

COVID-19 And Civil Aviation Markets

A Bit Like Falling Off A Cliff, Only Without the Nice View

Richard Aboulafia
Vice President, Analysis
Teal Group Corporation
www.tealgroup.com

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Last Week's Developments

Through May 1; Boeing Dominates News Flow

- **Boeing/Embraer JV collapsed in acrimony.**
 - Brazilian government implies China an option; not realistic.
- **Boeing announced \$25 bn debt, move away from USG or capital market funding.**
- **Boeing announced long-awaited rate cuts.**
 - More optimistic outlook, farther-looking rate announcement than Airbus, but less realistic about downturn.
 - Built/undelivered MAX pool revealed to be 450 jets; 50-100 more than anticipated.
 - 787 at rate 10 this year (ex disruptions); to rate 7 by 2022.
- **Airbus announced 1Q results; next rate changes known by June.**
 - Also, expectation of return to 2019 peak in 2023-25.
- **Safran, others increasingly concerned about smaller suppliers' health; may consider vertical acquisitions.**
- **Growing disconnect between relief measures, industry production plans and the downturn's likely depth and duration.**

COVID-19 And Aero Markets

Issues And Impact

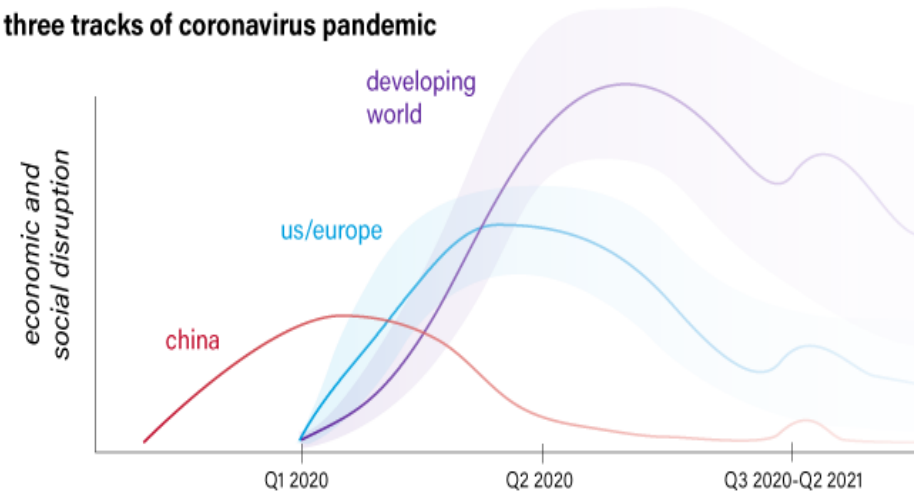
- **Apparently, these things come in pairs:**
 - The fuel price shock is as important as traffic.
 - Or trios. Recession too.
 - Also, traffic de-link from economics already in play.
 - And China – economy, relations with the West, likelihood that it goes its own way in aviation, diminished air travel growth, etc....
- **What's different this time:**
 - Airlines in better shape.
 - Government more aggressive about response, so far.
 - No more interest rate stimulus; third party finance stimulus also unrepeatable.
 - Growth accelerated post 2008 due to several unusual factors (interest rate/fuel price bifurcation, emerging markets-particularly China); none are in play today.
- **The enormous state aid question, and strings attached.**
 - With state aid, a “synthetic market” pulls demand forward.



“You don’t make the timeline, the virus makes the timeline.” (Dr. Fauci)

- The economy, and people’s willingness to fly, depends on Coronavirus, and really nothing else.
 - Limited air travel recovery due to secondary outbreaks until vaccine, or effective post-infection drug or herd immunity.
 - Vaccine development/distribution is an 18-24-month process.
 - Therapeutic drugs may arrive sooner.
 - Key growth markets might be hit later, and worse, than China and the West.
- The most likely air traffic scenario is an L-shaped market, with an upward-angled floor, lasting 2-3 years.
- Another possibility scenario is a U-shaped recovery, with the floor lasting about two years. But it’s not a V.
- Return to traffic peak in 2023, we hope.

three tracks of coronavirus pandemic



Source: Eurasia Group

Aircraft Markets, In Good And Bad Years

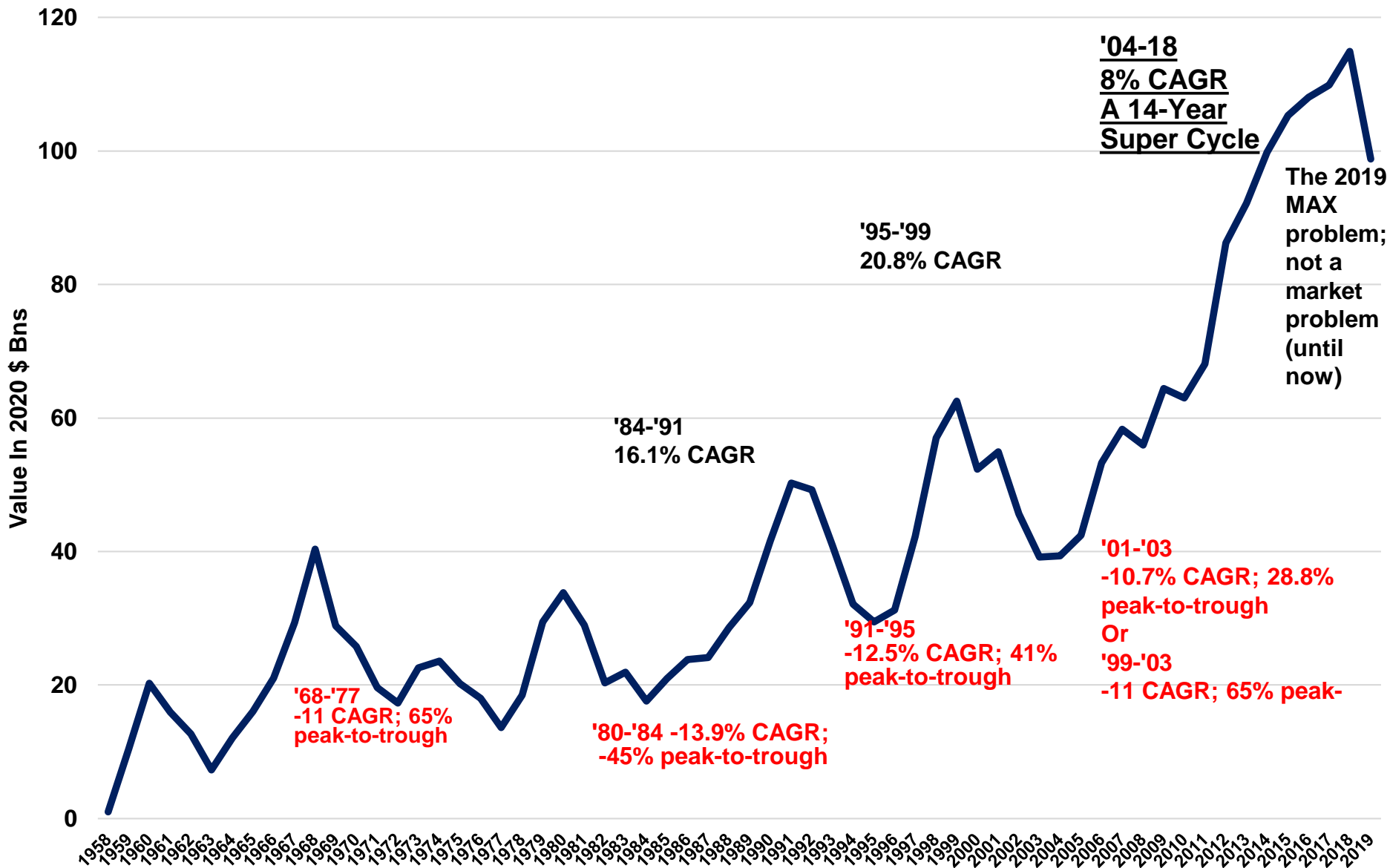
<u>World New Deliveries</u>	<u>CAGR</u>	<u>CAGR</u>	<u>CAGR</u>	<u>Change</u>
<u>In 2019 (2020 \$)</u>	<u>'03-'08</u>	<u>'08-'14</u>	<u>'14-18</u>	<u>'18-'19</u>
Jetliners-SA (\$46.2 b)	9.7%	6.9%	5.0%	-23.9%
Jetliners-TA (\$55.3 b)	5.0%	13.5%	1.7%	2.0%
Regionals (\$5.8 b)	3.9%	-3.1%	-5.2%	-5.1%
Business Aircraft (\$22.4 b)	16.7%	-2.2%	-5.0%	15.6%
Civil Rotorcraft (\$3.9 b)	18.5%	-2.5%	-7.4%	-6.6%
Military Rotorcraft(\$13.3 b)	10.6%	9.6%	-11.8%	16.9%
Military Transports (\$4.9 b)	3.2%	-0.9%	0.2%	-1.2%
Fighters (\$24 b)	1.6%	0.8%	2.5%	25.5%
<u>All Civil</u> (\$133.8 b)	<u>9.7%</u>	<u>5.6%</u>	<u>1.4%</u>	<u>-7.6%</u>
<u>All Military</u> (\$45.5 b)	<u>3.9%</u>	<u>4.0%</u>	<u>-3.3%</u>	<u>16.6%</u>
<u>Total</u> (\$179.3 b)	<u>8.0%</u>	<u>5.2%</u>	<u>0.3%</u>	<u>-2.4%</u>

Aviation Segments By Damage

Most to Least

Twin aisle jetliners	International traffic hit hardest and longest. Already an overcapacity situation. Secular shift towards single aisles already underway.
Single aisle jetliners	Fuel prices a big problem. China comeback uncertain. Some relief due to deferred Airbus ramp, and MAX stop.
Business Jets	Large cabin strongly correlated with oil prices. Small/medium strongly correlated with corporate profits, equities indices.
Civil Rotorcraft	Oil and gas segment (large) hit again, before recovery even began.
Military Programs	Emphasis on “shovel-ready.” Advance development programs at greater risk. Pure-play contractors in best shape; suppliers with most defense in best shape.

