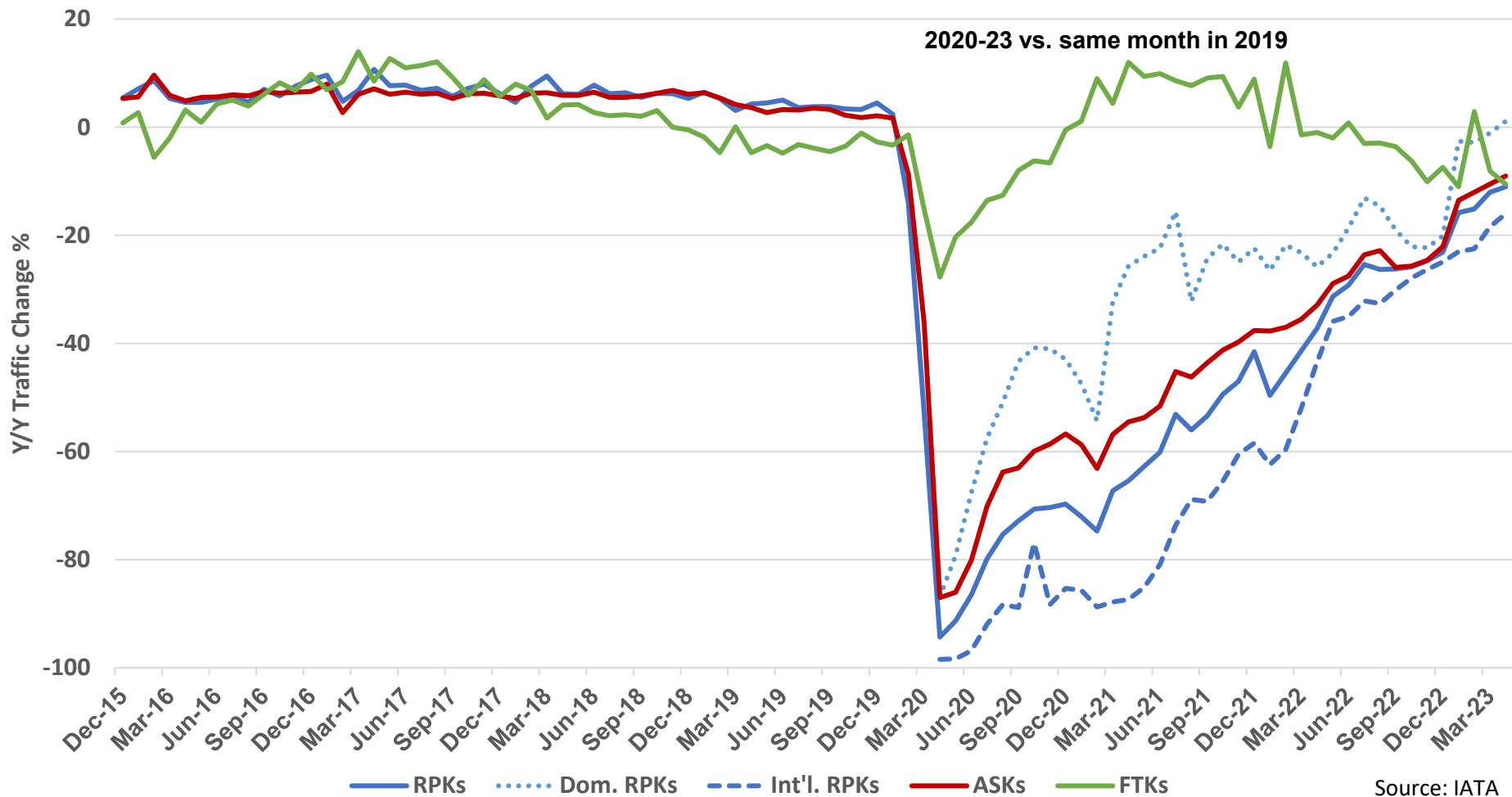
Aviation Segments By Pandemic Damage

Most to Least
**Annotated, 36
Months In**

Regionals	<p>Pilot shortages forcing grounding of existing fleets</p> <p>Mainline carriers prioritizing seats per departure over frequency</p> <p>Bleak prospects as pilot union hostility only gets stronger</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>Recovery will lag for awhile</p>
Single Aisle Jetliners	<p>MAX is back (mostly)!</p> <p>China market uncertainty</p> <p>Domestic and Regional markets rebounding strongly</p> <p>Supply Chain issues limiting deliveries</p>
Business Jets	<p>Large cabin strongly correlated with oil prices</p> <p>Small/medium strongly correlated with corporate profits, equities indices</p> <p>2023 continuing strong '21/'22 momentum, but for how long?</p>
Civil Rotorcraft	<p>Oil and gas segment picking up.</p> <p>Oil and Gas environment mixed, caught between Ukraine invasion and Climate Change.</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>All good. In fact, better</p>

Traffic: Domestic Leading The Recovery; International Recovery Lags; Freight Softening

2022 Totals (vs 2019): RPKs -31.5%; ASKs -28.1%; FTKs -1.6%
2021 Totals (vs 2019): RPKs -58.4%; ASKs -48.8%; FTKs +6.9%

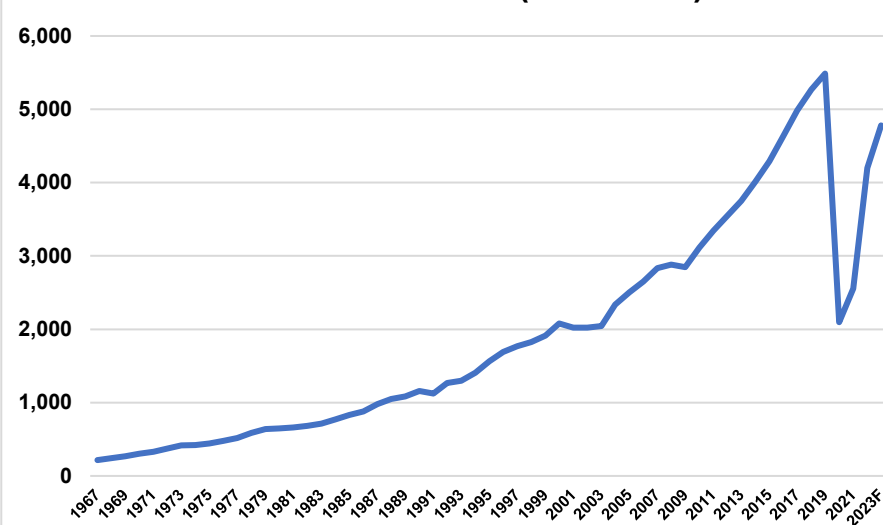


Source: IATA

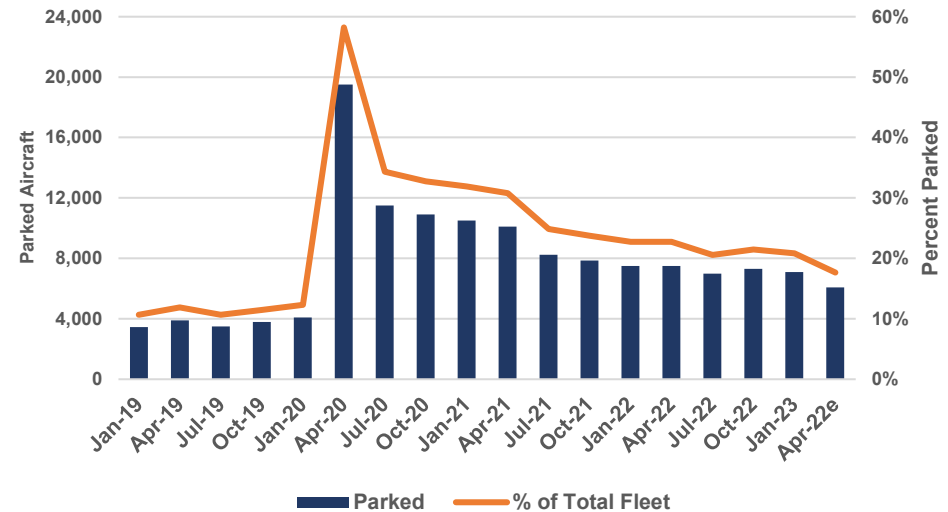
Still Recovering

- **Traffic decline, parked fleet like no previous shock.**
 - Per Paul Krugman, reflect a world economy recovering from a “medically-induced coma.”
- **Backlogs growing, but production rates struggling to meet demand.**
 - Persistent supply chain issues exacerbated by labor and materiel shortages
- **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 creating problems.

World Air Traffic (RPM Bns)



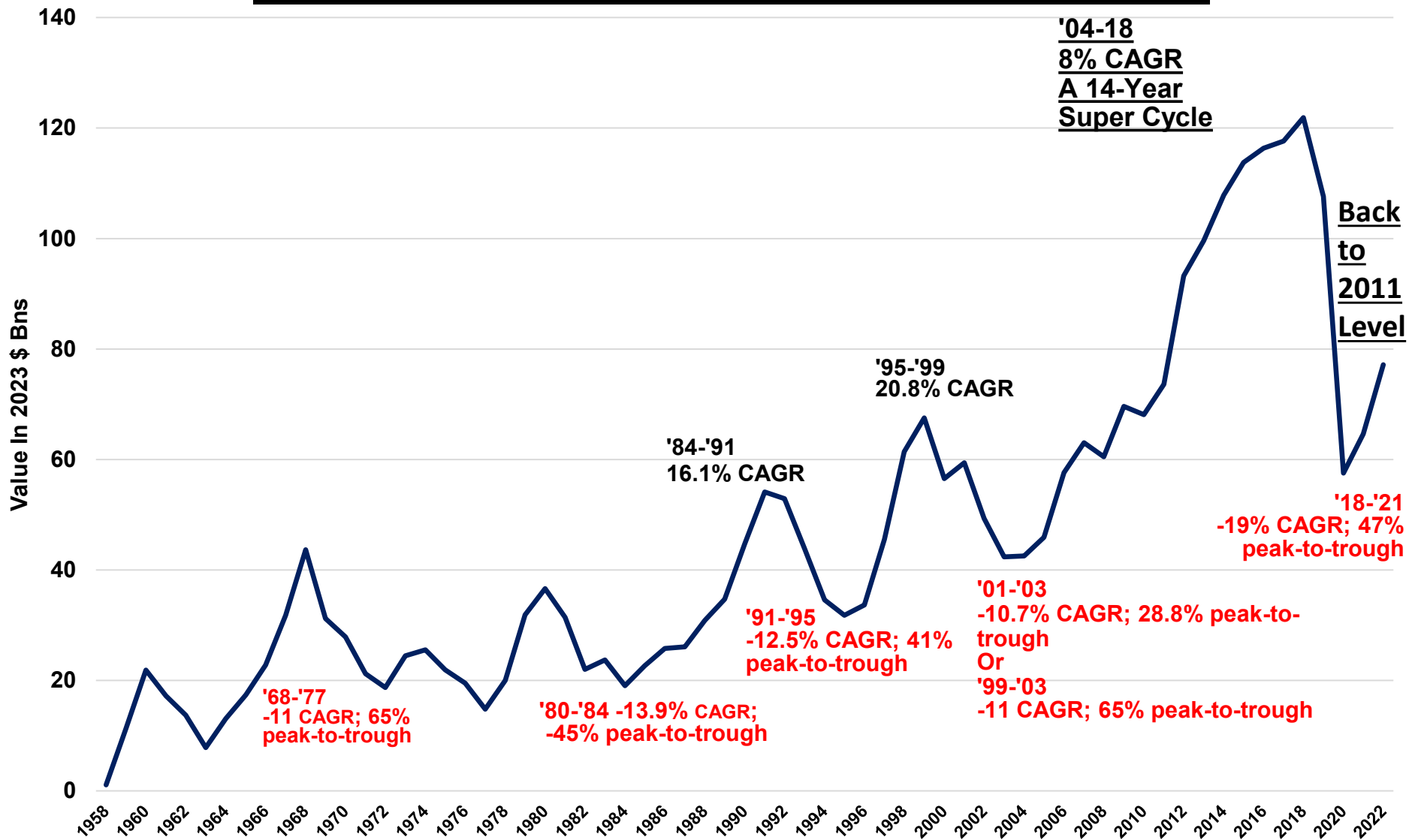
World Fleet: Down to ~18% Unemployed



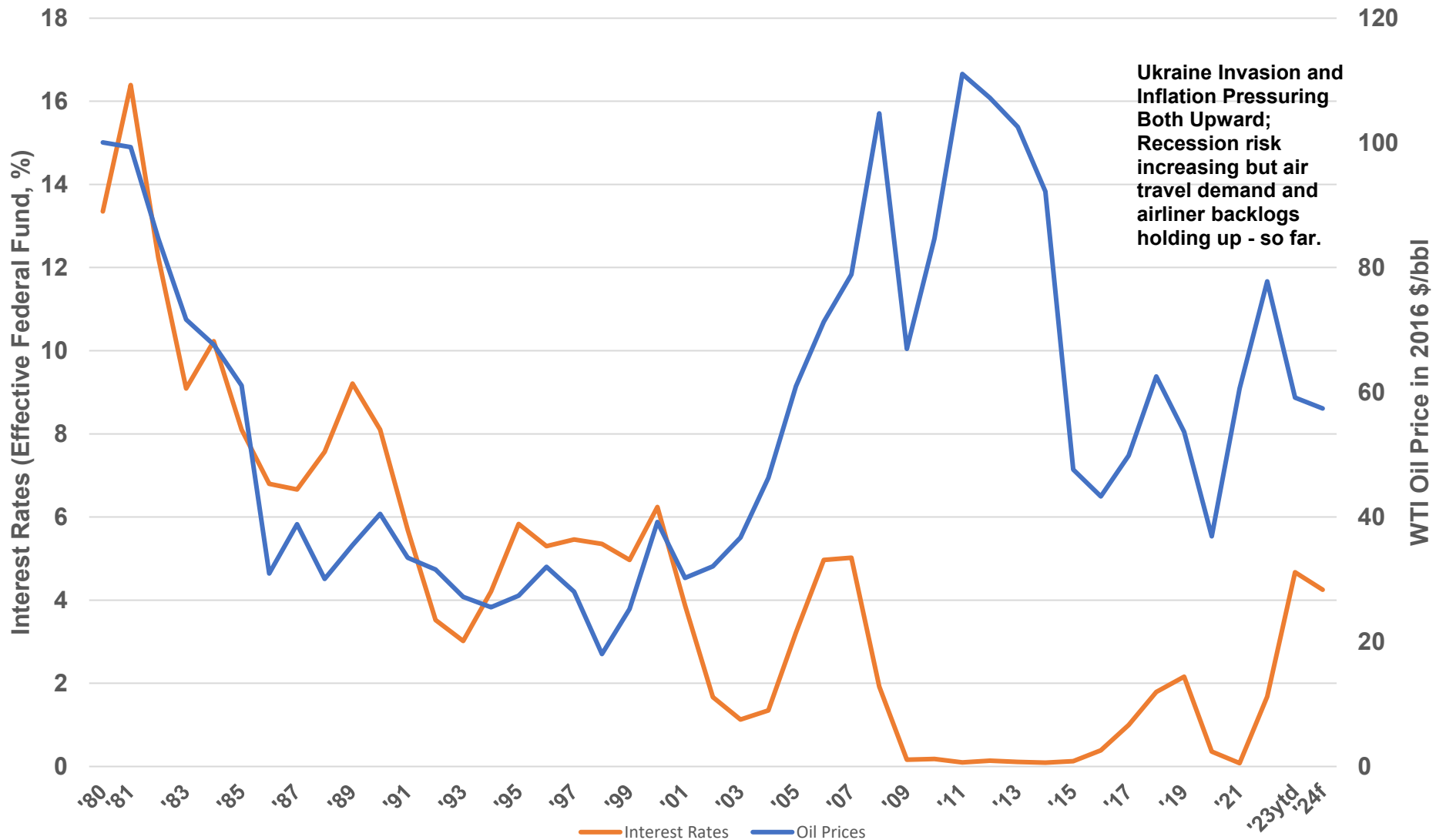
Traffic Peak Recovery not for awhile. Why?

