COVID-19 And Civil Aviation Markets

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

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Fourth Update; June 8, 2020

Last Month's Developments
Through June 5; Bottoming Out?

- **Slight improvements in apocalyptic traffic numbers; IATA still at -48% for 2020; TSA numbers improve from -95% to -86%.**
- **Increasingly confrontational relationship between primes and customers.**
  - **Airbus: undelivered orders and default notices.**
  - **Qatar threatens future orders if deferrals aren't granted.**
  - **Emirates "unable to commit" to existing orders.**
- **Airbus did not cut rates further;**
- **Boeing re-started MAX production; 31/month by late 2021?**
  - **Another round of deferrals/cancelations…the single most vulnerable program due to MAC clause.**
- **Rolls-Royce cut to junk by S&P; 17% of workforce cut.**
- **Mitsubishi freezing SpaceJet; risk of death (but CRJ support business acquisition finalized).**
- **Three business jet OEMs (BBD, GD, TXT) have announced major layoffs.**
- **<u>Continued disconnect between relief measures, industry production plans and the downturn's likely depth and duration.</u>**

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COVID-19 And Aero Markets
Issues And Impact

- <u>Apparently, these things come in pairs:</u>
  - 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 (going into the crisis).
  - 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.
- <u>The state aid question, and strings attached.</u>
  - With state aid, a "synthetic market" pulls demand forward.
- <u>Impact on R&D budgets likely to be profound.</u>
  - Both for new models, and advanced tech development.

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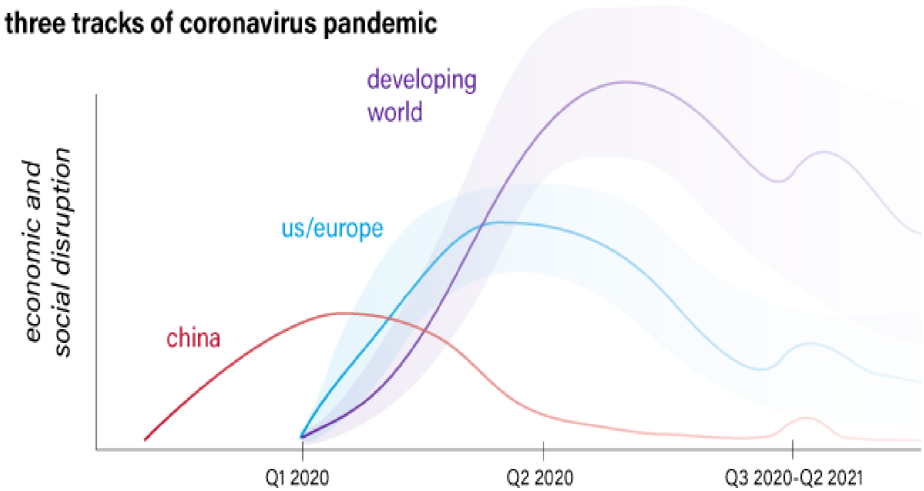
"You don't make the timeline, the virus makes the timeline." (Dr. Fauci)

- 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.



Source: Eurasia Group

- 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. <u>But it's not a V.</u>
- Return to traffic peak in 2023, we hope.

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Aircraft Markets, In Good And Bad Years

World New Deliveries In 2019 (2020 $)	CAGR '03-'08	CAGR '08-'14	CAGR '14-18	Change '18-'19
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%
All Civil ($133.8 b)	9.7%	5.6%	1.4%	-7.6%
All Military ($45.5 b)	3.9%	4.0%	-3.3%	16.6%
Total ($179.3 b)	8.0%	5.2%	0.3%	-2.4%

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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.