Cyclicality, Our Long-Forgotten Nemesis

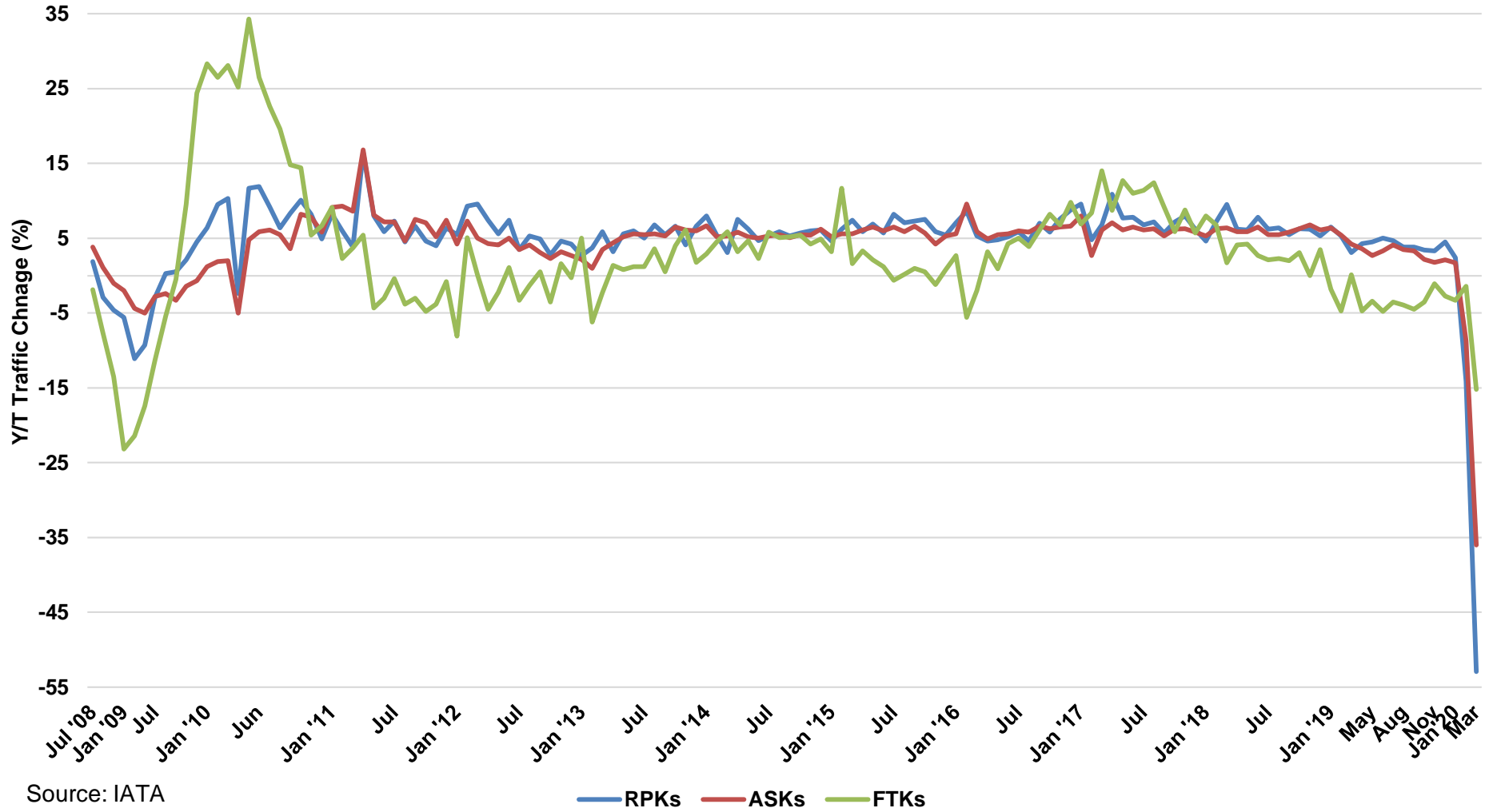


Traffic: Way Above Trend...Until March 2019

48% Decline in 2020? Down 90-95% Now

2019 Totals: RPKs 4.2%, ASKs 3.4%, FTKs -3.3%

2018 Totals: RPKs 6.5%, FTKs 5.4%; 2017: RPKs 7.6%, FTKs 9%



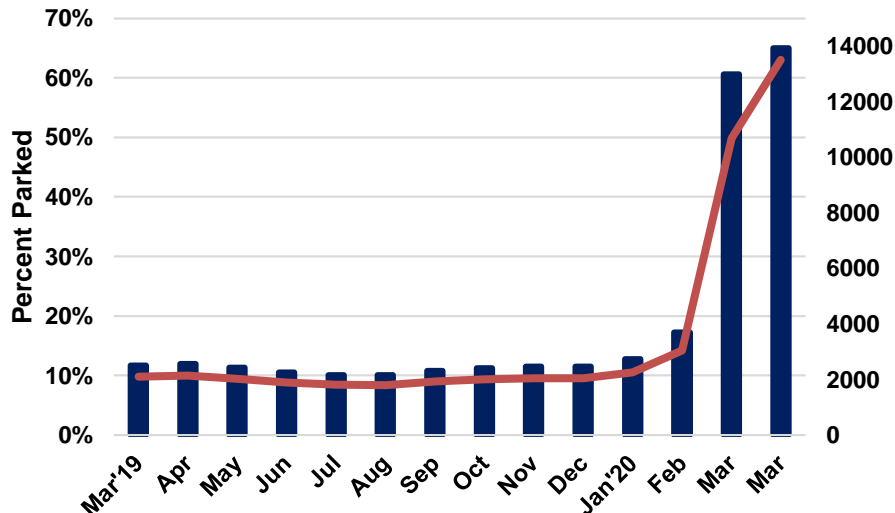
Source: IATA

— RPKs — ASKs — FTKs

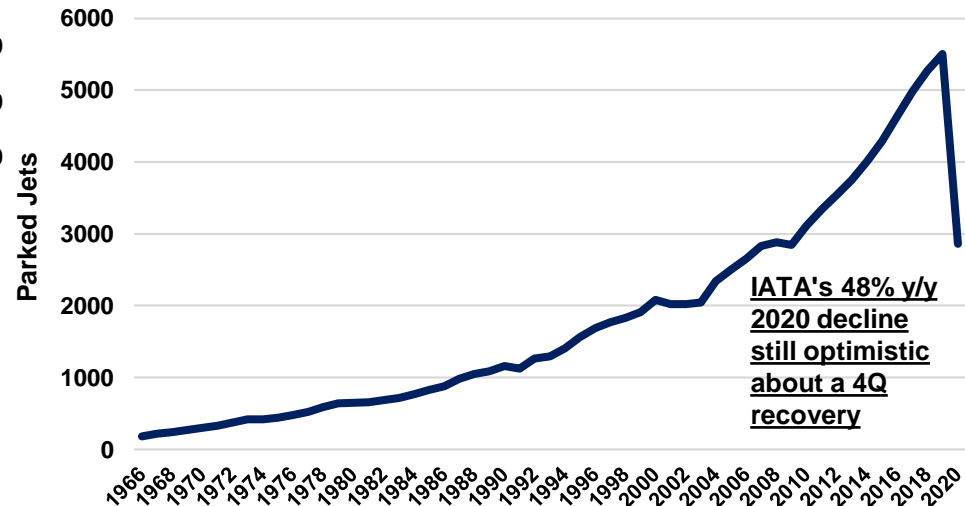
And Now, Unprecedented Numbers

- **Traffic decline, parked fleet like no previous shock.**
 - Per Paul Krugman, reflect a world economy in a “medically-induced coma;” -40% US GDP?
 - Again, traffic recovery is determined by the virus, not politicians or economics.
- **Backlogs holding up (MAX a concern), but meaningless in a downturn.**
- **Many early retirements coming, particularly twin aisles.**
 - Primarily twin aisles; A380 bloodbath.
- **Aftermarket catastrophe.**
 - 48% down ASMs (hopefully), de-stocking, deferred maintenance/upgrades, plentiful USM with early retirements.

World Jet Fleet: Now ~65% Unemployed



World Air Traffic (RPM Bns)