- **Business Travel still lagging**
- **China recovery is incomplete**
 - Domestic travel no longer held back by “zero-Covid” but economic growth is a concern
 - Long-Haul affected by geopolitical tensions
- **Staffing shortages limit growth potential**
 - Curtailed operations
 - Regional operations losing pilots
 - Big airplanes are back in vogue (A380)
- **Vacation travel resurgence at risk on economic uncertainty**
 - Record savings rates fueling travel are starting to dwindle
 - Persistent concern about world economic growth
 - Skyrocketing airline costs (esp. labor) affecting affordability

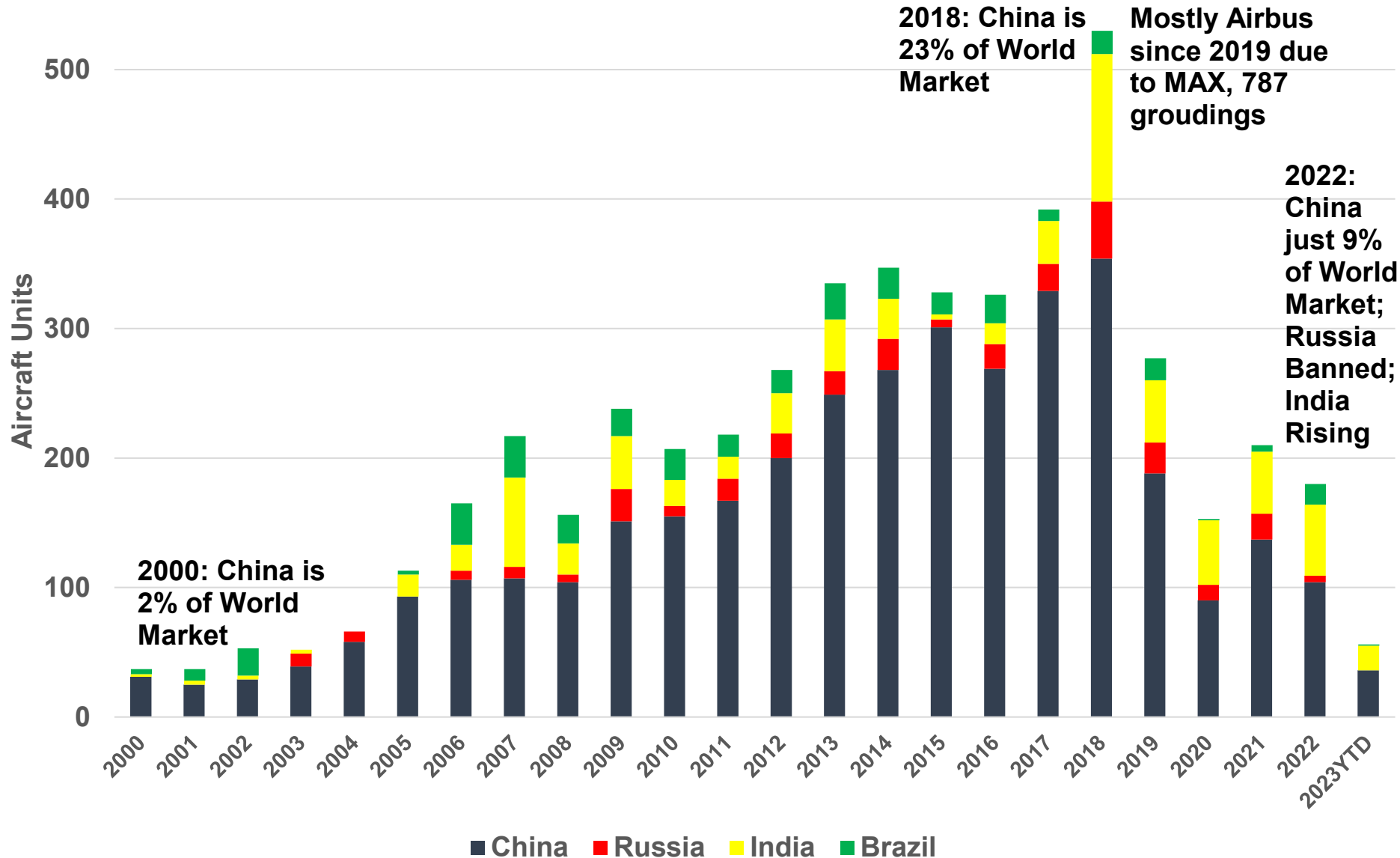
The Dreaded Chart, Only Somewhat Improved



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

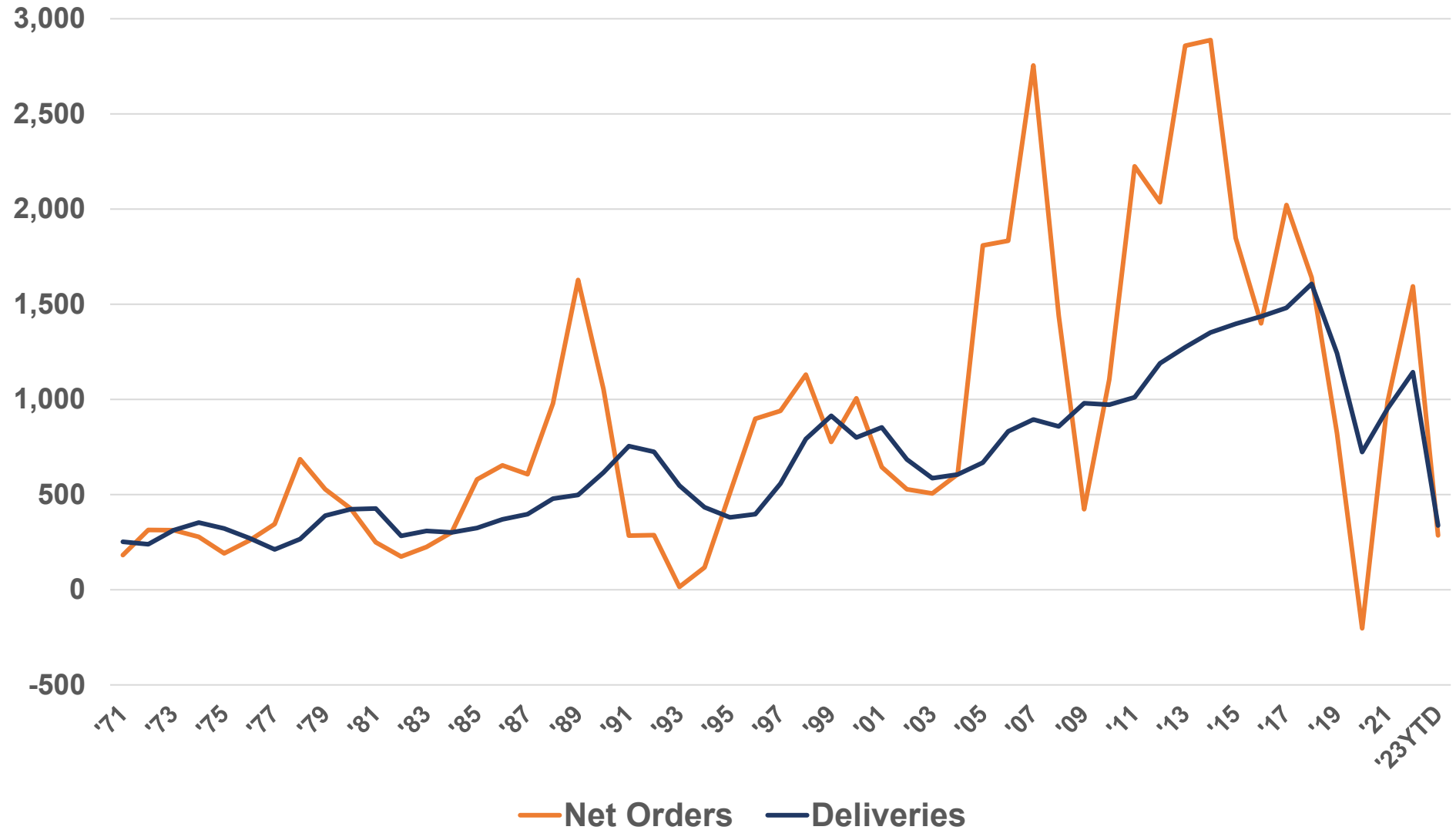


B(R)IC Deliveries: All About China?



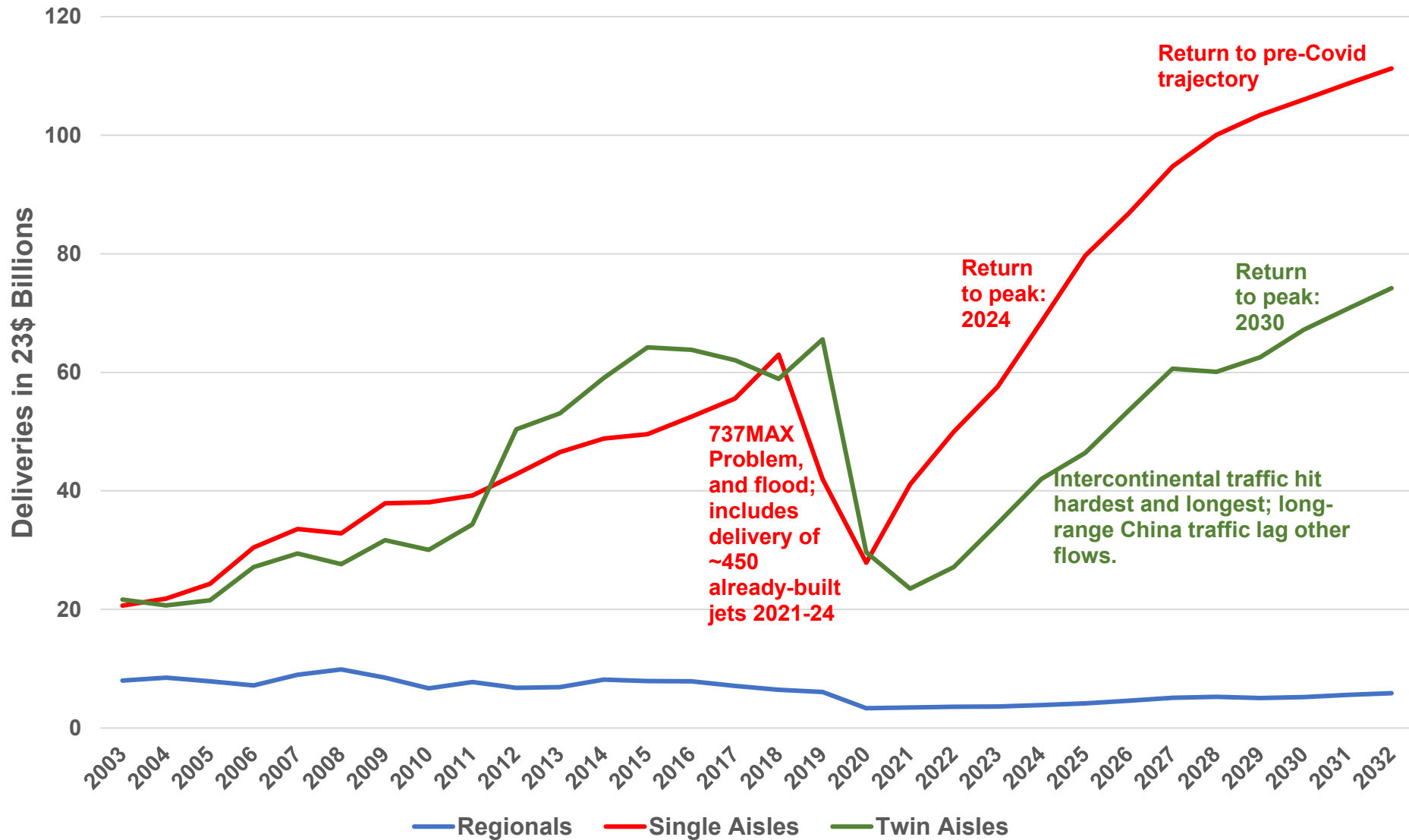
Large Jetliner Orders and Deliveries

Book-to-Bill A Thing Again

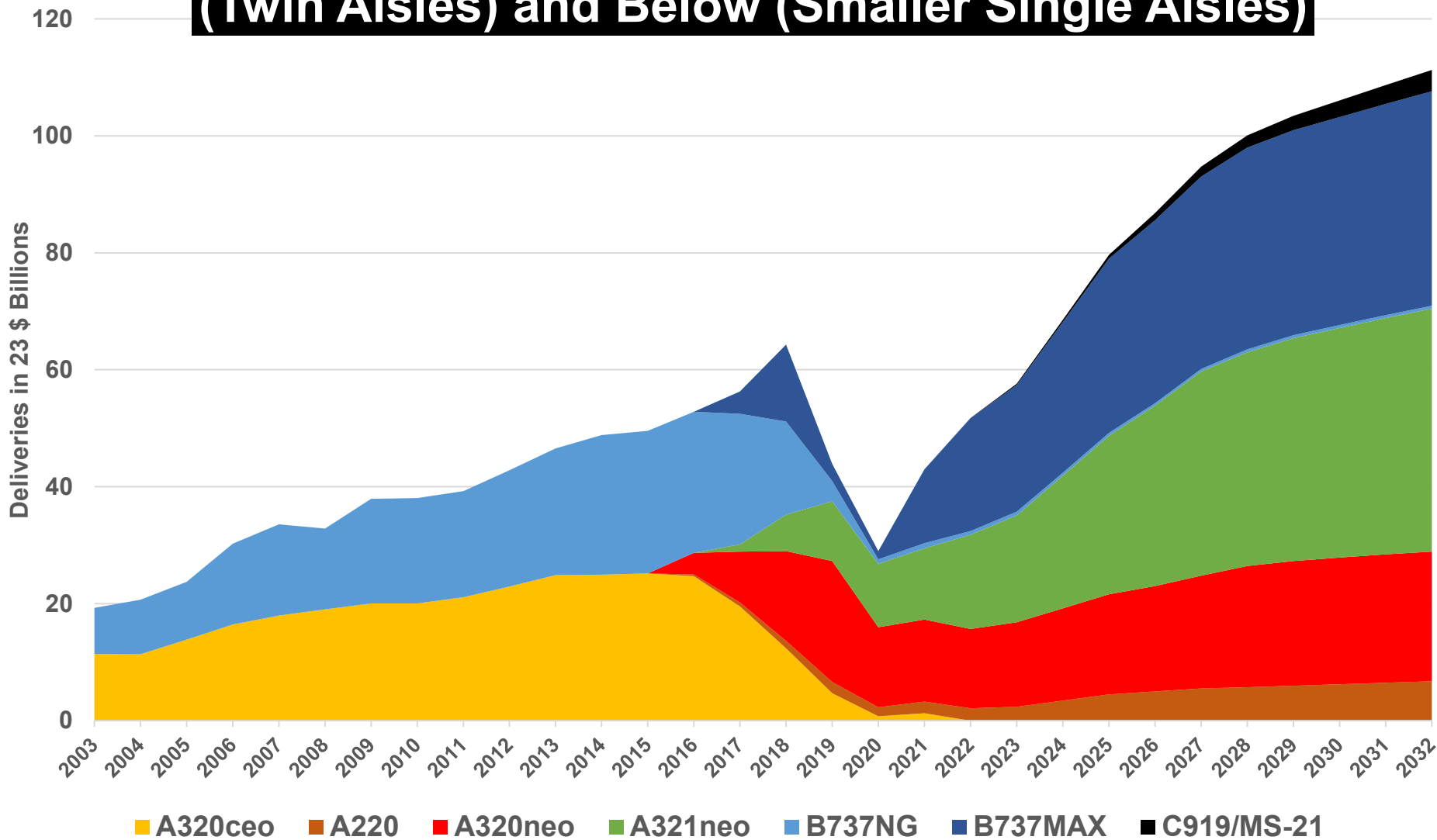


The Air Transport Market By Segment

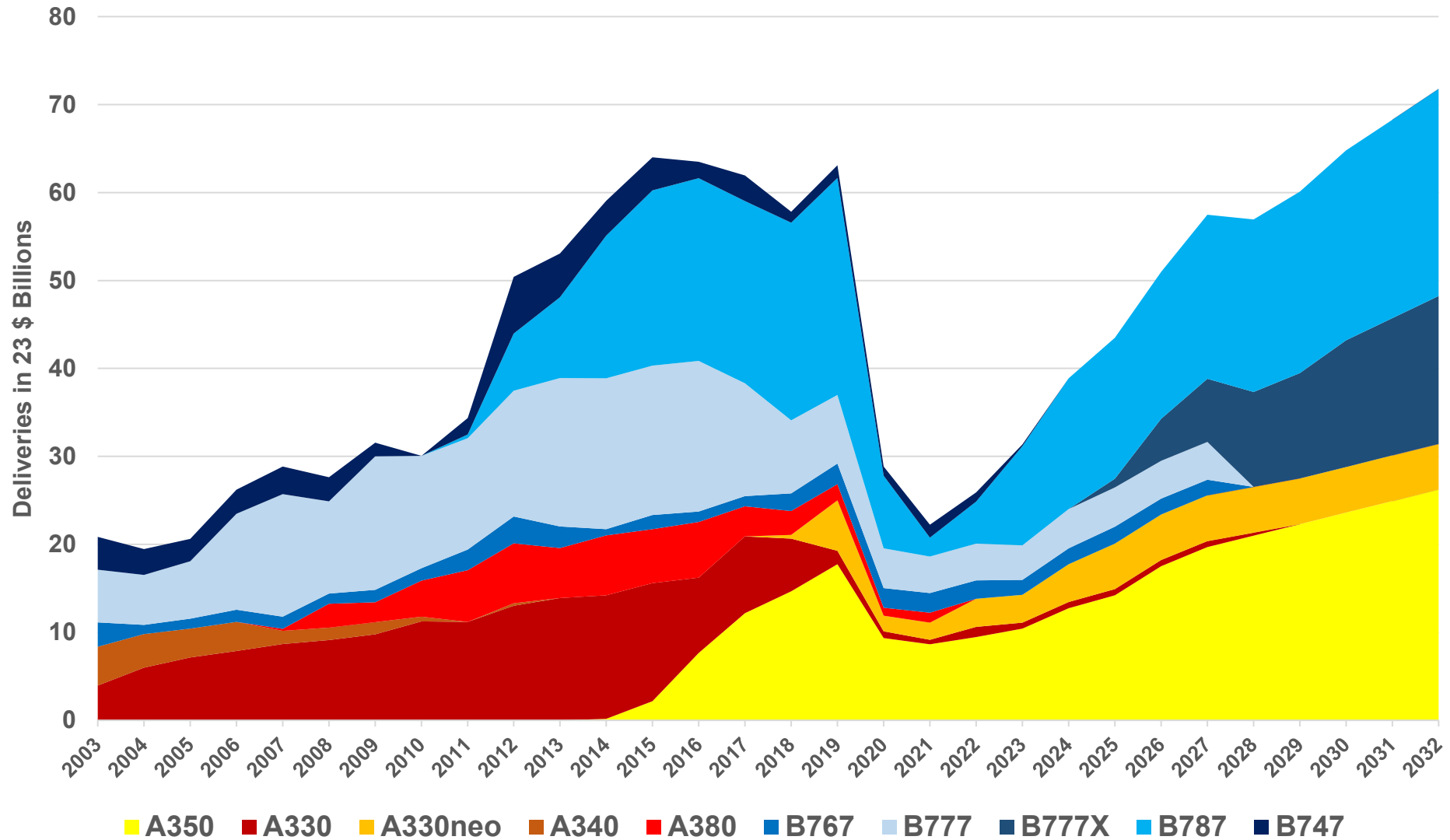
Single Aisles Surge; Twin Aisles Lag



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 lasting shift towards single aisles, with profound consequences for primes, suppliers, and jetliner financing. But twins 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).