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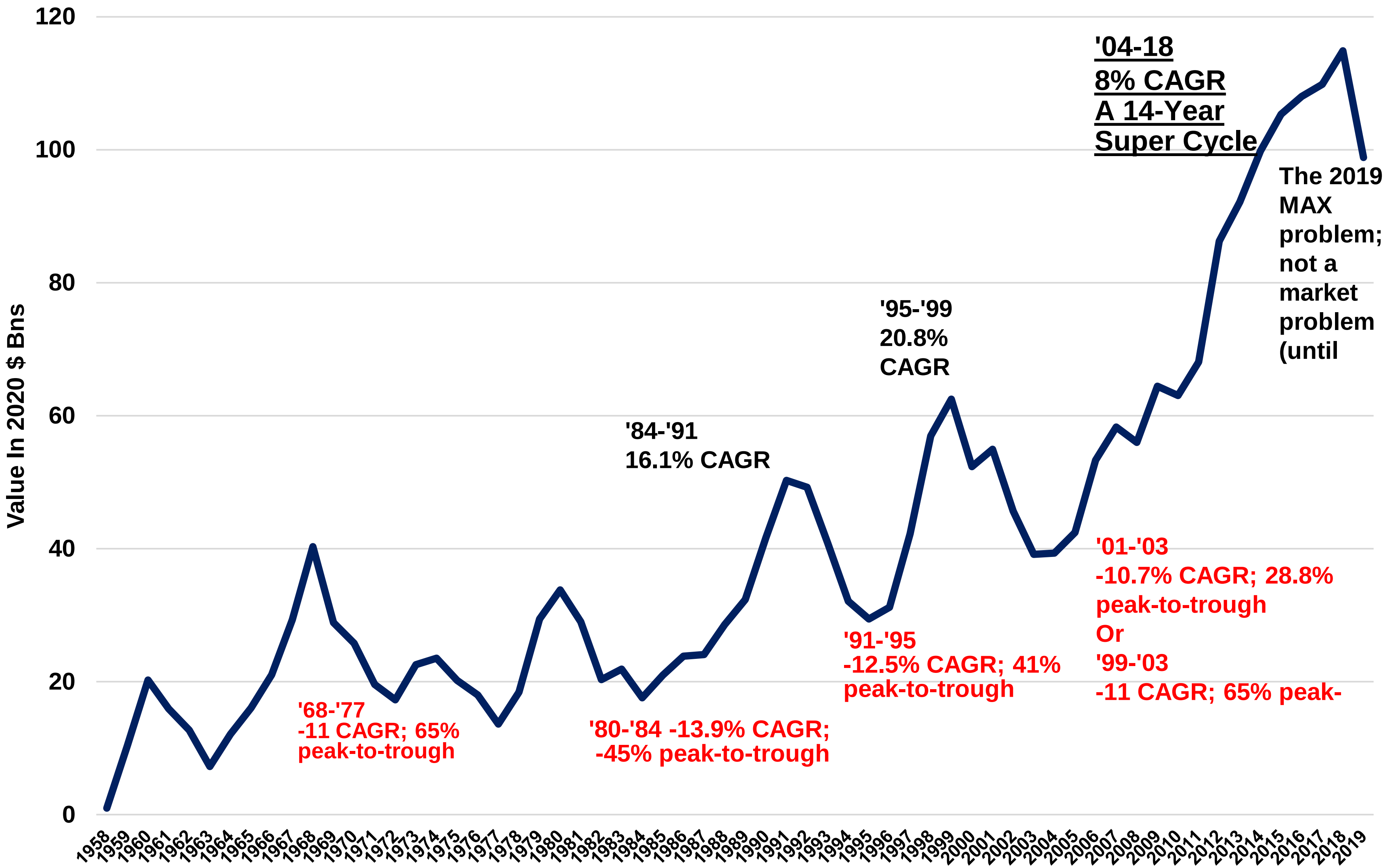
Cyclicality, Our Long-Forgotten Nemesis