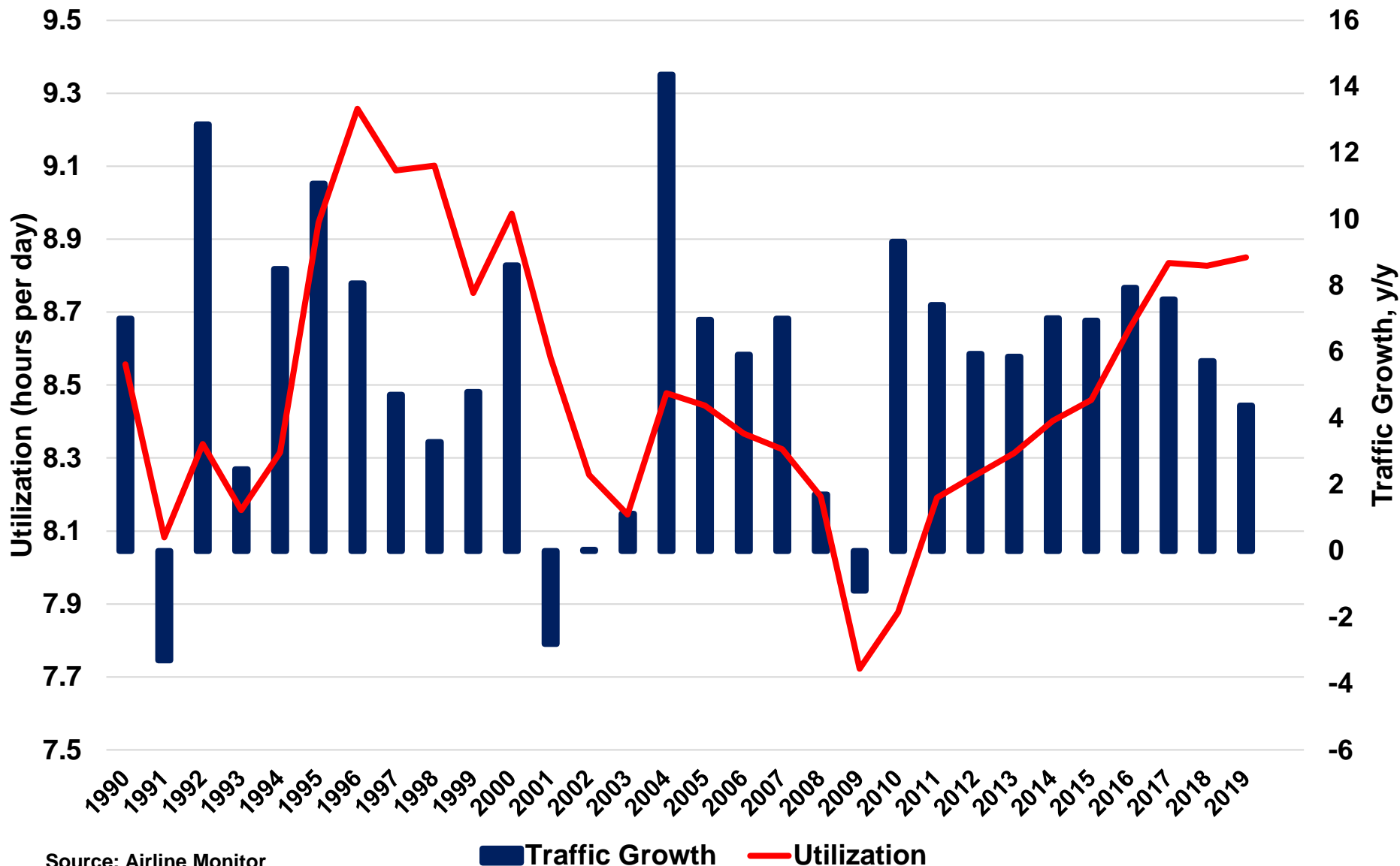


Source:
Ascend/Jeffries

■ Parked — Percentage Of Total Fleet

Lower Utilization Can Help With Overcapacity

But A 48%+ Traffic Drop Is Another Story

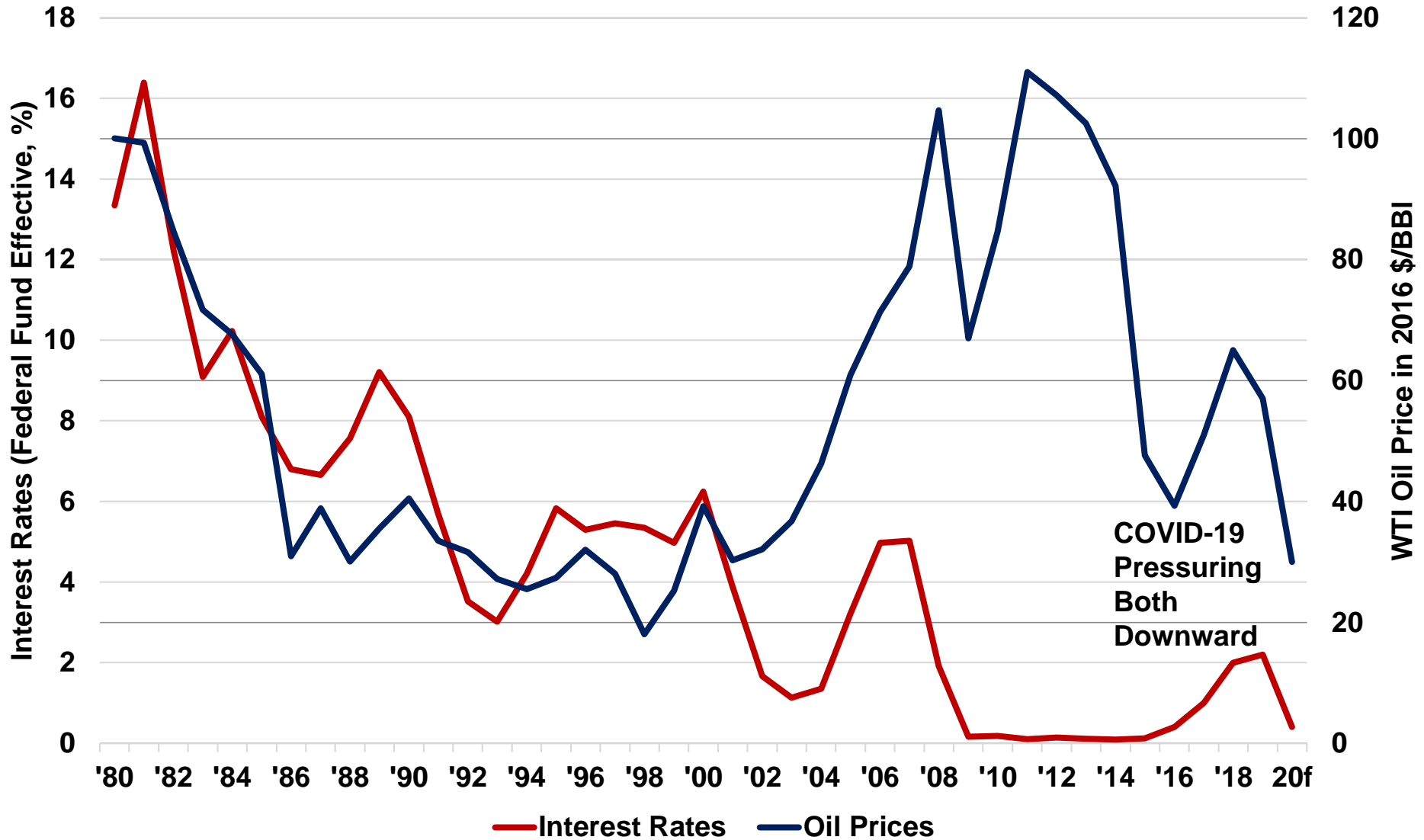


Source: Airline Monitor

■ Traffic Growth — Utilization

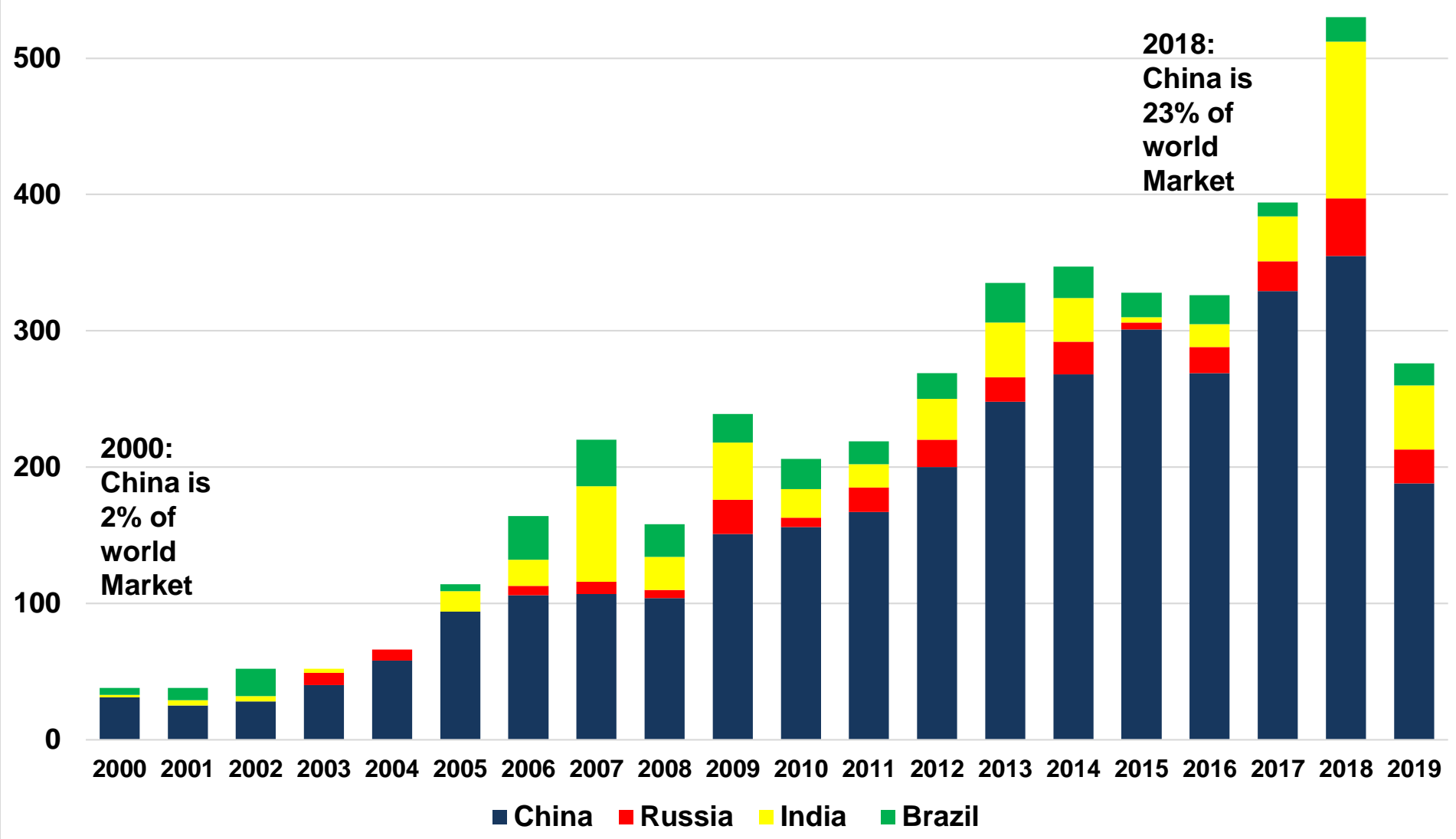


Interest Rates And Oil Prices: Less Than 4%, And \$50-85/bbl, Ideally; But The Ratio Matters Most