AVMARK's address on the internet is avmark@airbus.com

AVMARK NEWSLETTER

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Market Comment

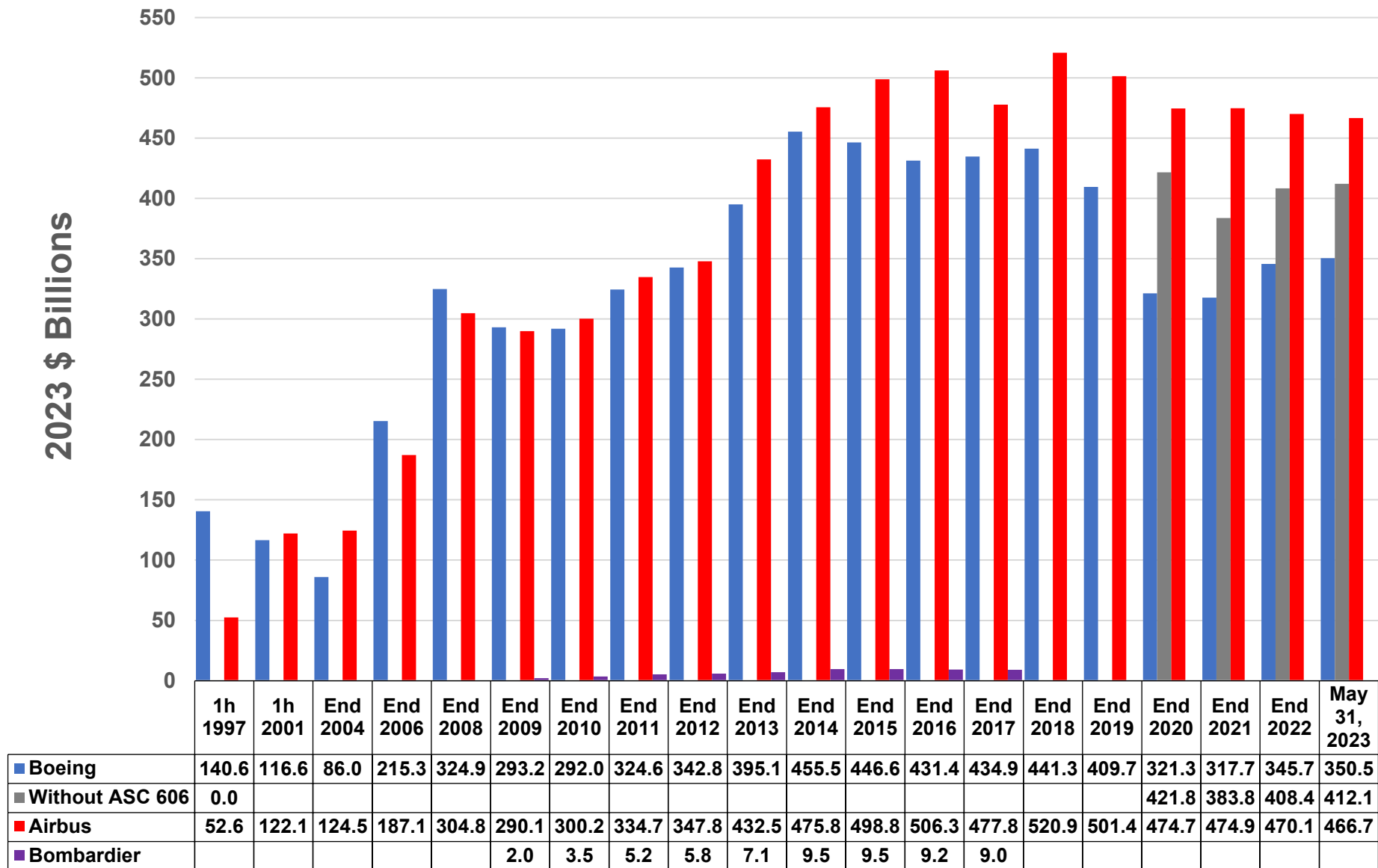
The World is Awash in Widebodies. Thanks to the Asian economic crisis and a flood of deliveries, the number of widebody aircraft available for sale or lease have grown at an astronomical rate. Currently, *Airfax* lists some 186 aircraft on the market, certainly less than the number available in the early 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
L-1011	29
DC-10	22
MD-11	3

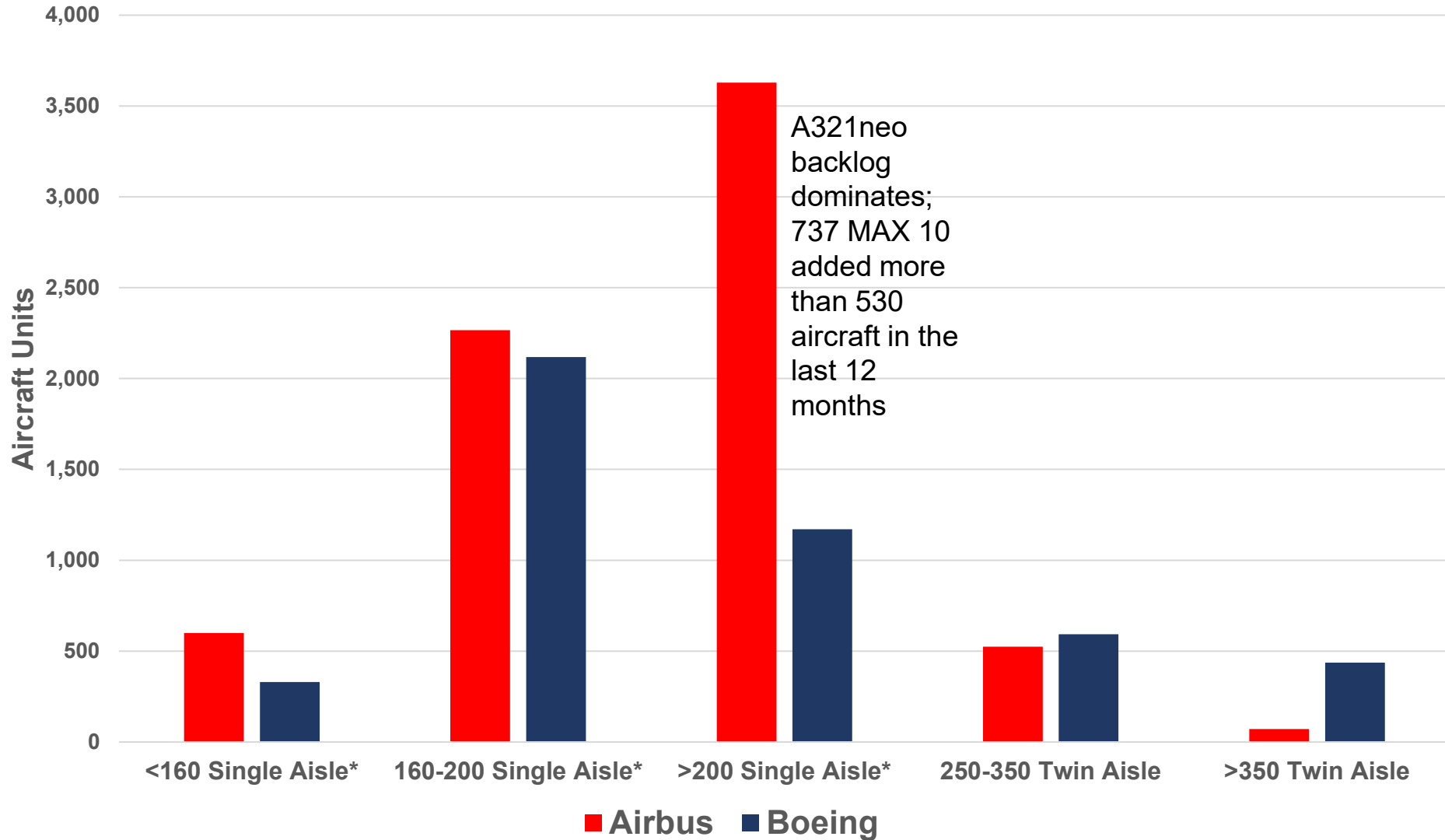
The number of widebodies available is unusual for three reasons. First, barring the economic problems in Asia, most of the world's airlines and the economies of most other major countries are holding up well, with yields at respectable levels and load factors at all time highs. Second, the number of 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 on demand for older aircraft. Already there are reports of new B-747-400s selling for little more than \$100 million while the aircraft's list price ranges between \$156 and \$174 million. Pricing like this makes the newer widebodies an incredible bargain and virtually dooms older, less attractive equipment to the scrap heap. There is little demand for them from new entrants or

Firm Order Backlog Values: Largely Stable; Boeing Edging Its Way Back

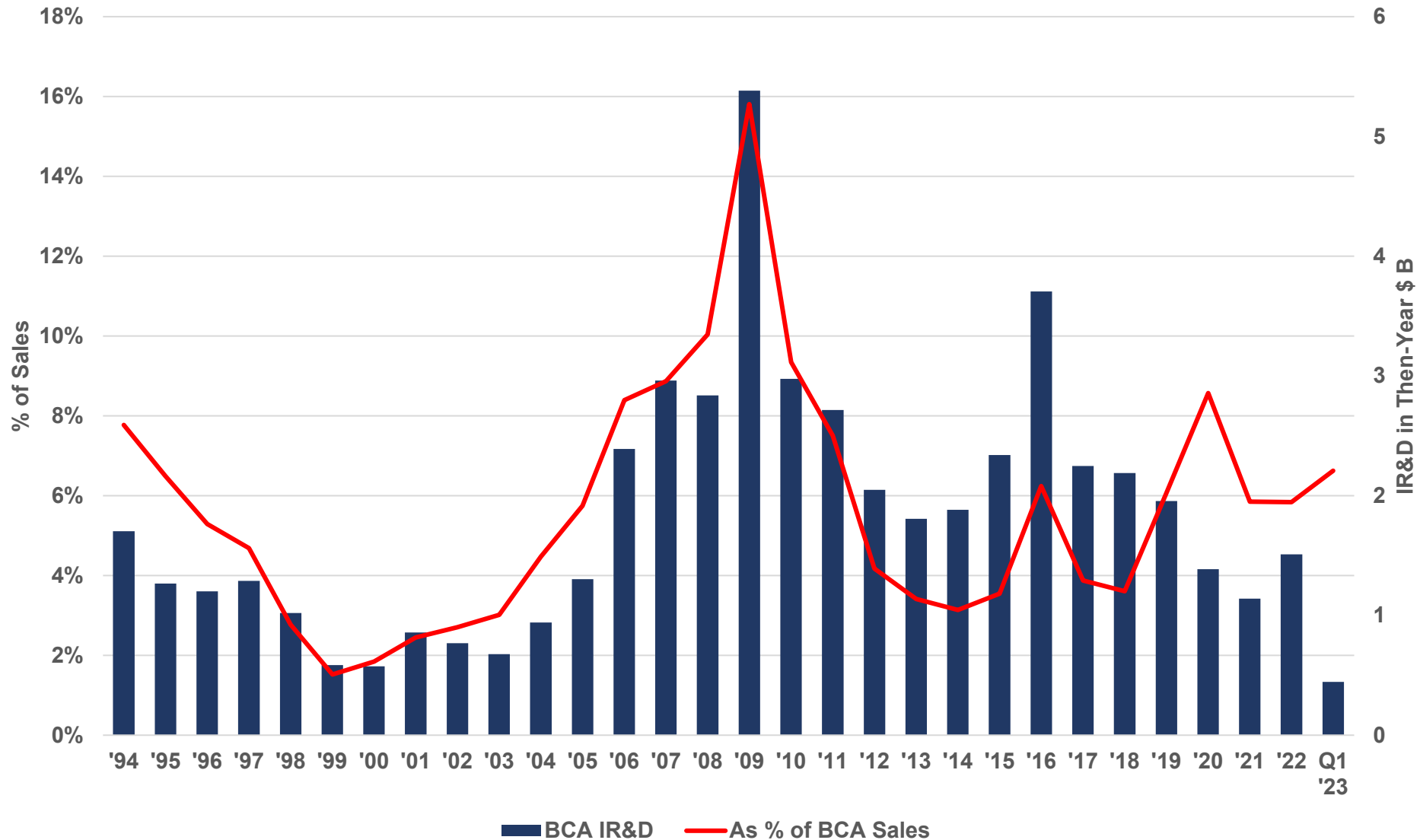


Airbus, Boeing Jetliner Backlogs (May '23, Gross Orders)