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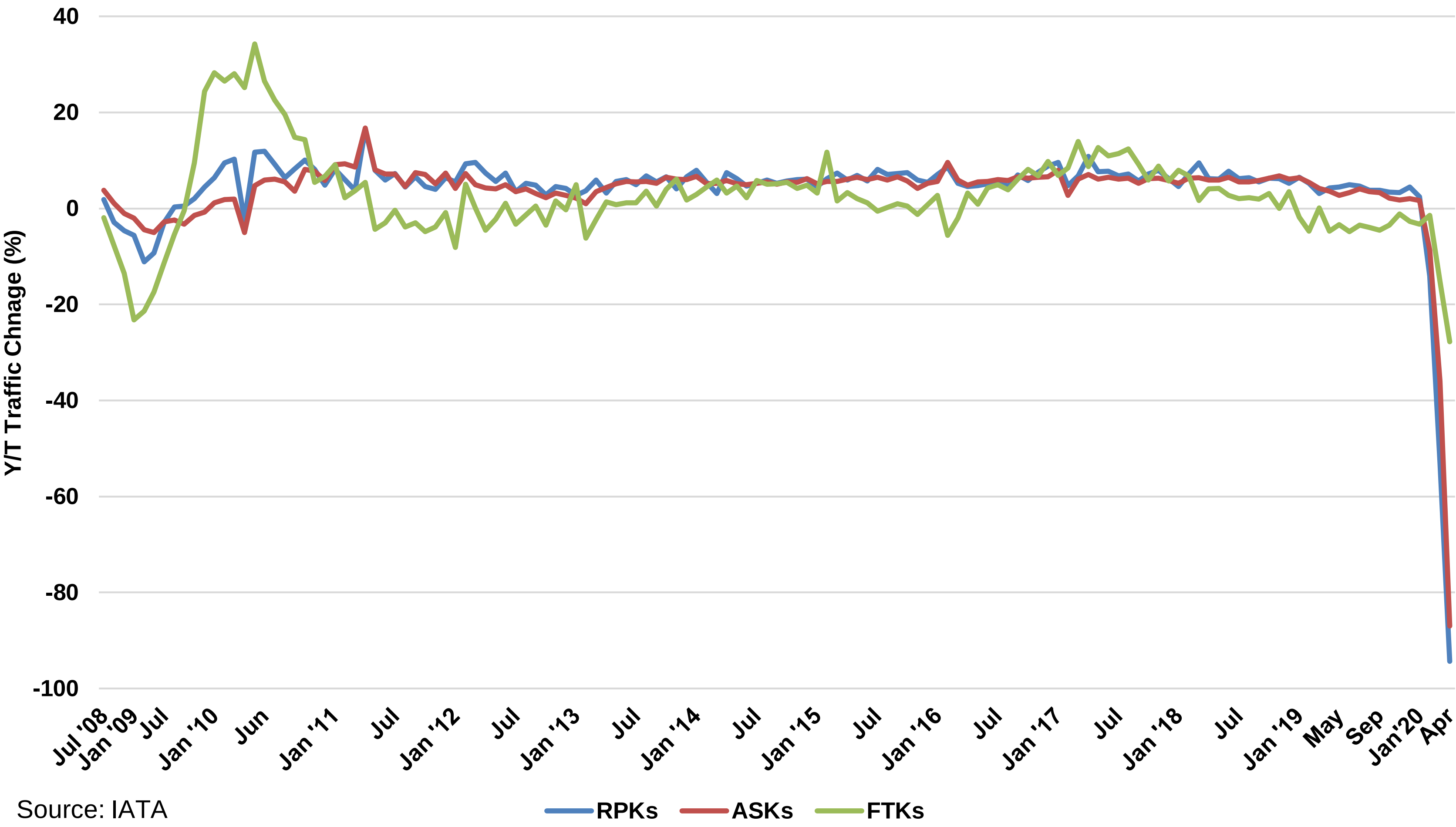
Traffic: Like Nothing We've Ever Seen Before