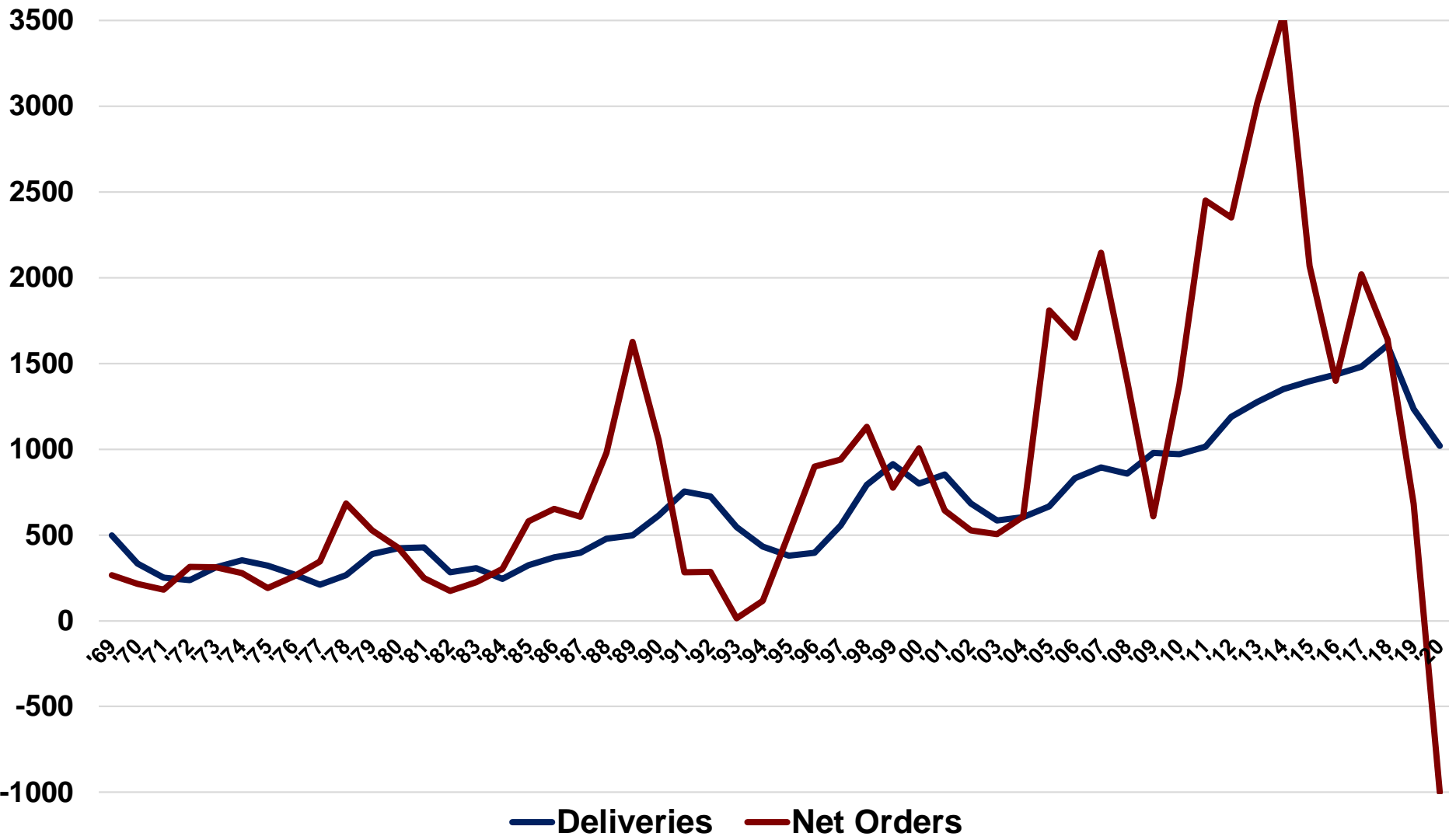
BRIC Deliveries: Peaked; Watch China

Growth May Not Resume For A Few Years



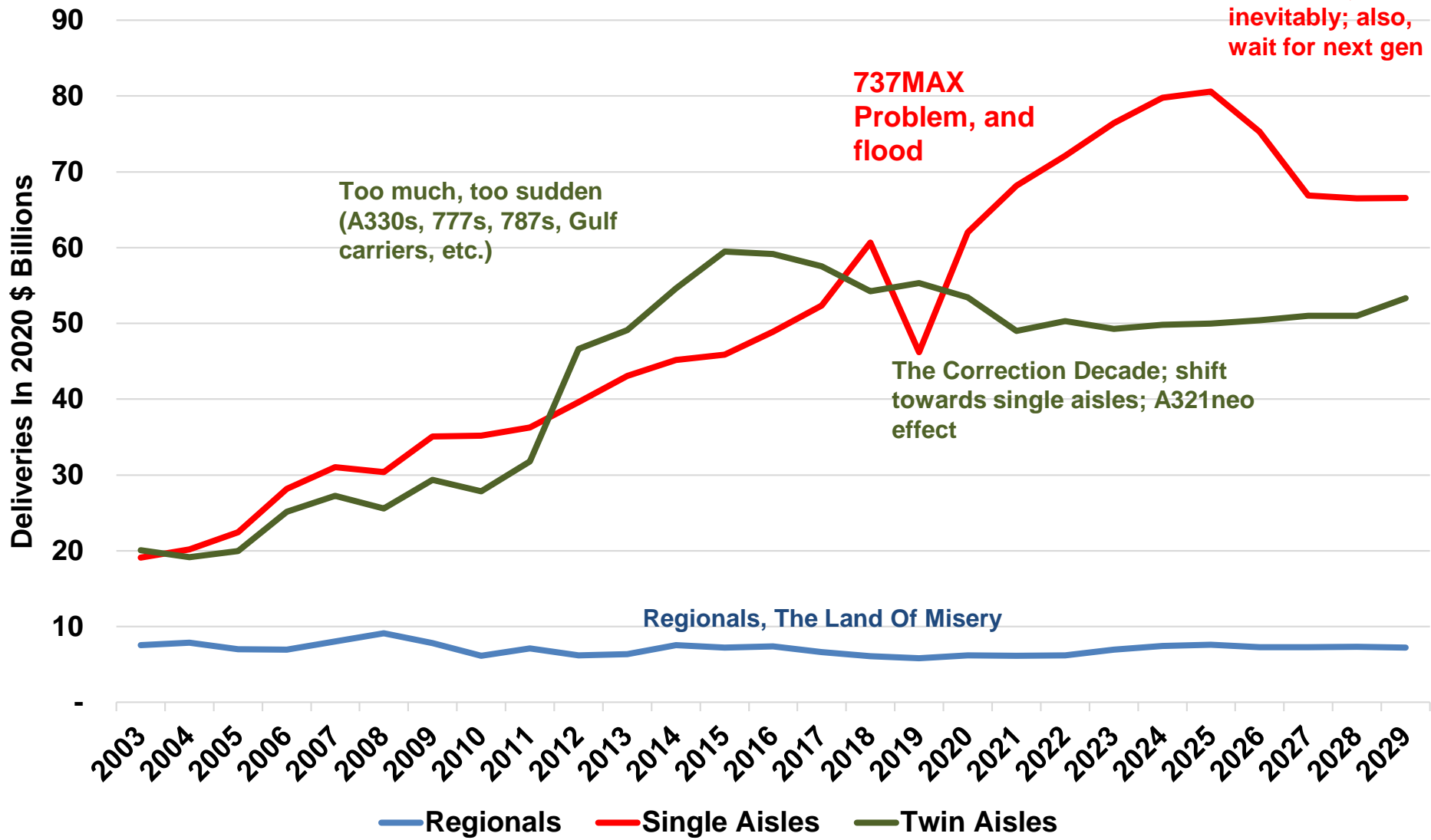
Large Jetliner Orders And Deliveries

Book-To-Bill No Longer A Thing

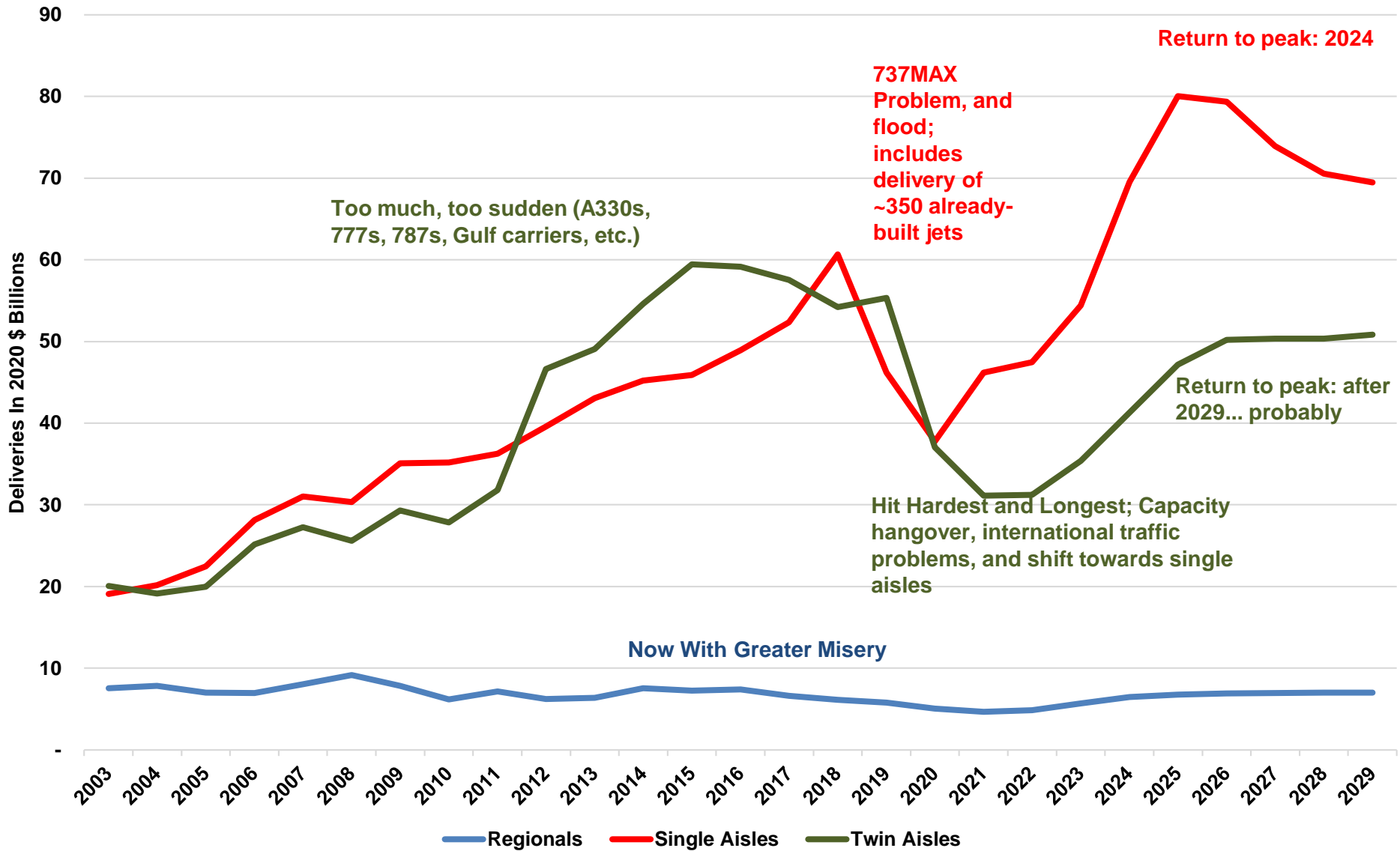


The Air Transport Market By Segment (As of January)