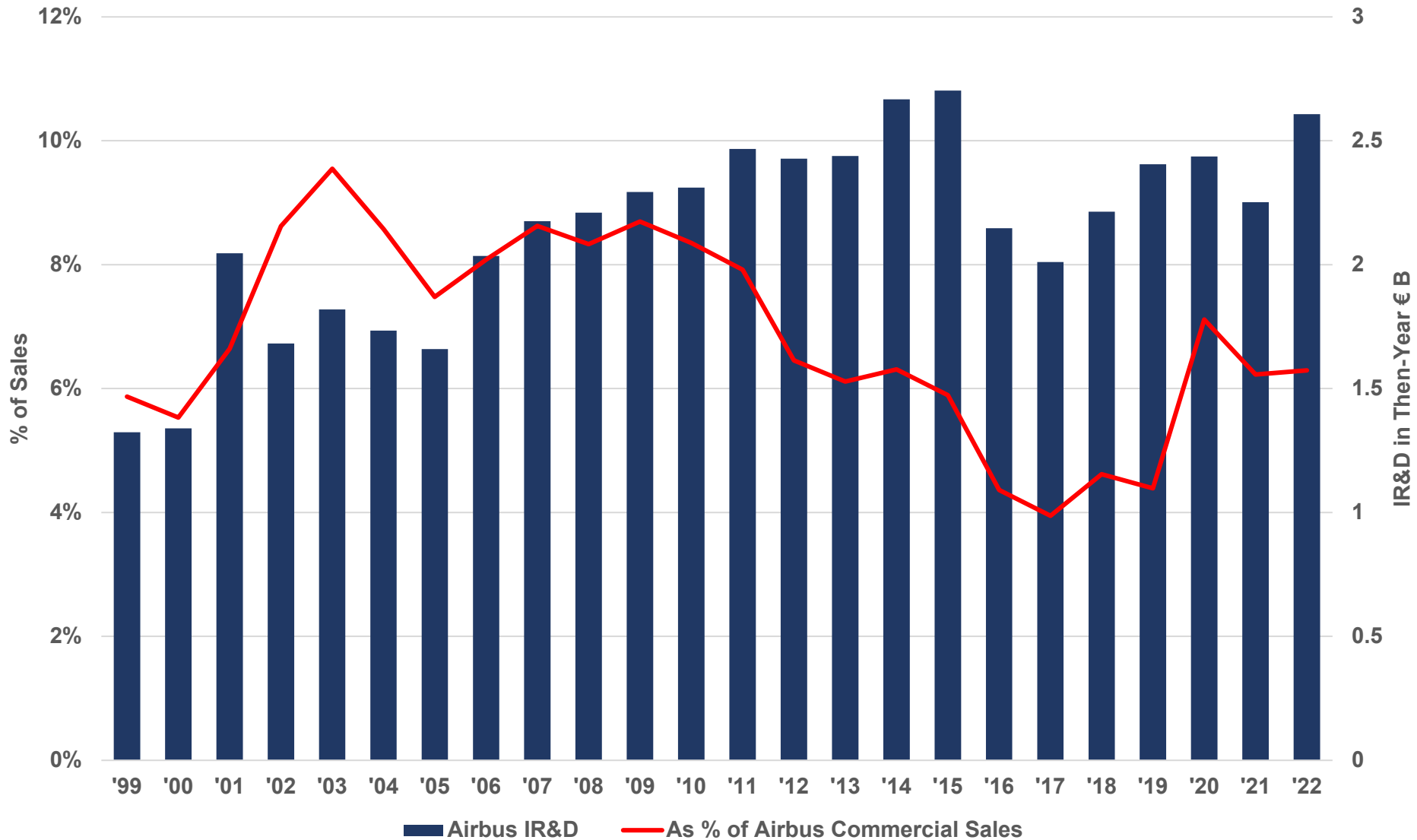


*Boeing figures estimated from press releases and other sources

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

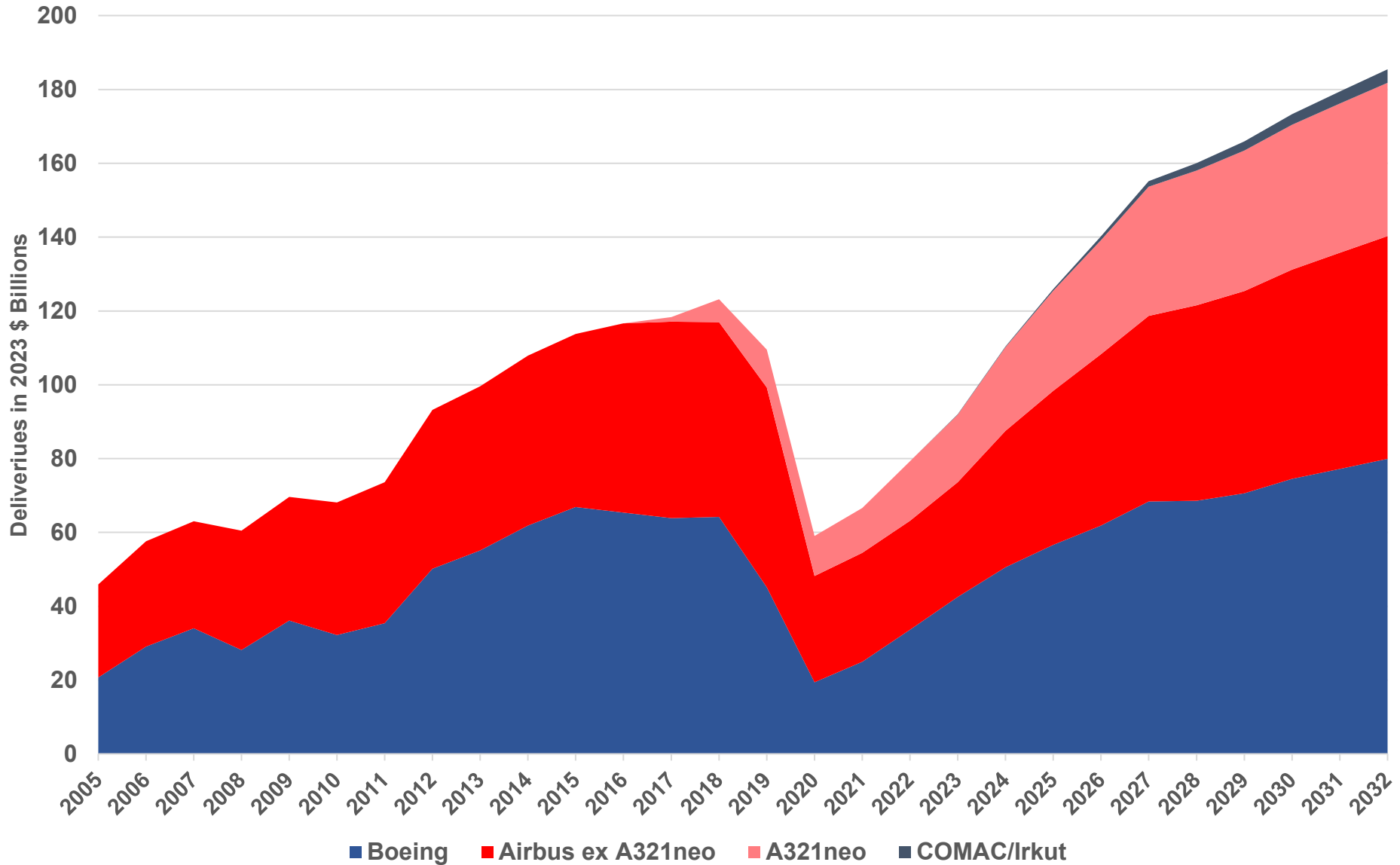


Airbus Commercial IR&D: More Spend, Less Discipline...Until 2016; Heading Up Again



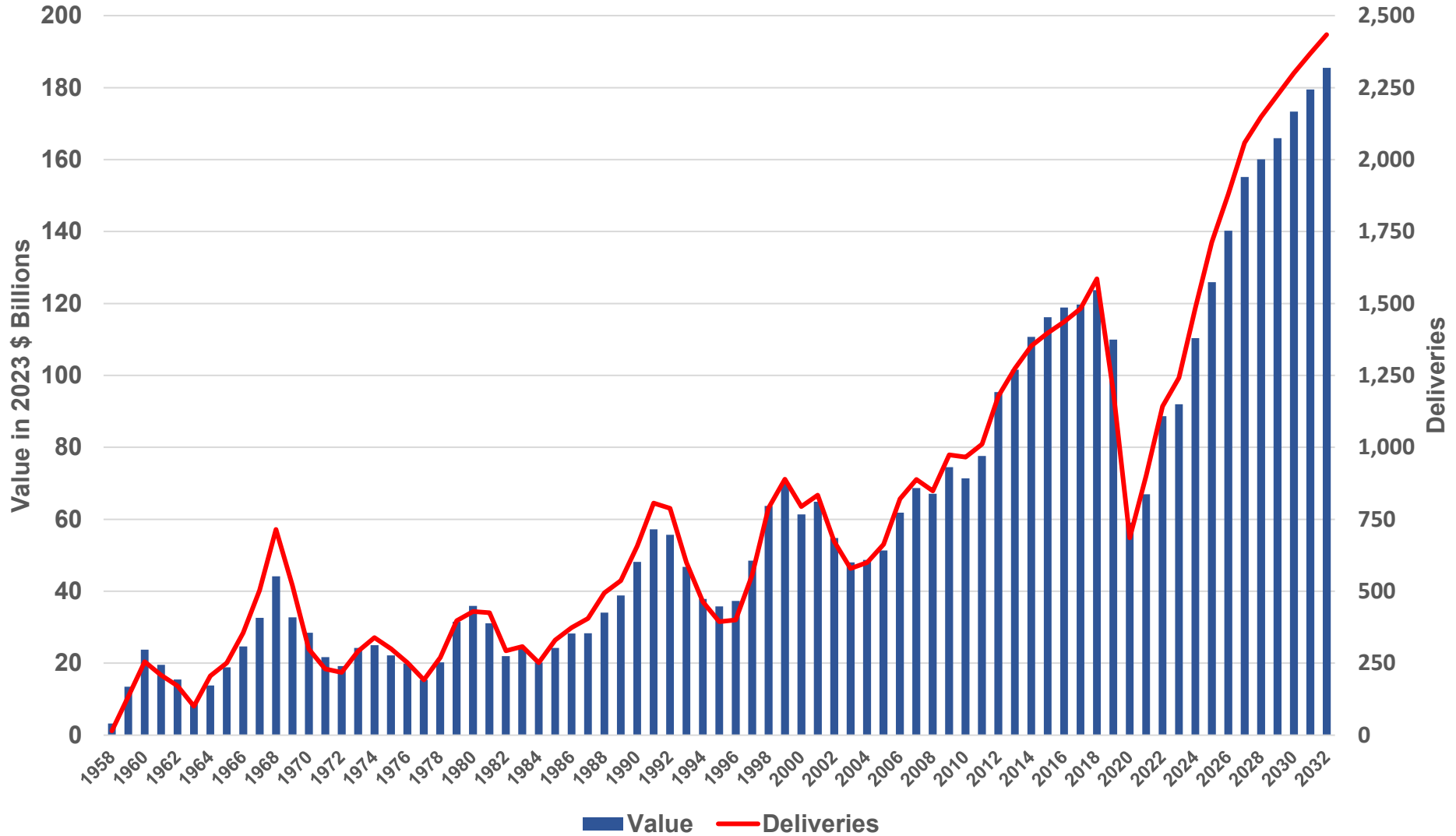
Jetliner OEM Market Shares by Deliveries

Airbus Seizes The Middle Market and First Place



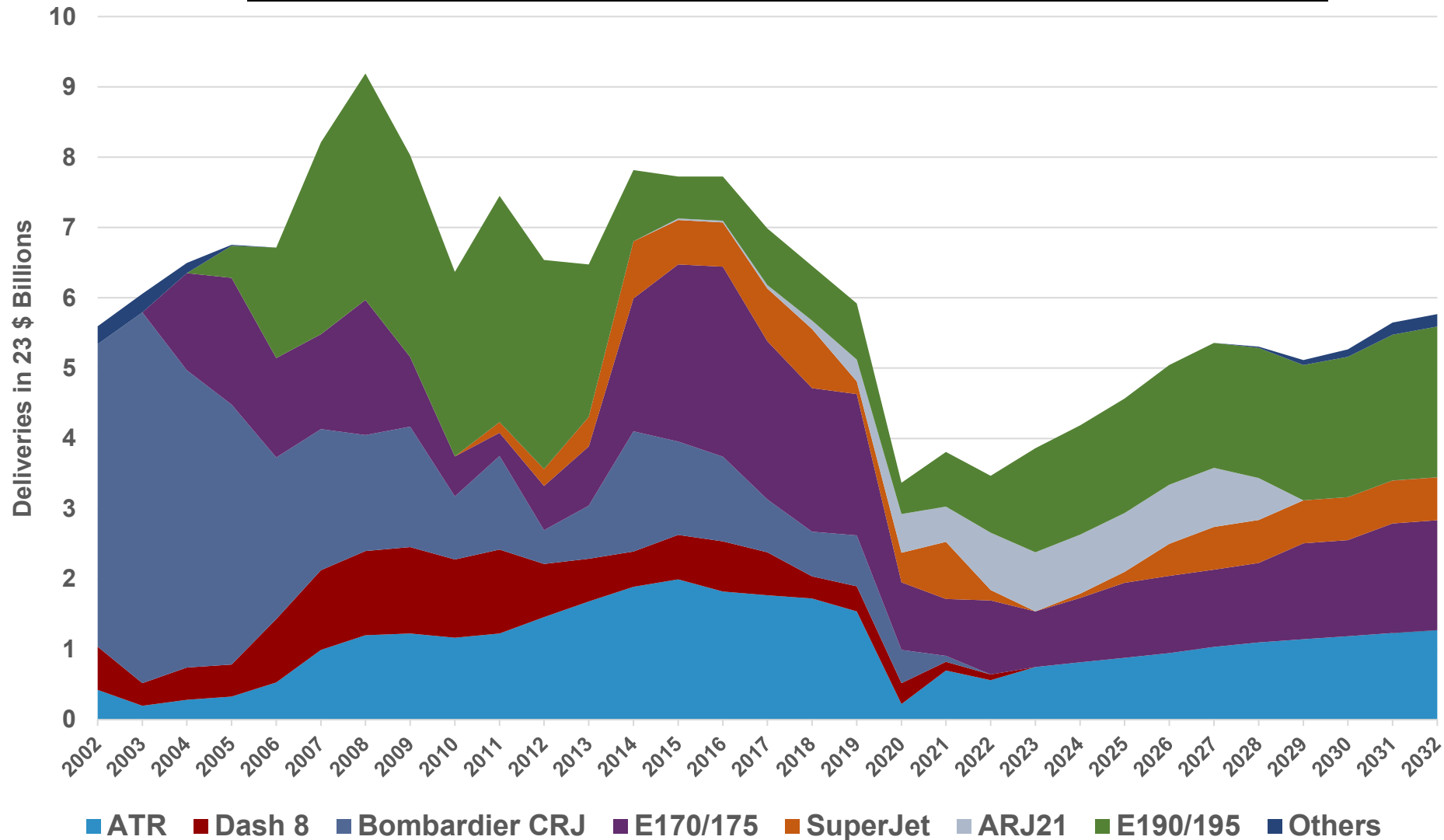
Deliveries Bouncing Back

Value Lags Deliveries as Single-Aisles Gain Share

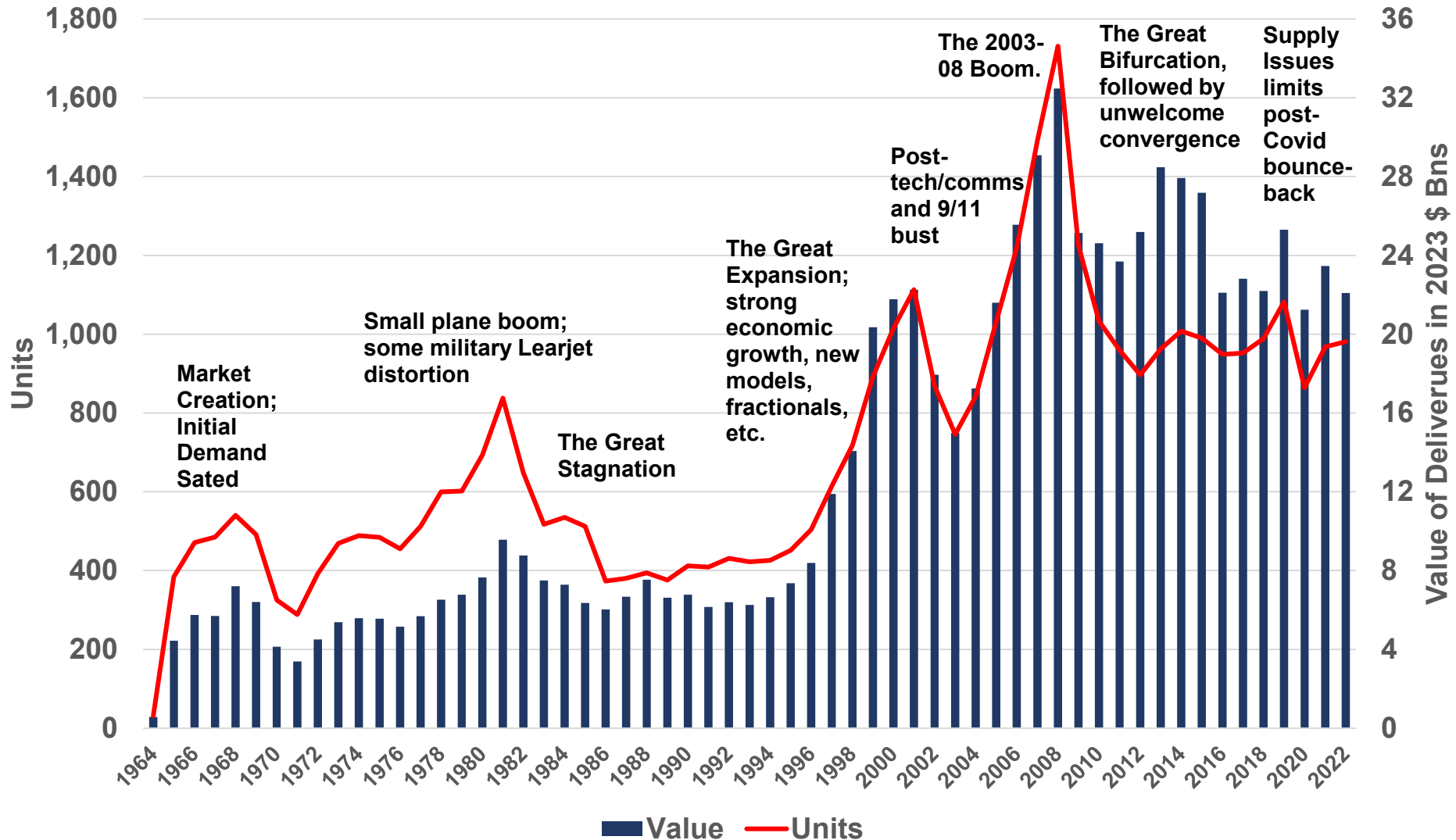


Regional Aircraft Deliveries (Value)