IATA's 48% Decline in 2020 Very Unlikely At This Point

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%

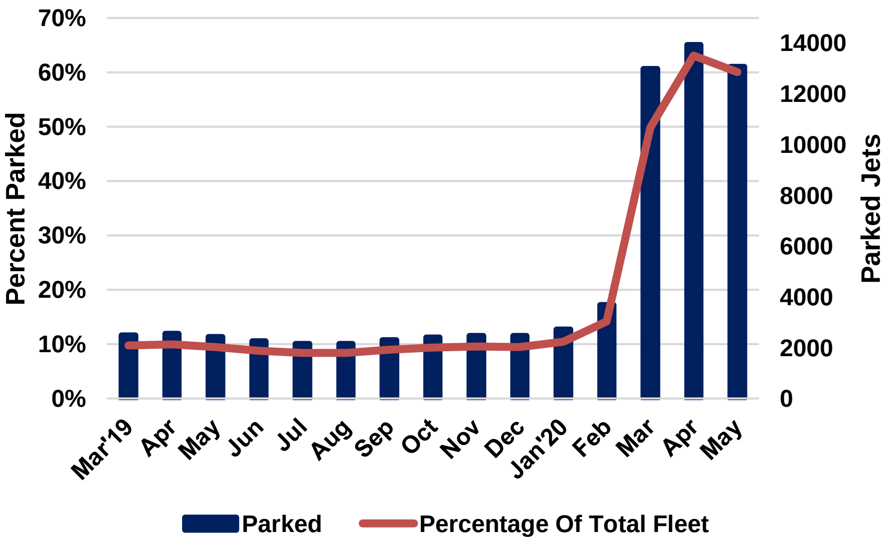


Source: IATA

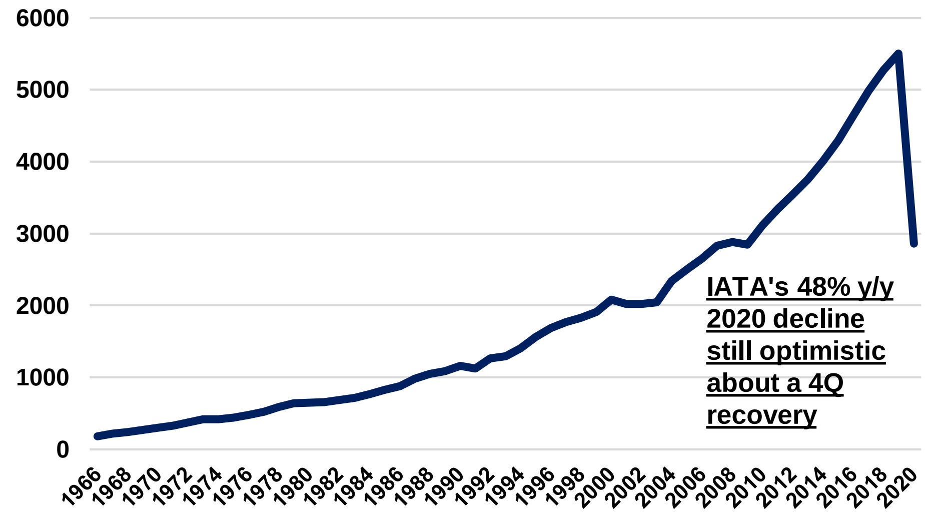
And Now, Unprecedented Numbers

- **Traffic decline, parked fleet like no previous shock.**
  - **Per Paul Krugman, reflect a world economy in a "medically-induced coma."**
  - **Again, traffic recovery is determined by the virus, not politicians or economics.**
- **Backlogs holding up (MAX a concern), but meaningless in a downturn.**
  - **Just 1% of January backlog has cancelled; over one third has deferred.**
- **Many early retirements coming, particularly twin aisles.**
  - **Primarily twin aisles; A380 bloodbath.**
- **Aftermarket catastrophe.**
  - **-48% ASMs (60-70%, really), de-stocking, deferred maintenance/upgrades, plentiful USM with early retirements.**

World Jet Fleet: Now ~60% Unemployed



World Air Traffic (RPM Bns)