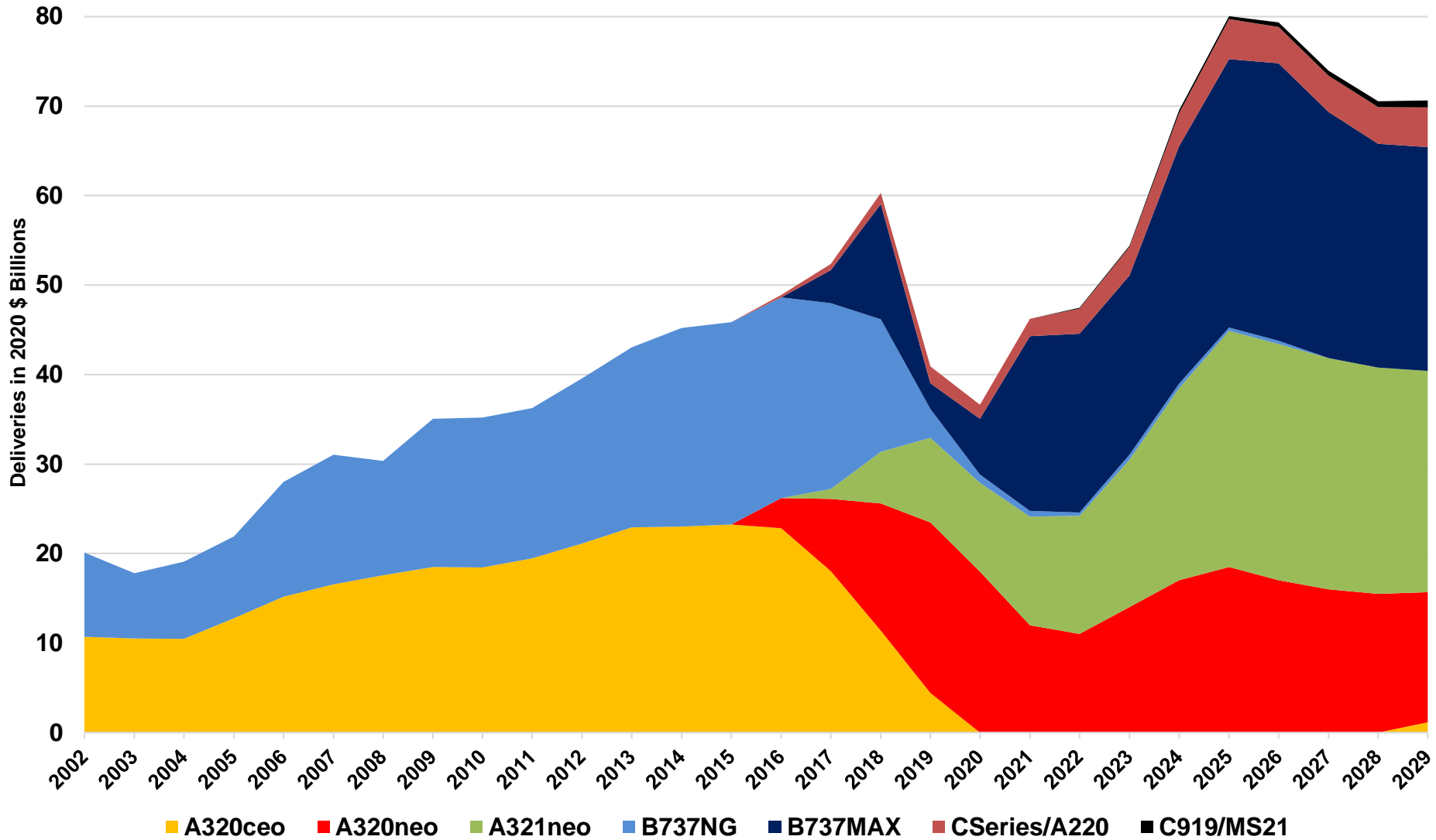
Some kind of correction, inevitably; also, wait for next gen



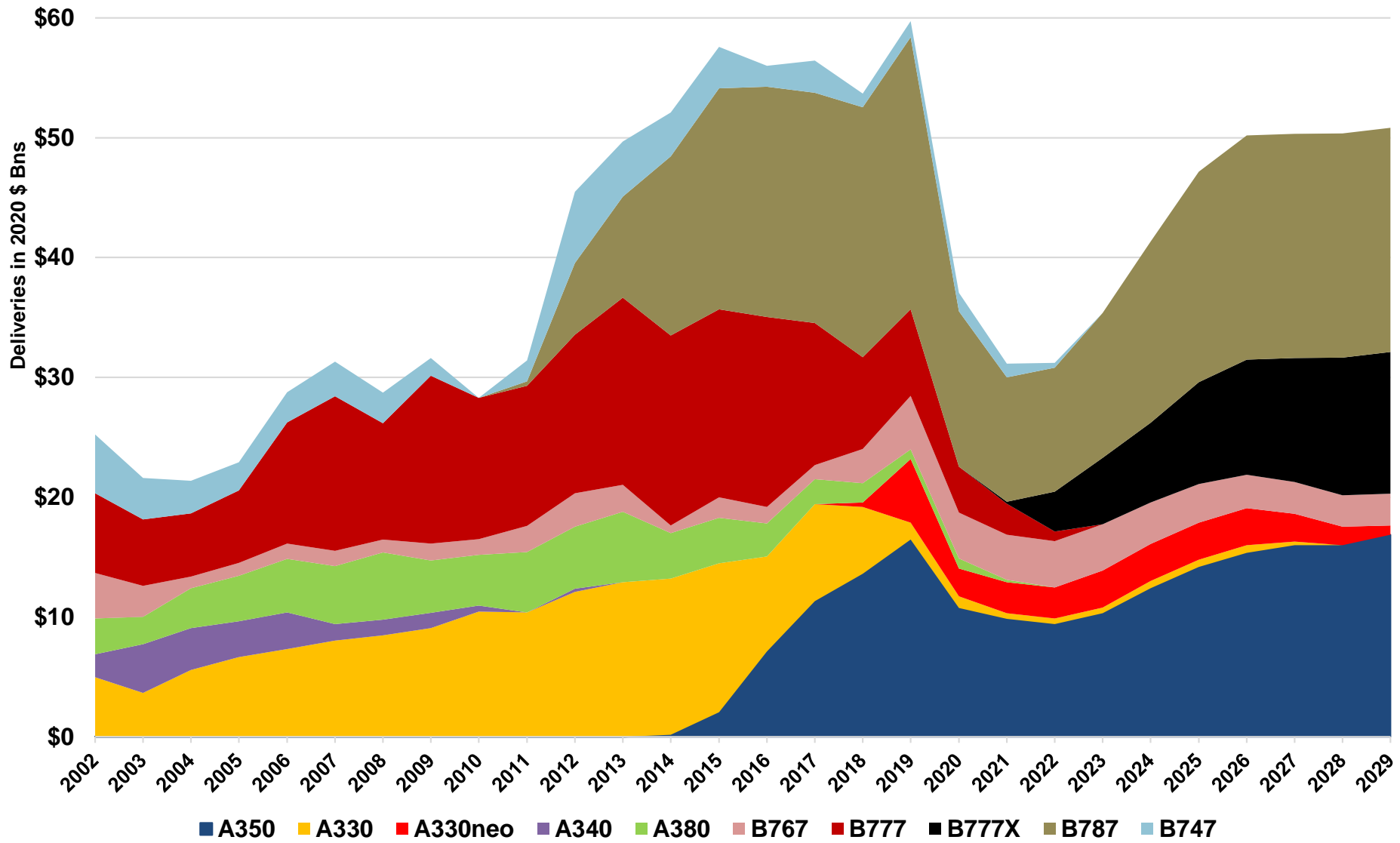
The Air Transport Market By Segment (May 1)



Single Aisle Deliveries: Protected By MAX Return (including jets built already), and By Shift Away From Twin Aisles