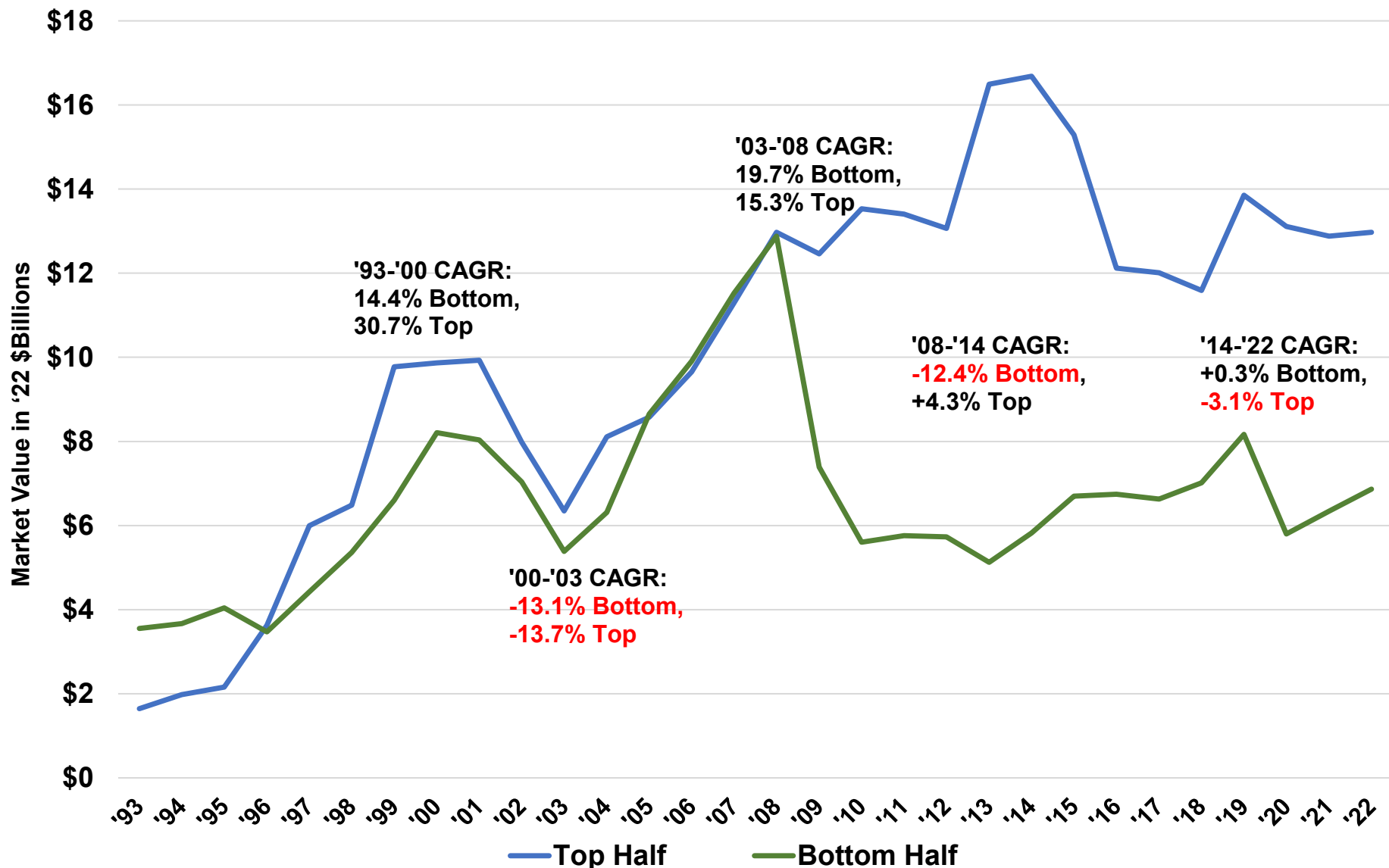
A Shadow Of Its Former Self; Larger Jets Predominate



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

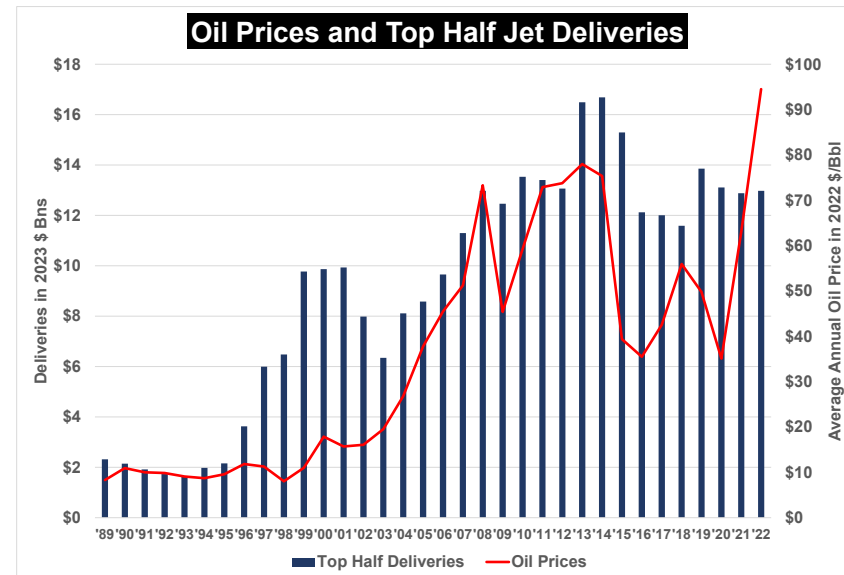


Bottom Half Bizjet Segment vs. Top Half

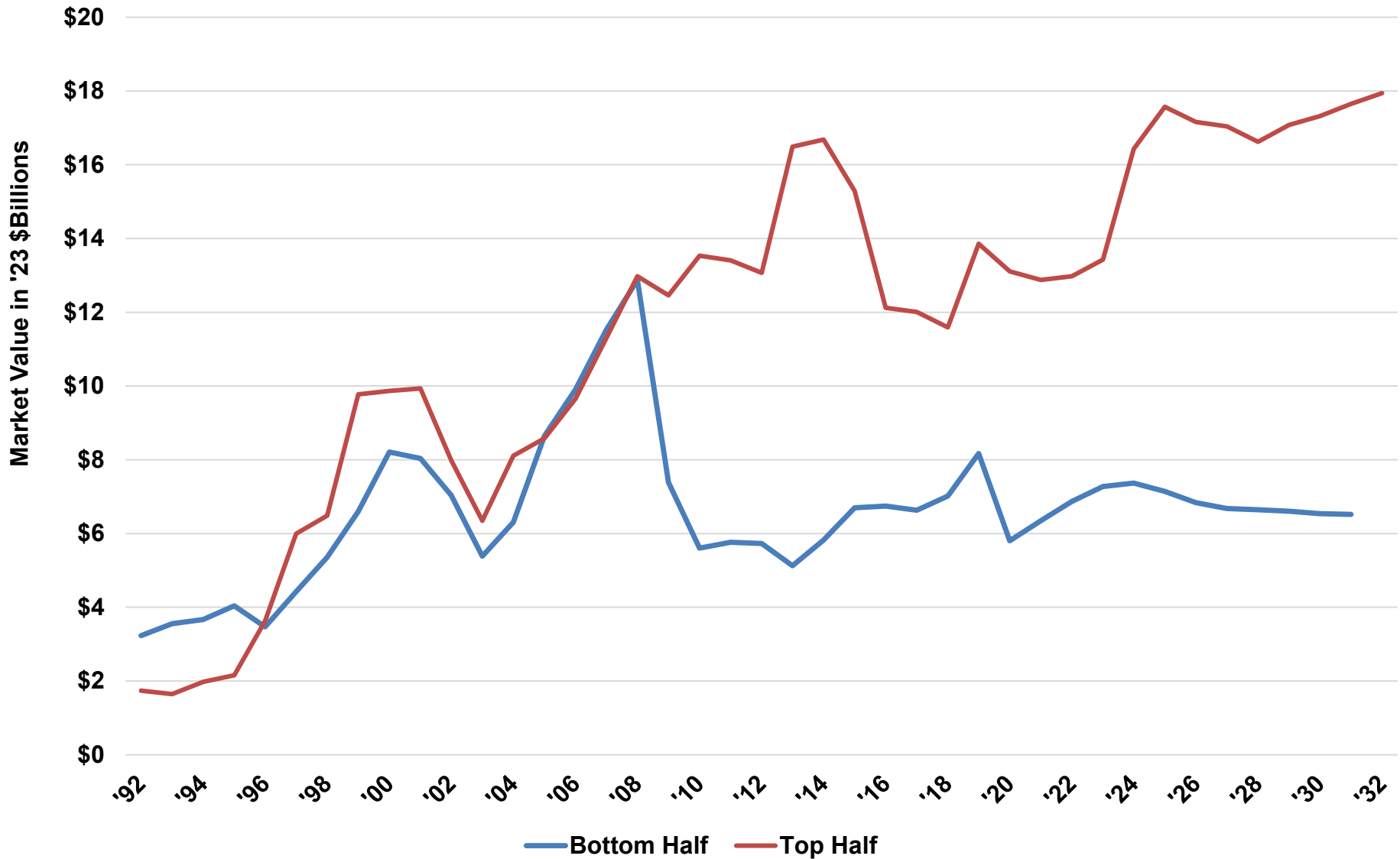


Eight Contradictory Bizav Indicators (and two unknowns to worry about)

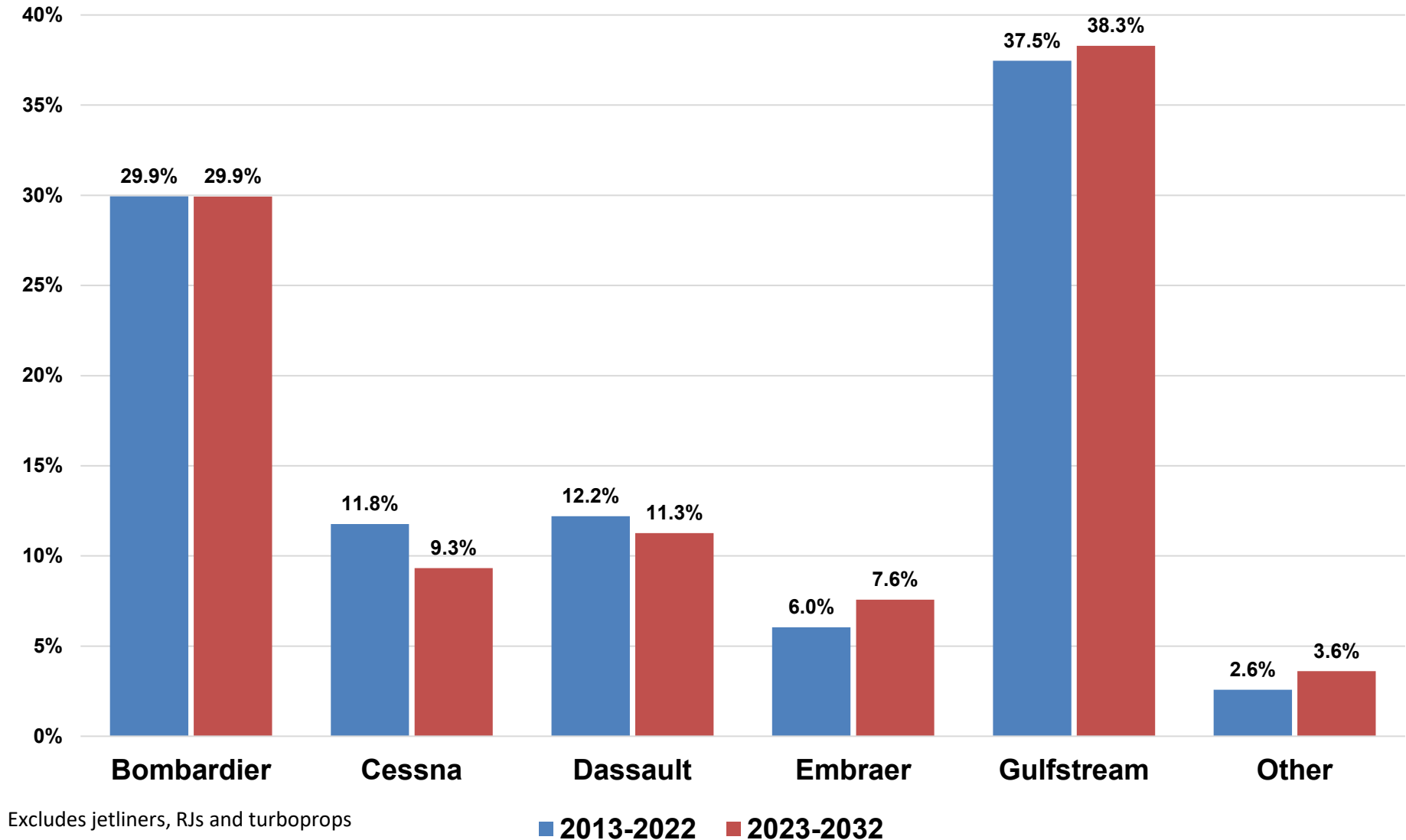
- **Three Leading Market Indicators:**
 - Corporate profits (stable, but uncertain)
 - Equities markets (uneven)
 - Oil prices (elevated but stable)
- **Five Immediate Market Health Indicators:**
 - Deliveries (rebounding slowly)
 - Aircraft available for sale (tight, but easing)
 - Aircraft prices (historically high)
 - Labor Market (struggling to find talent)
 - Utilization (Holding up, but pockets of softness)
- **Two Unknowns**
 - Fallout from Russian Invasion
 - Ability of the industry to address sustainability push



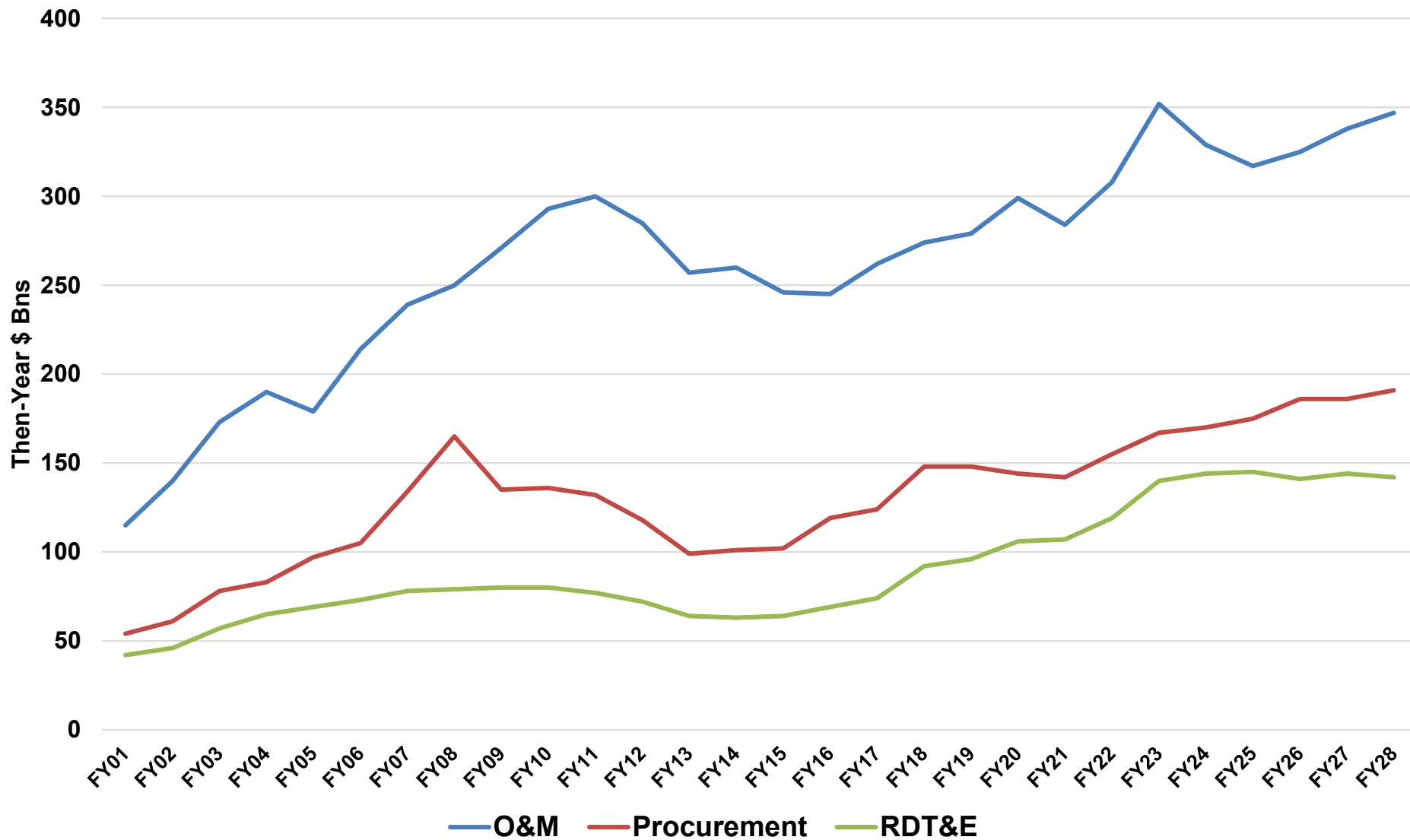
Bottom Half Bizjet Segment vs. Top Half History and Forecast



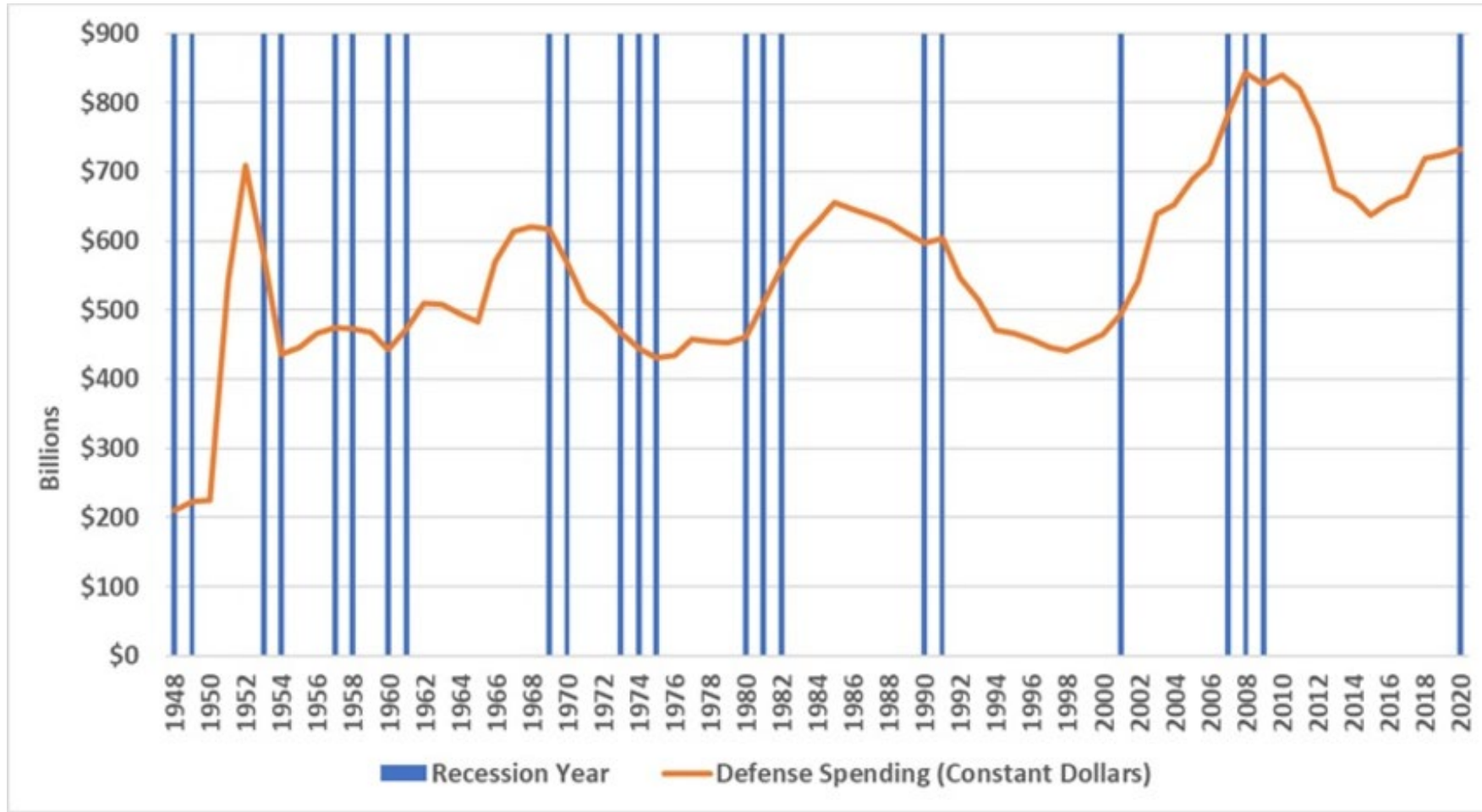
Business Jet Manufacturer Market Shares By Deliveries Value, 2013-2022 vs. 2023-2032



DoD Investment: Much Better Than In The Last Jetliner Downturn

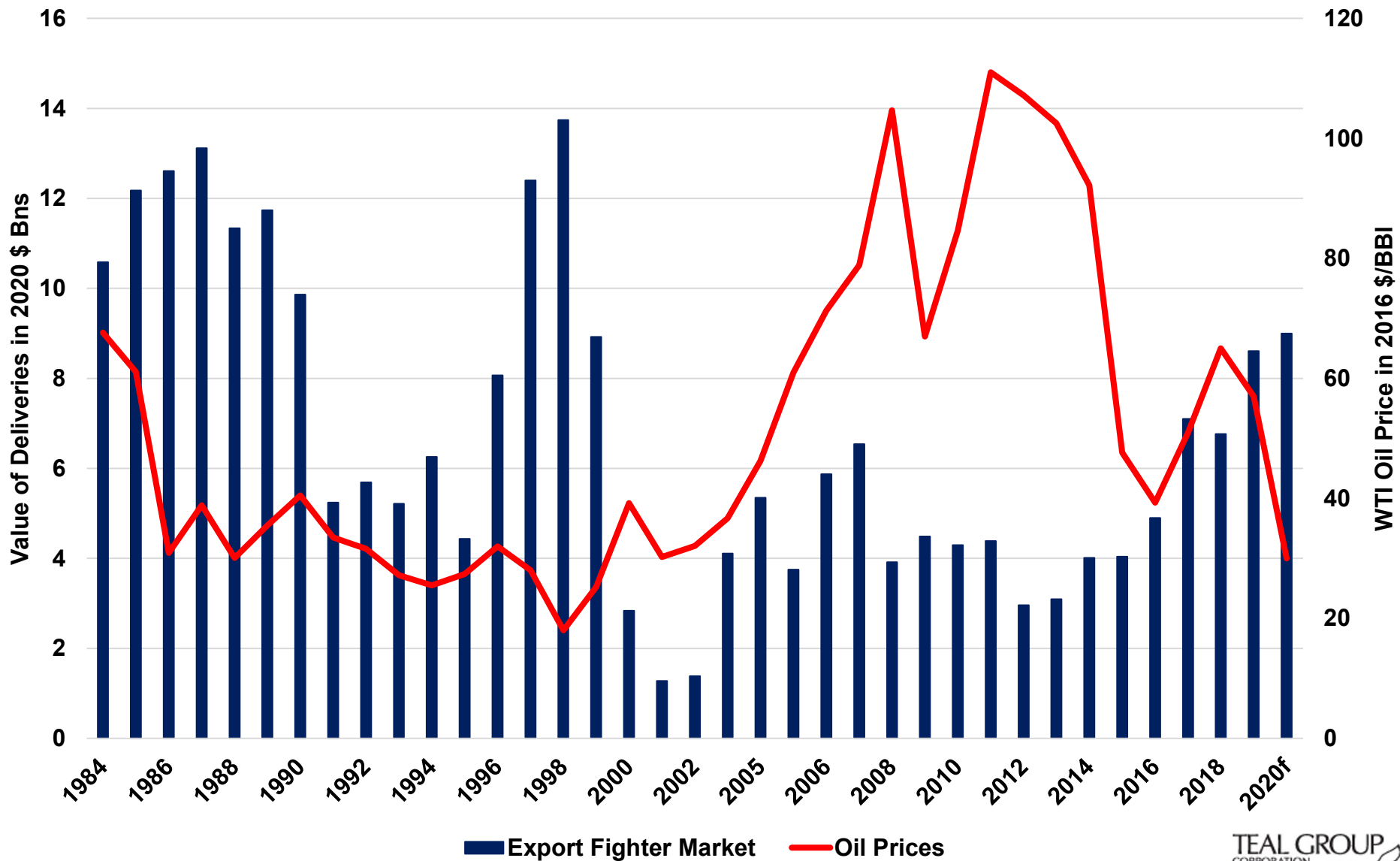


No Clear Relationship Between US Defense Spending, Economy



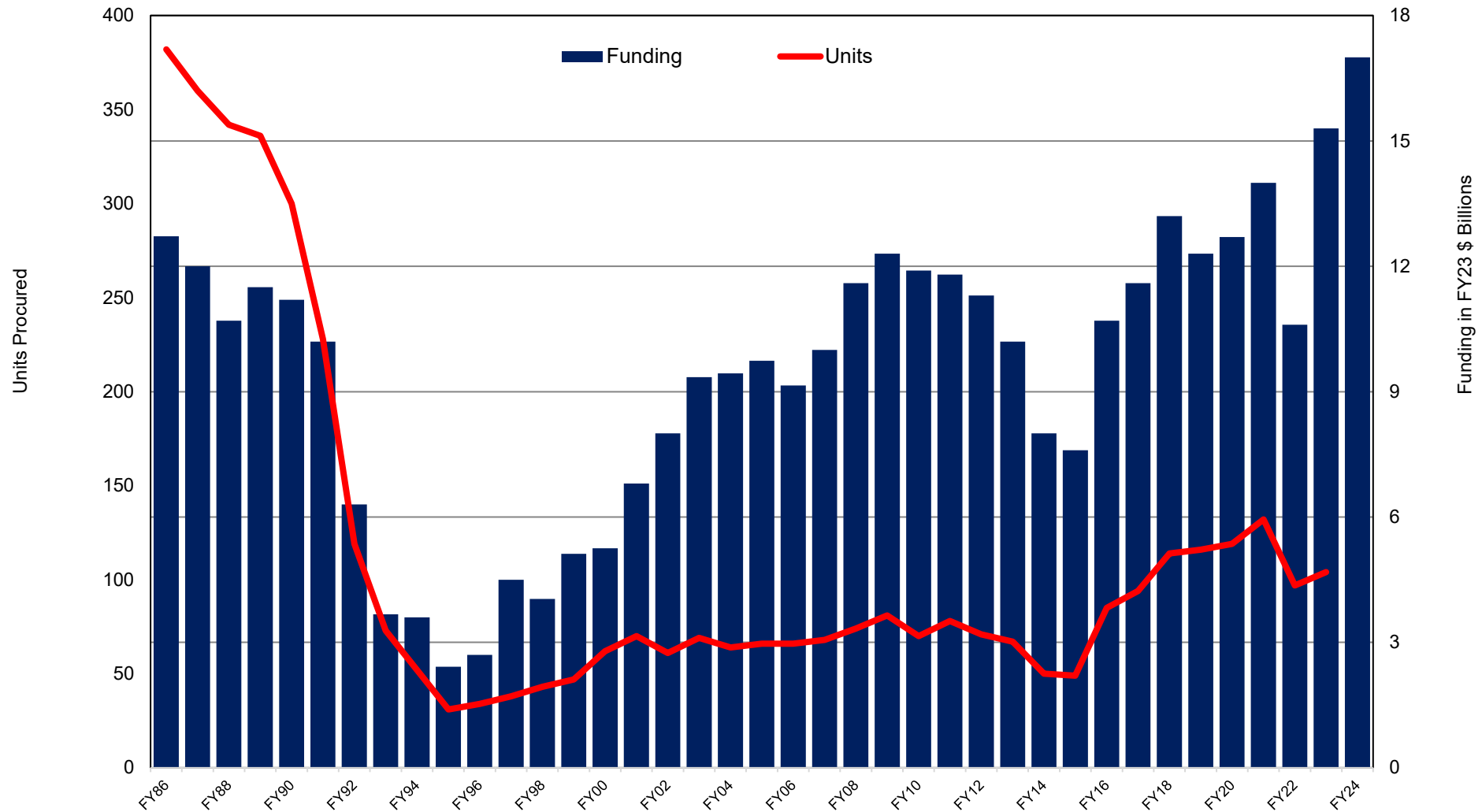
Also No Clear Relationship Between Export Markets, Resource Prices

(Or any other economic indicator)