Twin Aisles: Formerly Hot; Now Crowded And Depressed

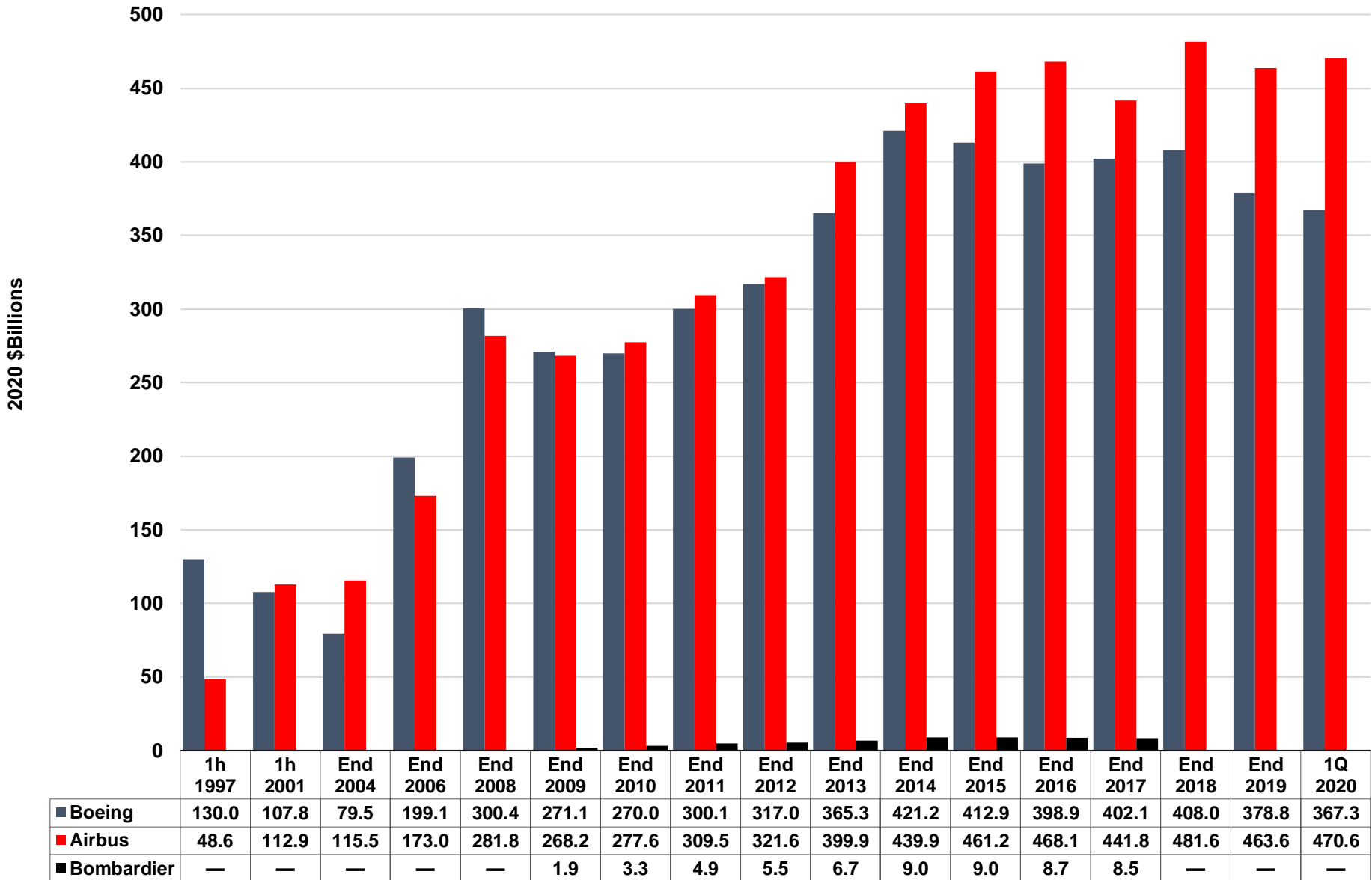


Jetliner Types And Fleets

Trends And Themes

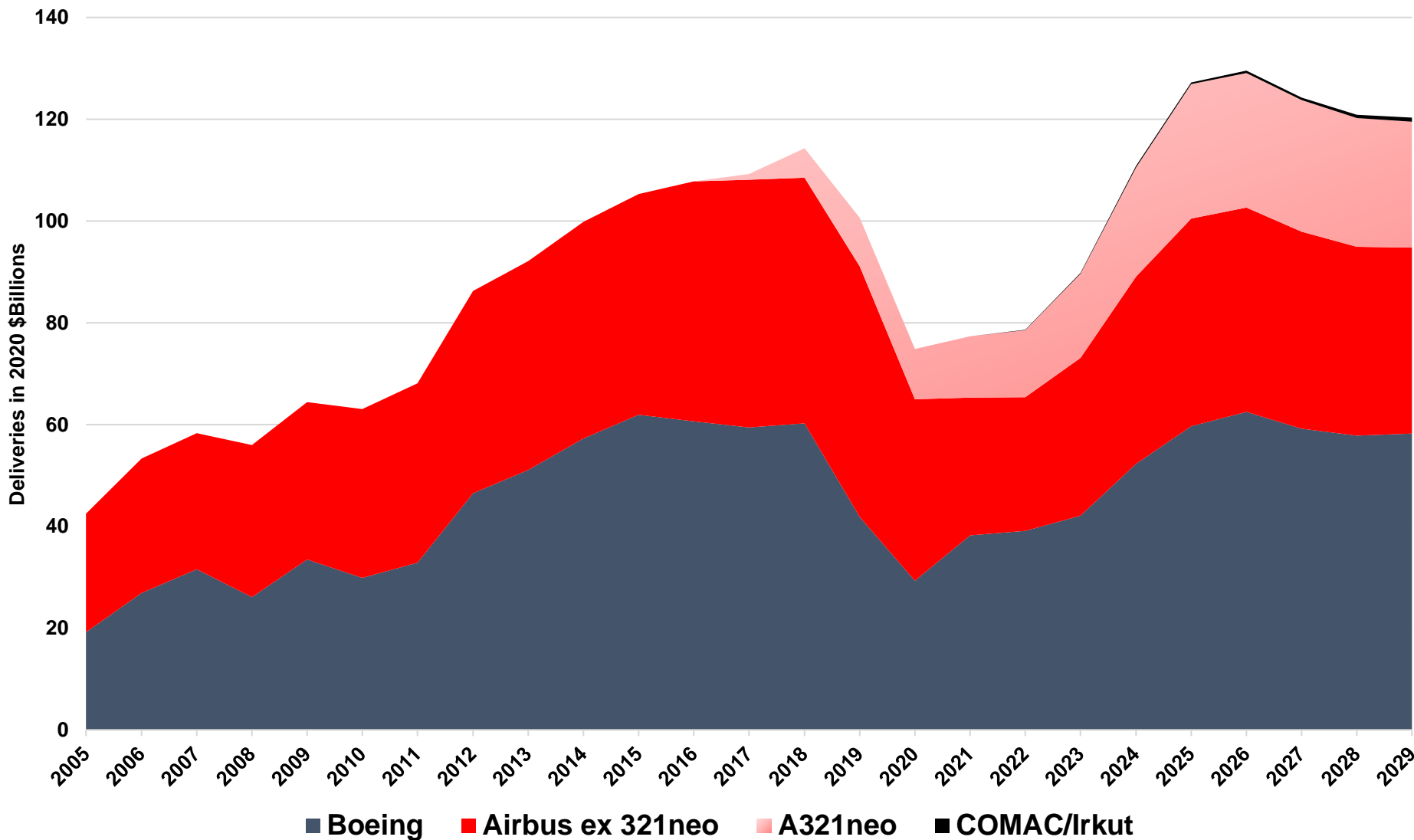
- **Downsizing trend: demand for jets offering equivalent functionality and equal/better economics, fewer seats, than older models.**
 - Thus, A321neo will do well as replacement for older, mid-range twin aisles; A220 will do well as replacement for older 737s and A319/320s.
- **Boeing single aisle product line now boxed in; MAX8 fine, but outflanked from above and below.**
 - A321neo increasingly dominant in 180/220-seat segment; CDB MAX10 order conversion further indication that larger MAXs uncompetitive.
 - Embraer JV termination means Boeing abandoning 100/130-seat segment.
 - BA 25% R&D cut announced in 1Q call not a good sign for product development.
 - MAX8 lease rates, orders (particularly lessor orders) also taking a hit.
 - Boeing, in short, is therefore at risk of losing out due to airline downsizing.
- **E-Jets will lose market share and/or profit without a large partner.**
- **A330neo increasingly at risk of MD-11-like fate.**
- **Almost all remaining quadjet fleets look set to retire young.**
- **Large twins (777X, A350-1000) look marginal for most of decade.**

Firm Order Backlog Values: Boeing Taking A Hit



Jetliner Market Shares By Deliveries

Airbus Seizes The Middle Market and First Place; Covid-19 Accelerates shift to Middle Market



■ Boeing ■ Airbus ex 321neo ■ A321neo ■ COMAC/Irkut

Embraer JV Fallout

Winners, Losers, Questions

- **Winners**

- Airbus.
- Mitsubishi.

- **Winner/Loser**

- Boeing
 - Lose: Airbus wins 100/130-seat segment, KC-390 cooperation in danger.
 - Win: \$4 bn instant liquidity boost, no worries about optics if USG aid needed.

- **Losers**

- Embraer jetliners.
- Bombardier, maybe?

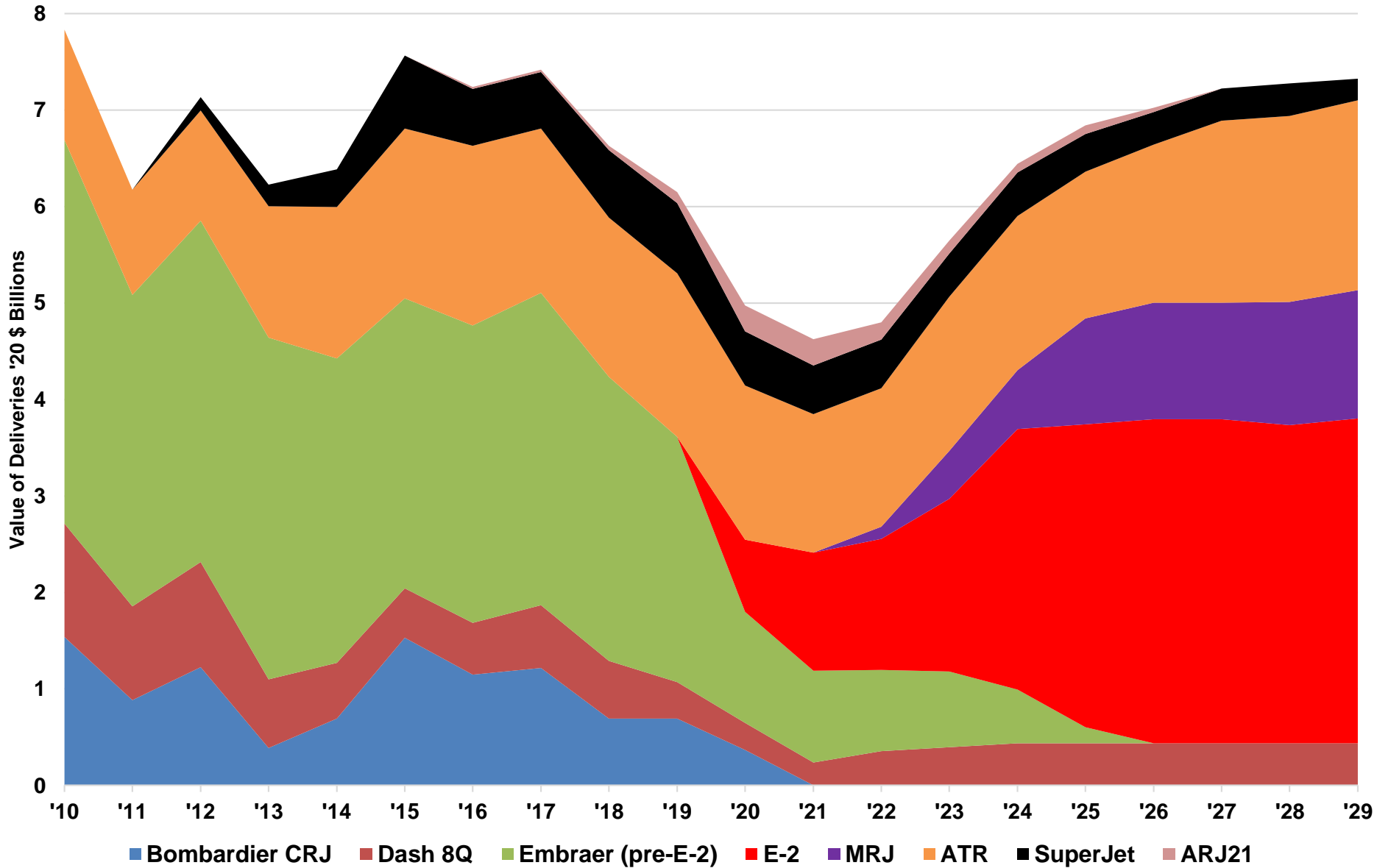
- **Big Questions**

- SpaceJet product support?
- Props: Viking's future? New ATR? New E-3? Anything else?
- State aid for Embraer?

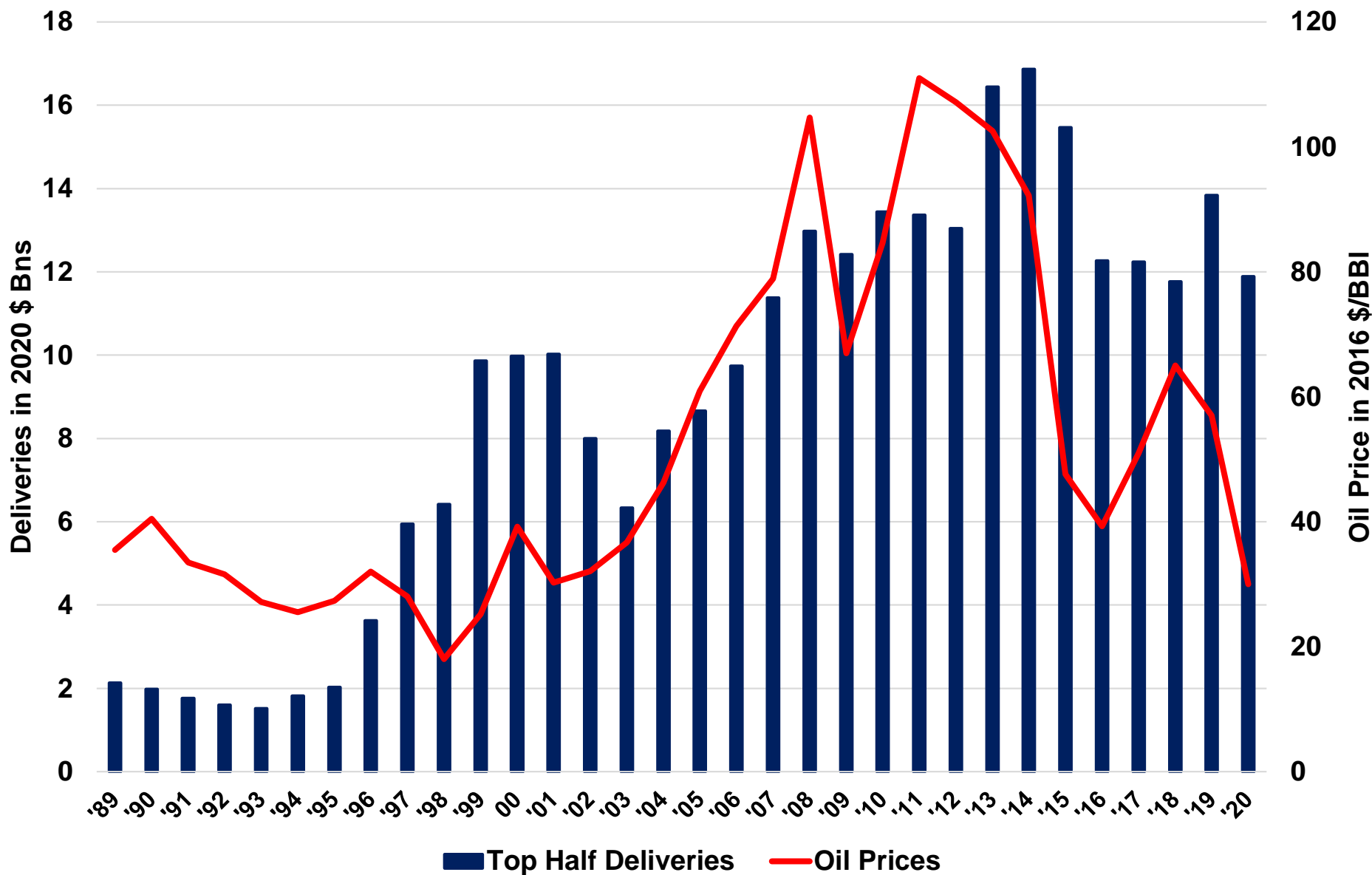
- **Biggest Question**

- About Embraer's future...hard to see anyone but Boeing as an acquirer, but smaller partners possible on specific programs.

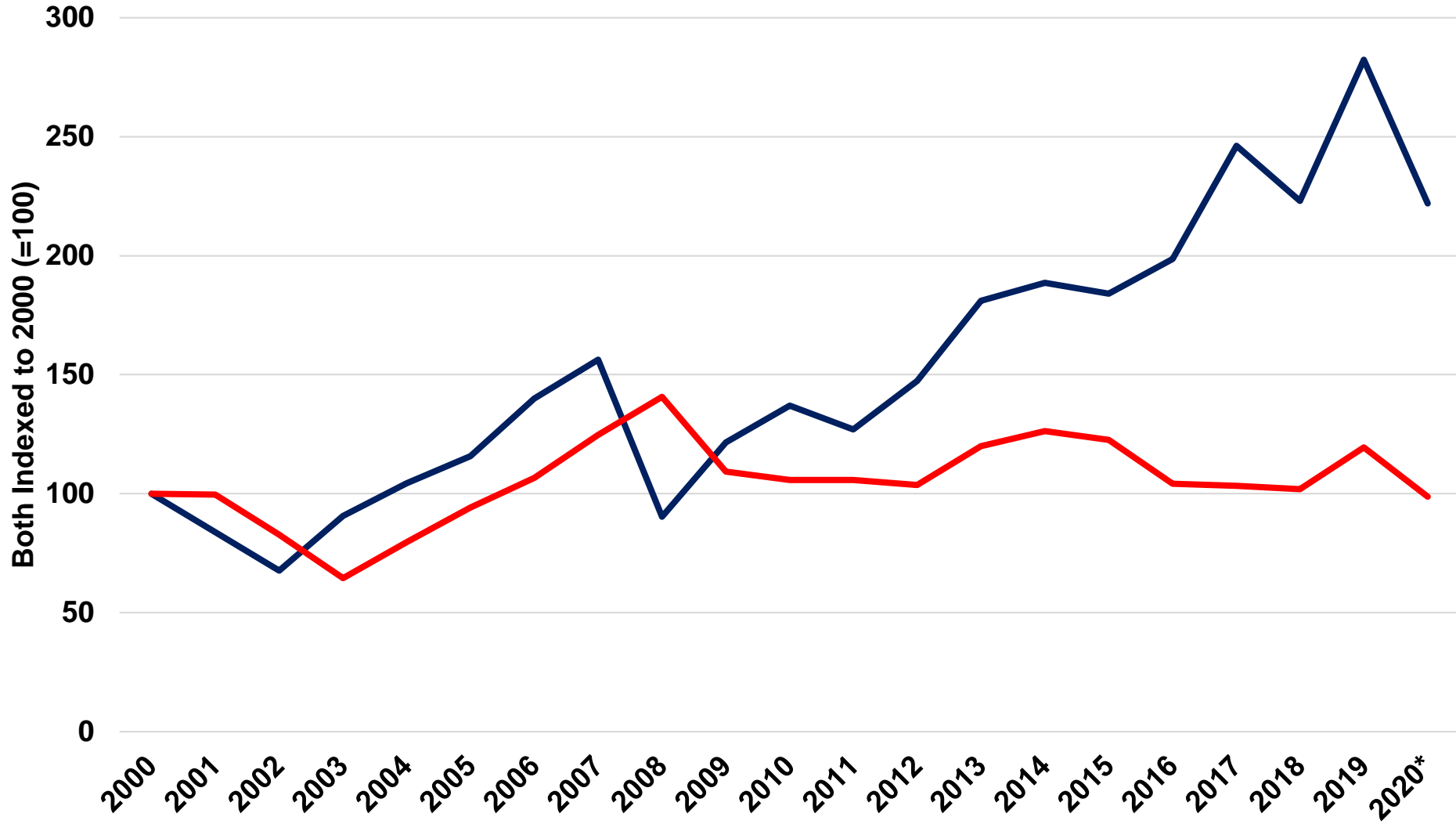
Regional Deliveries By OEM (Value)



Oil Prices And Top Half Business Jet Deliveries



Business Jet Market Has Lagged Global Equities For Last Decade, But A Downturn Will Still Hurt

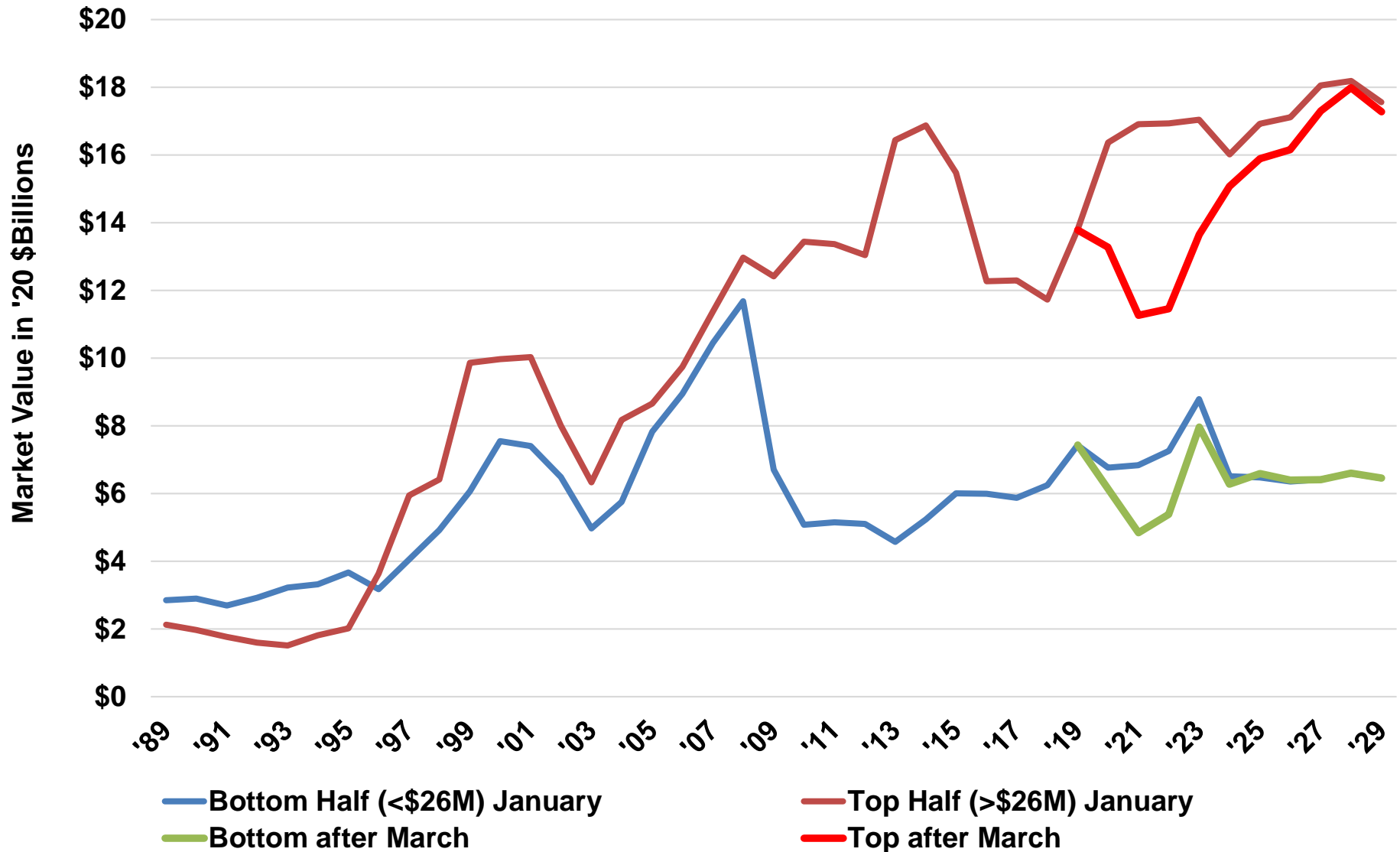


ACWI is a global equity markets index;
2020 is forecast for jets, April 1 for ACWI