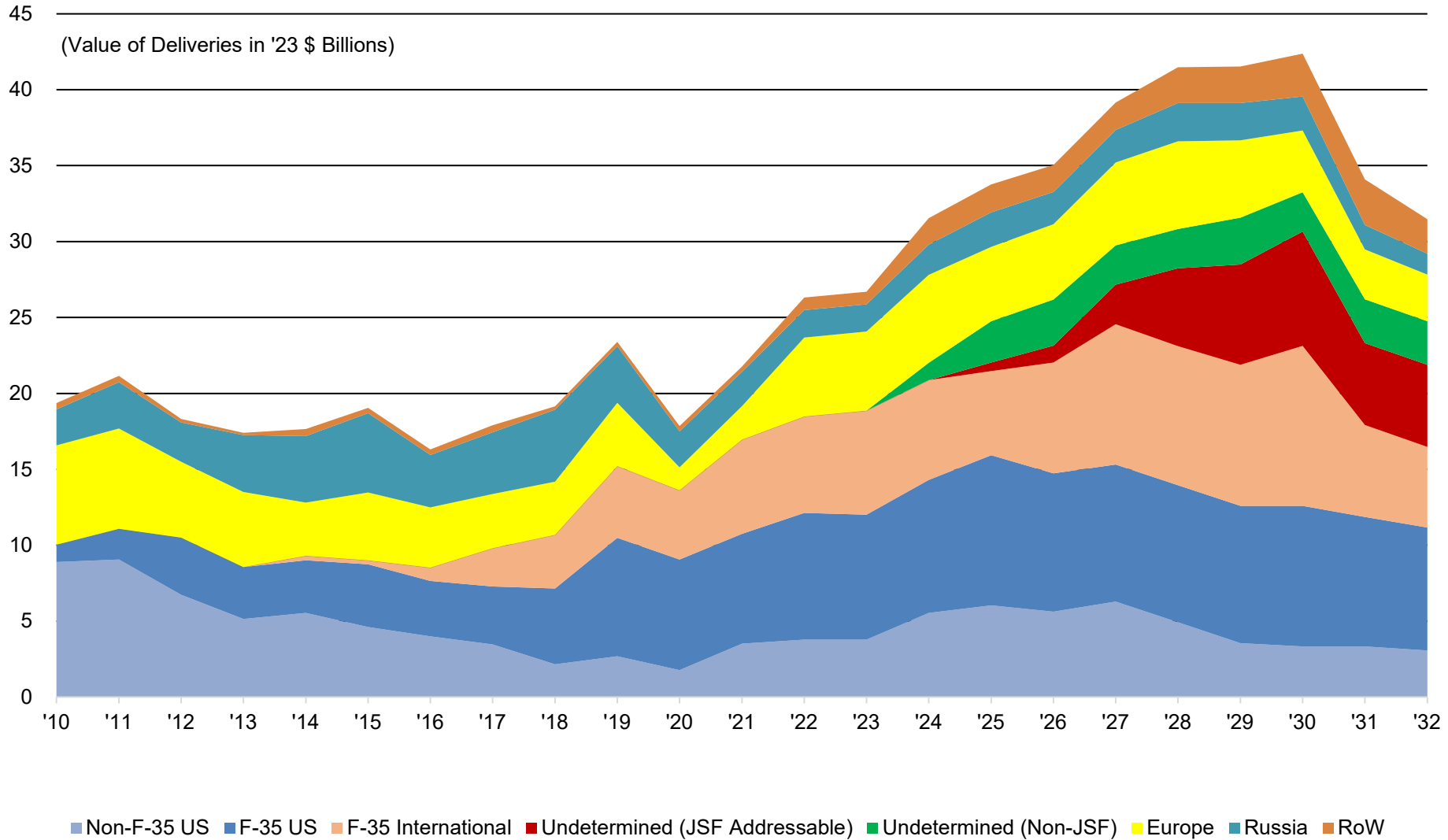


DoD Tactical Aircraft Procurement FY86-FY24

A Return to the Peak, But Fundamental Problems Remain

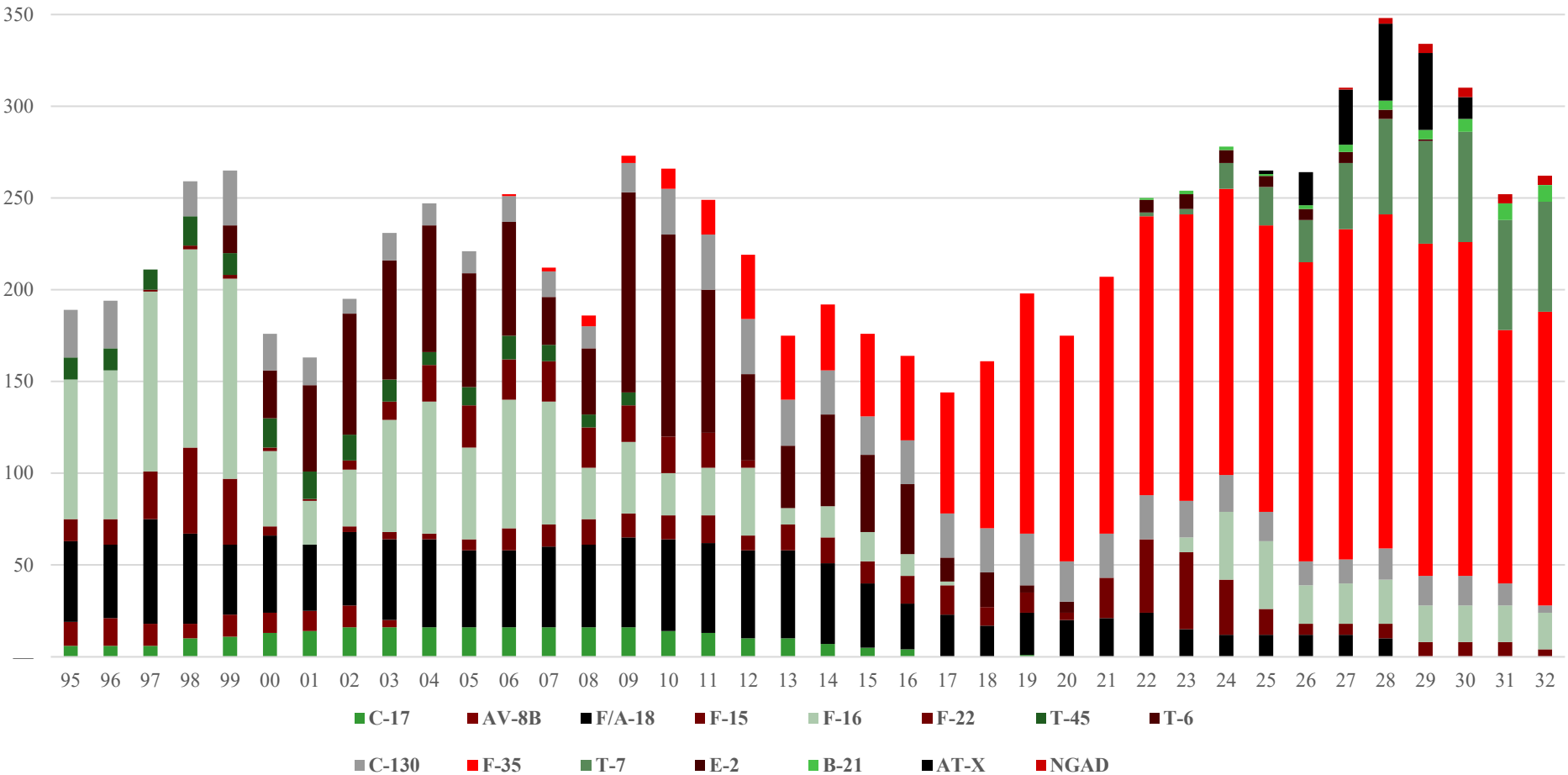


World Fighter Production Shares



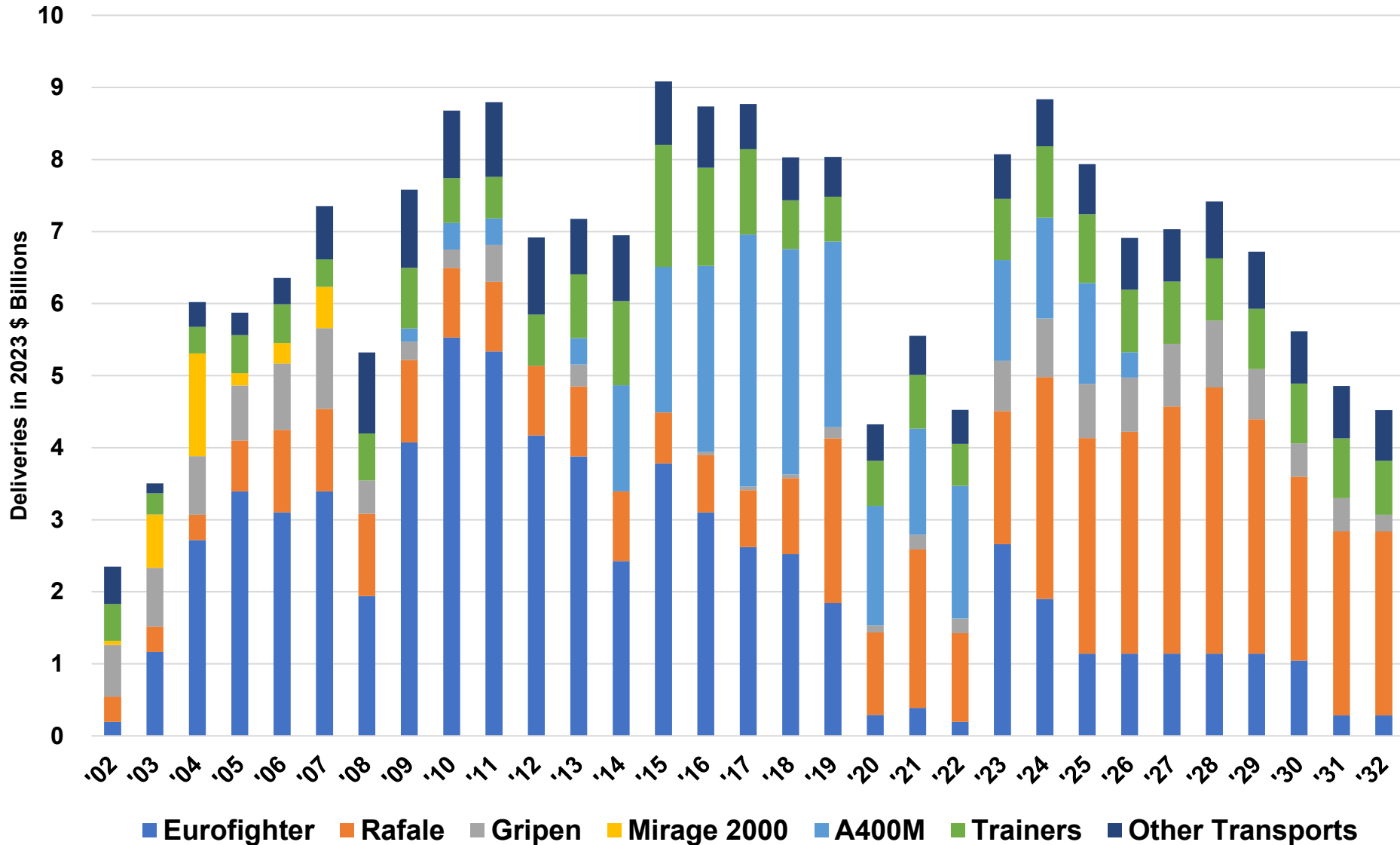
U.S. Fixed-Wing Military Aircraft Deliveries

(Does not include commercial derivatives)



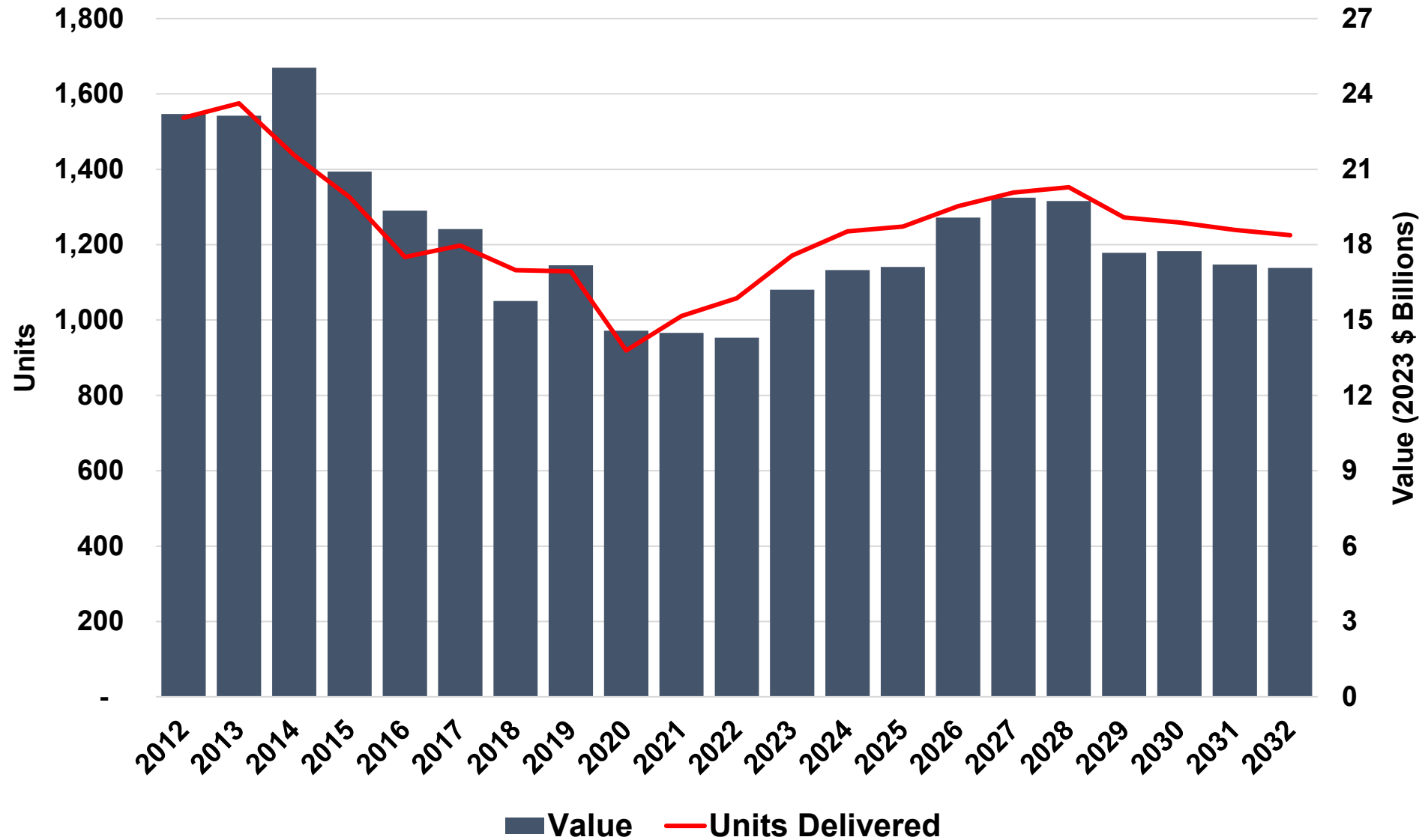
European Military Aircraft Deliveries

Coping Without F-35...To A Point

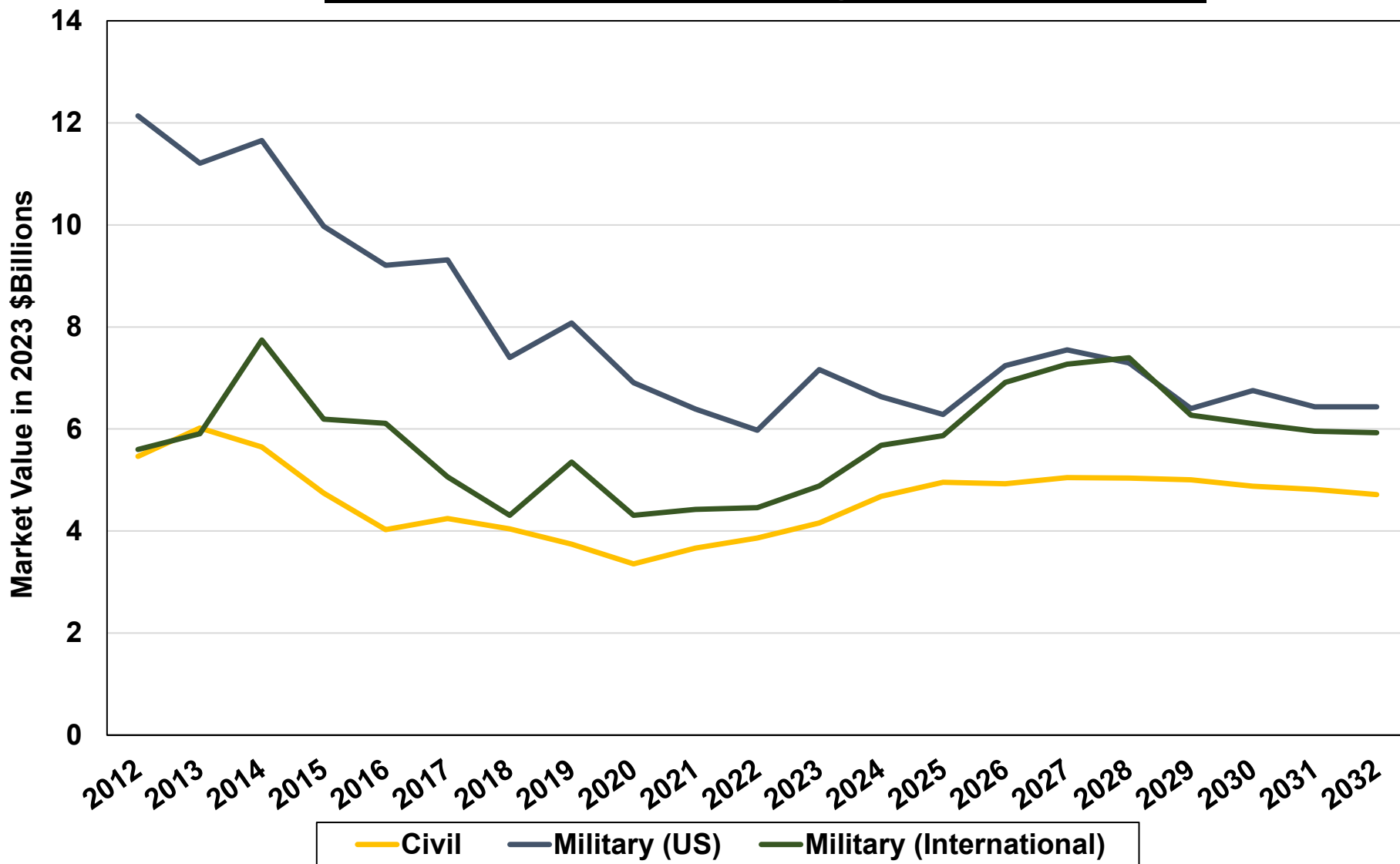


The World Rotorcraft Market

The Age of Diminished Expectations

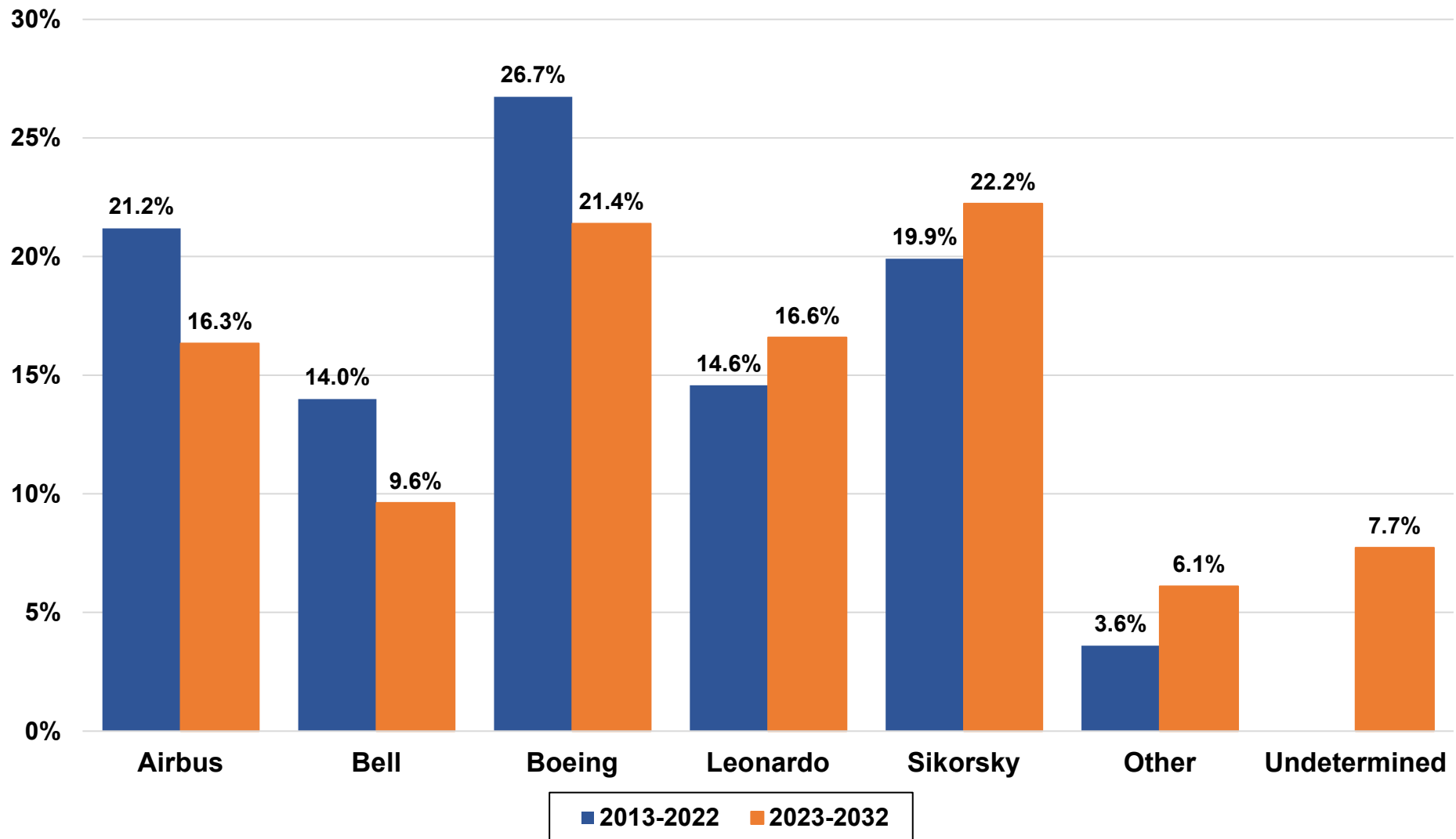


US Military Rotorcraft Market Falling; International Military, Civil Stable



Rotorcraft Manufacturer Market Shares

2023-2032 vs 2013-2022



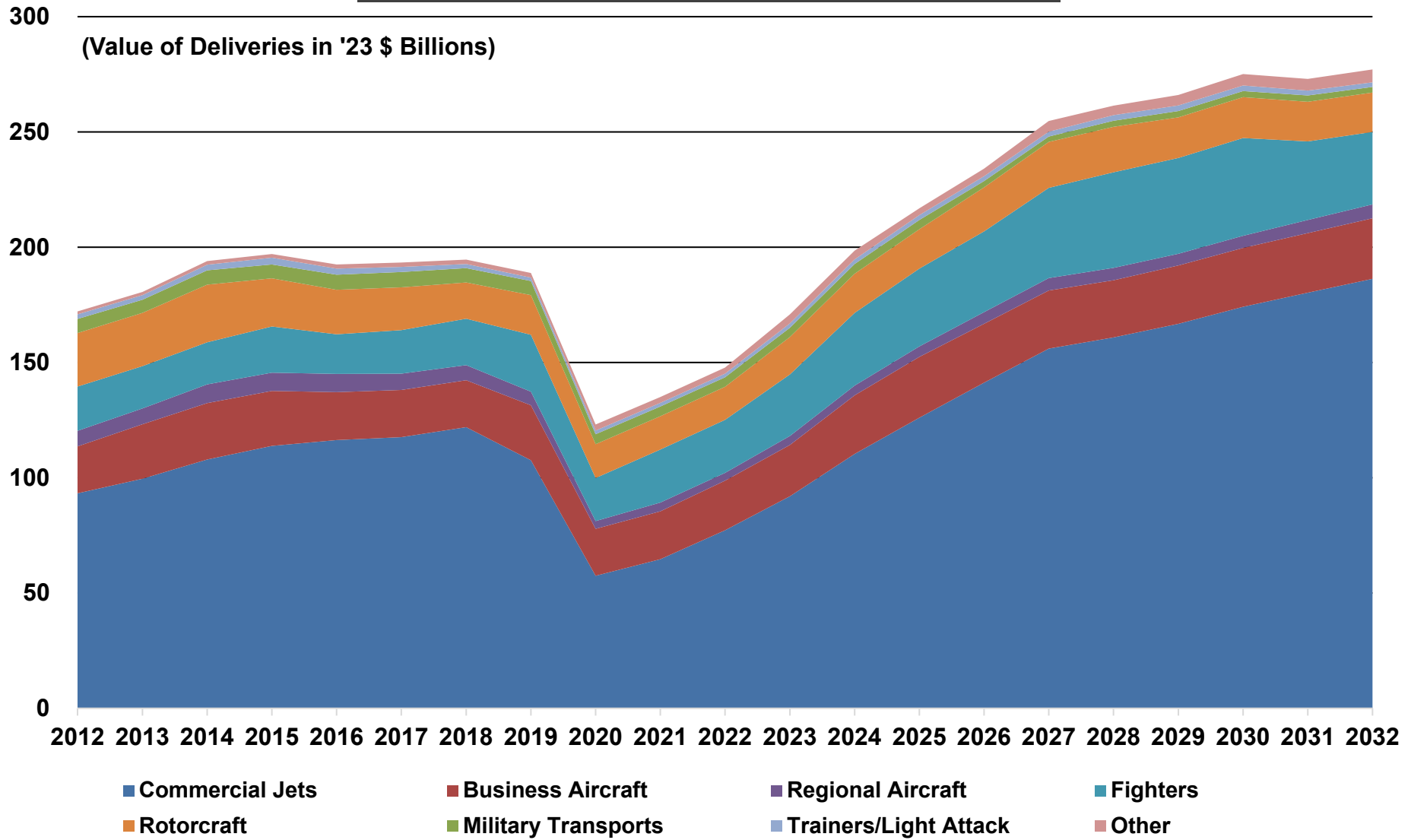
Global Aircraft Market Outlook In One Page