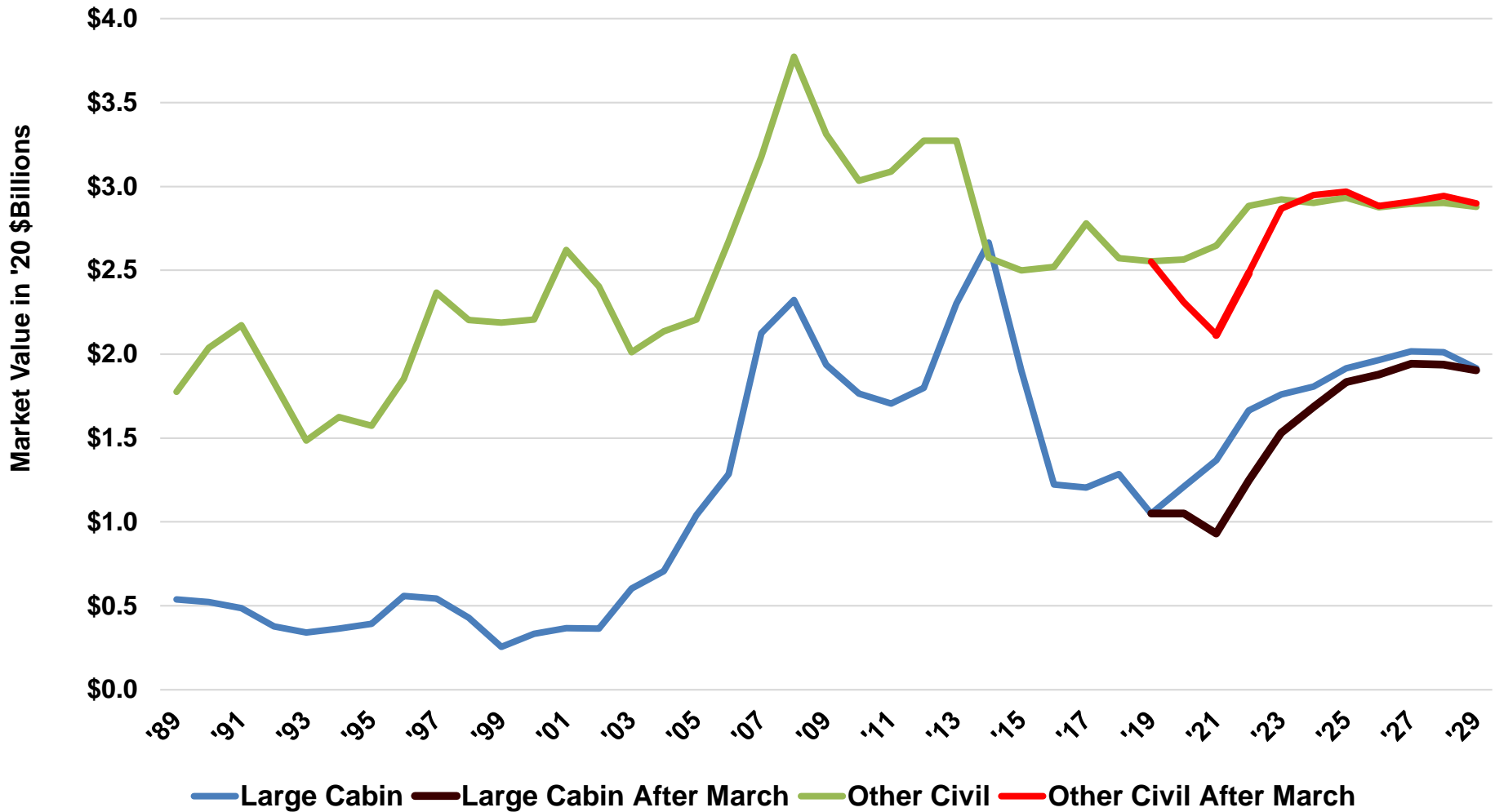
— MSCI ACWI

— Market Value

Bottom Half Bizjet Segment vs. Top Half



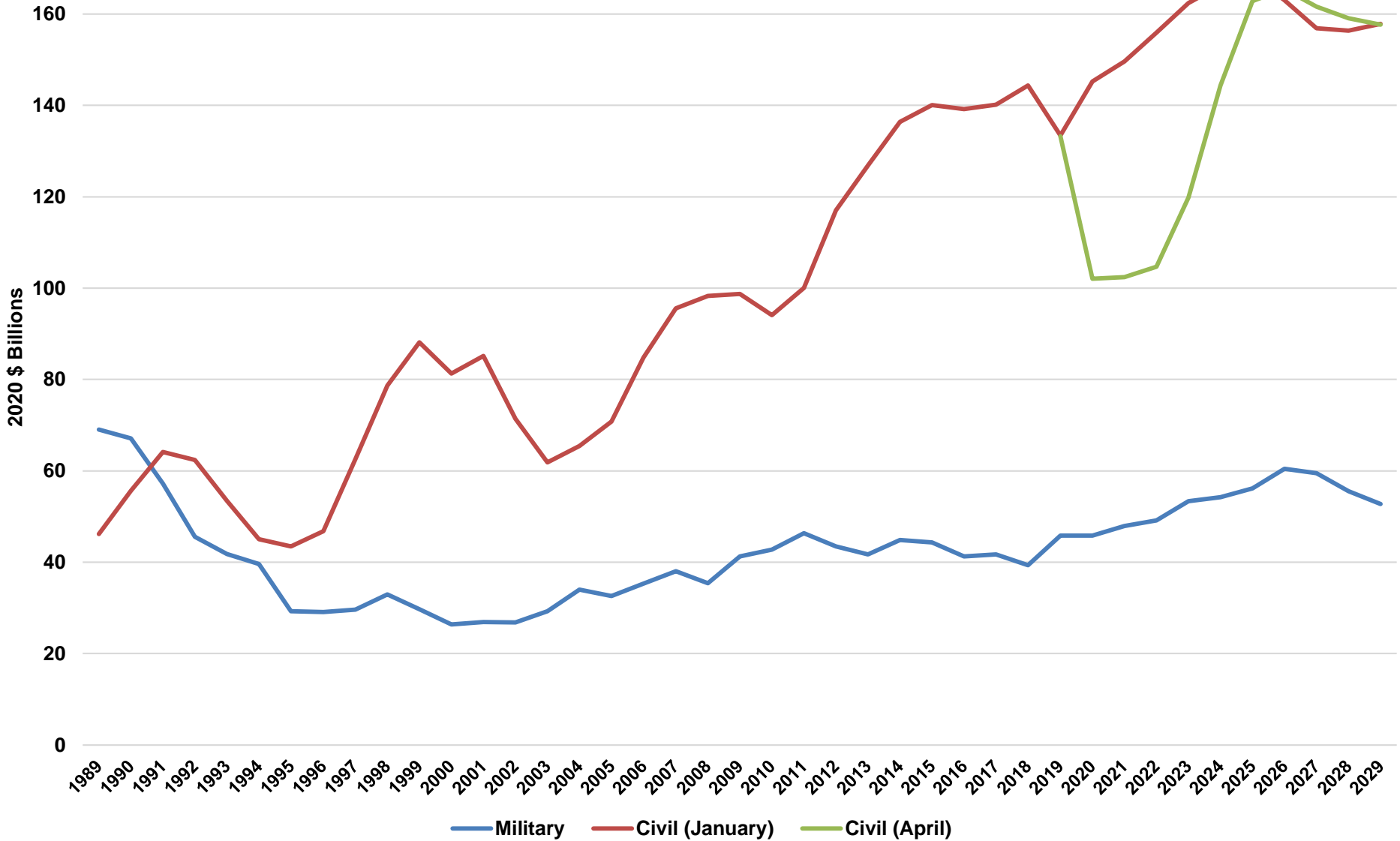
Civil Helicopter Demand May Worsen For Large Models, Depending On Energy Prices



Global Aircraft Market Outlook In One Page

<u>Segment</u>	<u>2020</u>	<u>'20-'21</u>	<u>Risk</u>	<u>Elevator Comment</u>
Jetliners-SA	-18.2%	22.3%	Red	Includes some already-built MAXs. Watch China, fuel, traffic.
Jetliners-TA	-33.0%	-15.9%	Red	Overcapacity, slow international recovery, secular shift to SAs
Regionals	-13.3%	-7.0%	Yellow	No Boeing supply chain effect on E-2; Scope clause de-risked, but little growth.
Business Aircraft	-17.0%	-8.0%	Red	Another hit after many false starts over a disappointing decade.
Civil Rotorcraft	-6.7%	-9.3%	Red	Large civil hit again. Too many new models aimed at a weak segment (oil/gas).
Military Rotorcraft	-1.6%	1.0%	Green	Programs end/slow; no risk of accelerated downturn; FVL beyond forecast, exc FARA.
Military Transports	-26.1%	9.1%	Yellow	A seriously underperforming market.
Fighters	2.9%	6.6%	Green	I like this market. F-35, plus strong Gen 4.5
<u>All Civil</u>	<u>-23.5%</u>	<u>0.3%</u>	Red	SAJetliner snapback due to MAX, weakness in other segments; more overcapacity risk.
<u>All Military</u>	<u>-0.1%</u>	<u>4.7%</u>	Green	Global insecurity, Tension, Malice. Special mission also boosts topline.
<u>Total Industry</u>	<u>-17.5%</u>	<u>1.7%</u>	Red	<u>No strong recovery until 2023</u>

World Aircraft Deliveries By Value, 1989-2029



Believe It Or Not...

There's Good News If You Look Hard Enough

- **A much bigger industry and market – % v. numbers.**
- **An airline paradise, except for the traffic.**
 - Fuel, Jet costs, Crew costs, interest rates, government support (for most, and for now).
 - Stimulate traffic, or restore profit?
- **Defense: budgets and export demand.**
- **Defense: industrial support.**
 - Companies: all about balance.
- **Financial sector stronger going into this crisis.**
- **Less business jet frothiness.**
- **Globalization redeemed. Different, but redeemed.**

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For more information about Teal Group:

www.tealgroup.com

Tom Zoretich

Senior Economist

tzoretich@tealgroup.com