(Deliveries, *not* Production)

<u>Segment</u>	<u>2023</u>	<u>'24/'23</u>	<u>Risk</u>	<u>Elevator Comment</u>
Jetliners-SA	14.9%	18.9%		Steady growth with return of MAX deliveries, constrained by supply chain issues.
Jetliners-TA	27.1%	21.8%		2023 recovery primarily from renewed 787 deliveries; also suffering from supply chain issues.
Regionals	11.3%	8.4%		Embraer E-2 deliveries increasing. Pilot shortages and supply chain issues are ongoing risks.
Business Aircraft	3.6%	14.2%		Strong orderbooks can't overcome supply chain problems and regulatory delays. New models in '24.
Civil Rotorcraft	7.6%	12.5%		Large civil lags; too many new models aimed at oil/gas. Rebound on higher oil prices.
Military Rotorcraft	15.5%	2.2%		Programs end/slow; no risk of accelerated downturn; FVL beyond forecast, exc FLRAA. Does FARA survive?
Military Transports	-1.3%	2.4%		A seriously underperforming market. KC-390 an emerging star.
Fighters	16.3%	18.1%		We like this market. F-35 (after COVID disruption); Ukraine replacements/transfers add unexpected boost.
<u>All Civil</u>	<u>15.3%</u>	<u>18.3%</u>		SAJetliner snapback due to MAX, but weakness in TA; supply chain risks impeding recovery.
<u>All Military</u>	<u>5.9%</u>	<u>10.8%</u>		Vladimir Putin is Salesman of the Year, again, bringing countries off the sidelines. Special mission (ISR, B-21) also boosts topline.
<u>Total Industry</u>	<u>14.3%</u>	<u>16.2%</u>		<u>Back to peak in 2024</u>

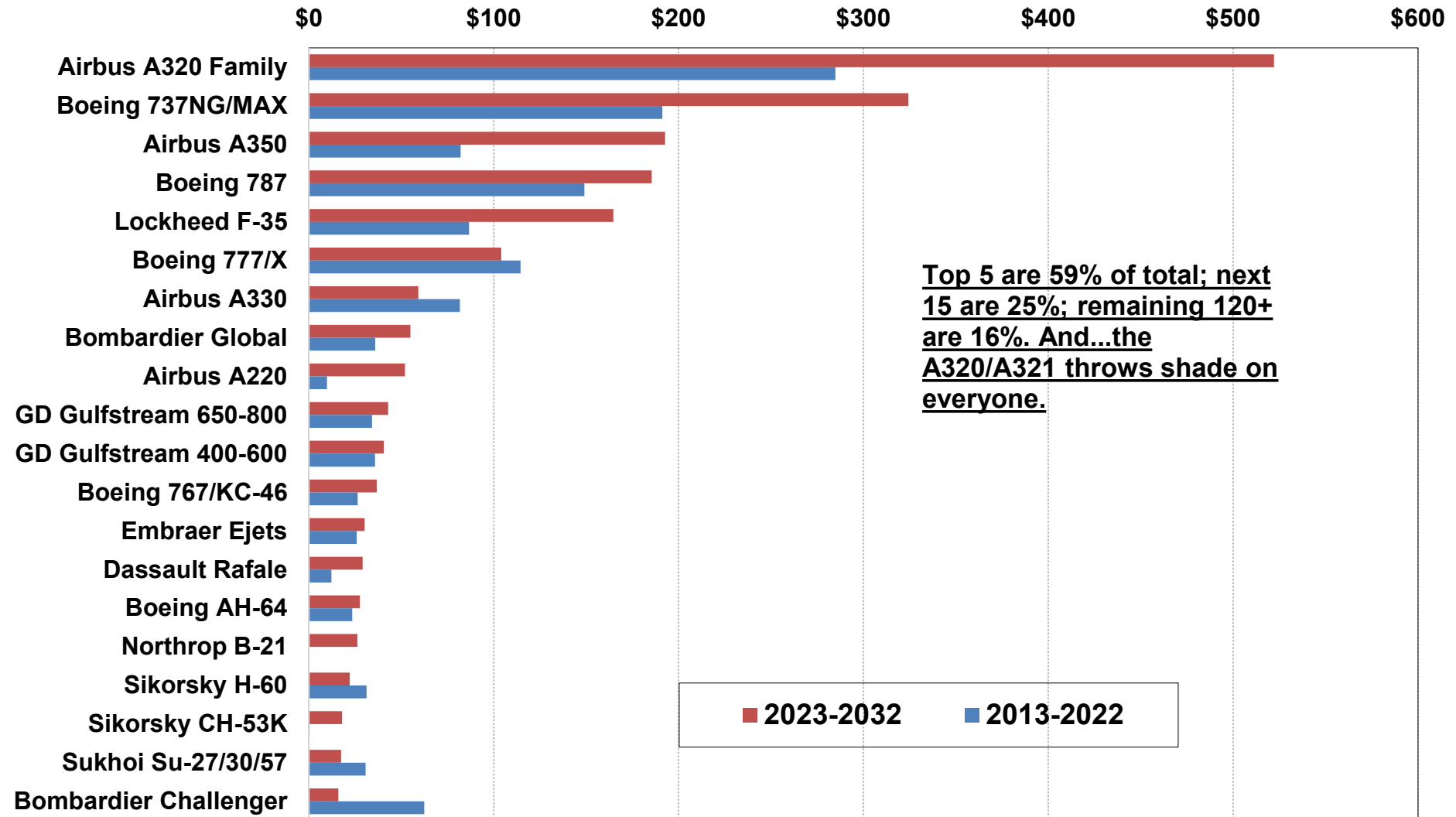
World Aircraft Production

History & Forecast

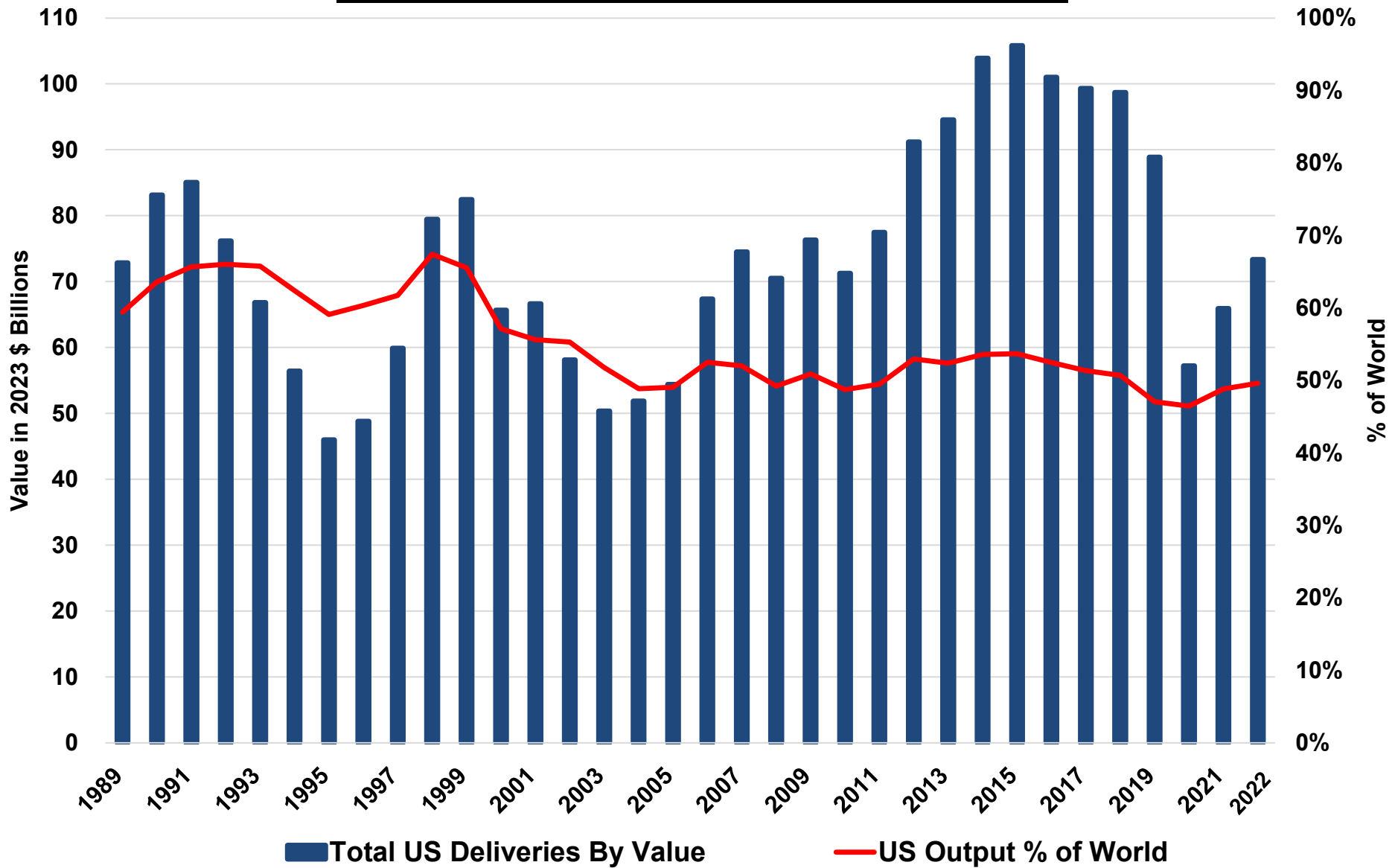


Top 20 Aviation Programs; Volume Matters

Cumulative Deliveries Value in '23 \$ Bns



US Aircraft Industry Output



Covid-19 Impact: Not Much New; Just An Acceleration of Pre-existing Trends

- **Societal:** growing inequality; growth of e-commerce over stores; movie theaters decline; normalization of formerly fringe beliefs; rising illiberal democracies/autocracies; rising climate activism
- **Macroeconomic:** Inflation, higher interest rates, excess savings, few investment opportunities, cheaper fuel, China de-coupling
- **Industry:**
 - More point-to-point international routes (fragmentation); related demand for smaller, mid-range jets
 - End of quadjets, marginalization of all larger jets
 - Growing reliance on third party jetliner finance
 - Jetliner price deflation
 - Supplier rationalization, particularly 3/4th tier
 - New product funding drought
 - China/Russia indigenous substitute product development
 - Boeing single aisle breadth concerns; Airbus mid-market dominance.
 - Rolls-Royce under pressure
 - OEMs and airlines: strong get stronger, weak get weaker.
 - Uncertain search for various alternative propulsion/fuel concepts

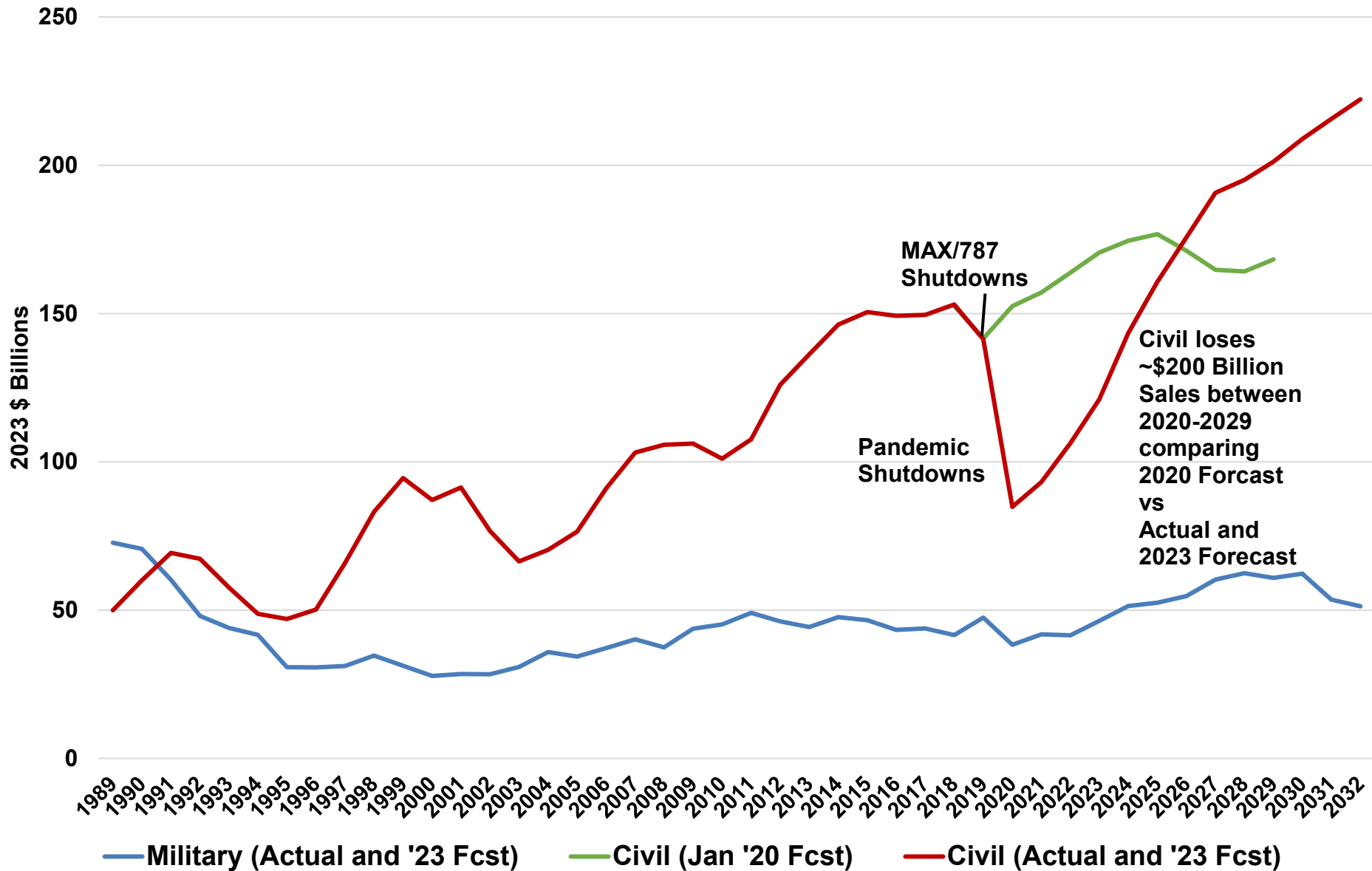
New Cold War Impact on Aviation

- **Russian Invasion of Ukraine**
 - Almost all commercial and business flights between Russia and “the West” suspended – 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

- **Civil aviation is rebounding from its very steep fall**
 - *But 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**
- **Defense companies can grow their civil side. Will they?**
- **High defense spending may complicate the civil recovery.**
- ***There is some good news:***
 - *An airline paradise, except for the traffic (and, perhaps, fuel).*
 - *Jet costs, Crew costs, interest rates, government support (for most, and for now); Stimulate traffic, or restore profit?*
 - *Defense: budgets, export demand, industrial support*
 - *Less business jet frothiness*
 - *Financial sector stronger this time ("2008 was worse; you couldn't print money."). Good for jetliners and for suppliers.*
- **A relatively isolated (severe) jetliner-only downturn is our baseline.**

World Aircraft Deliveries By Value, 1989-2032



Divergent Delivery Recovery Paths

Twin Aisles and Regionals Will Take Longer