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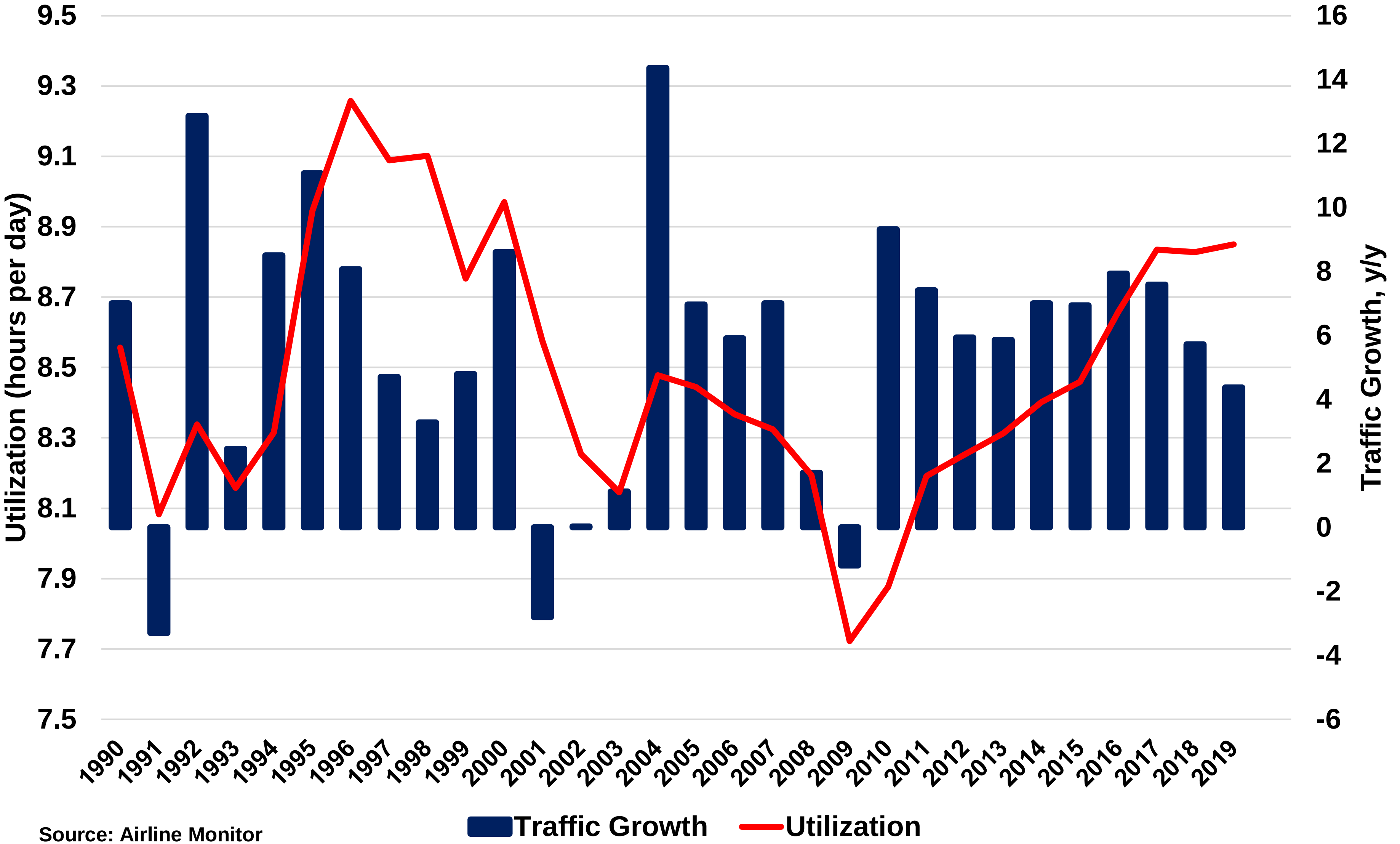
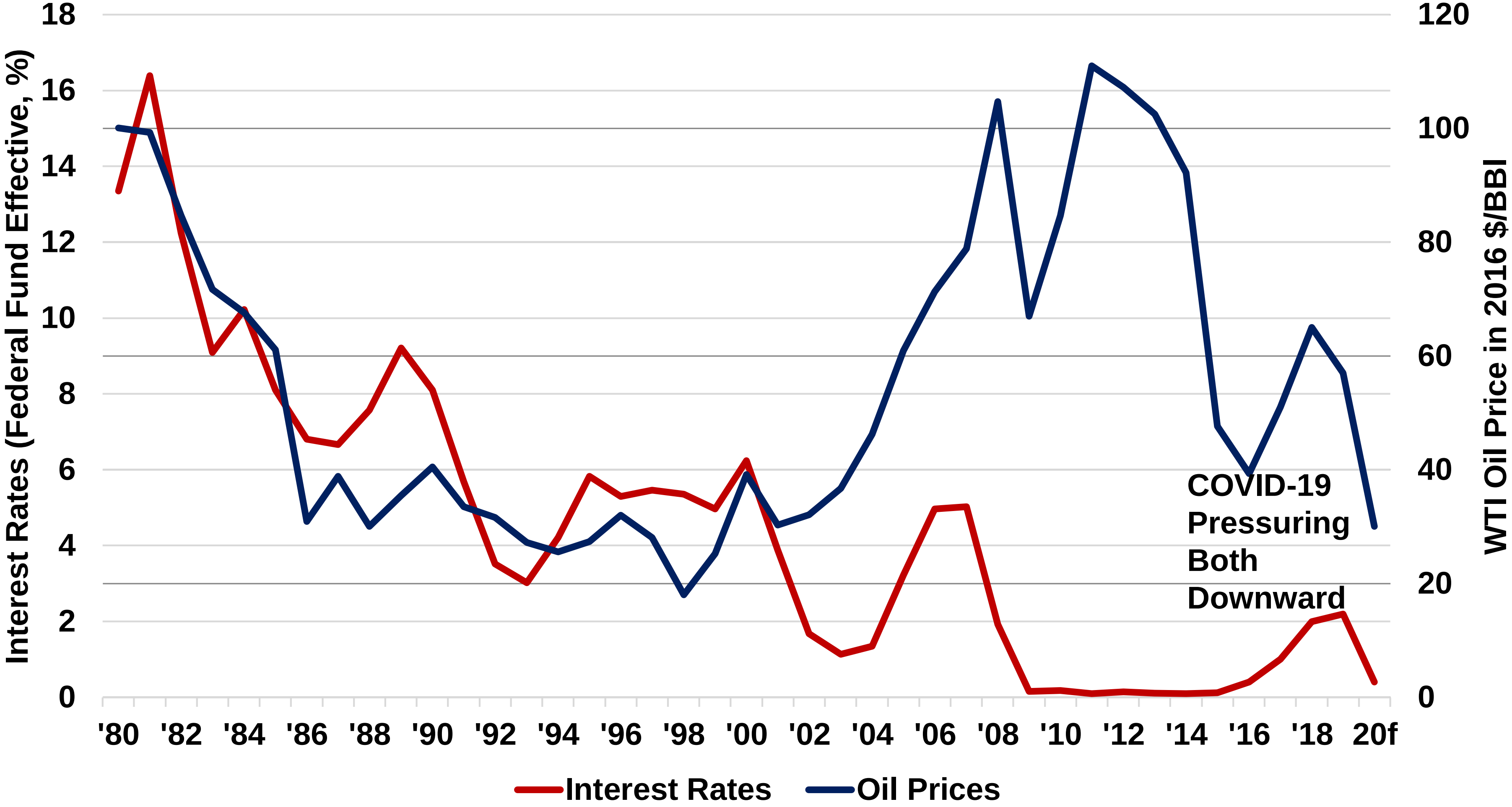
Lower Utilization Can Help With Overcapacity

But A 48%+ Traffic Drop Is Another Story



Source: Airline Monitor

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



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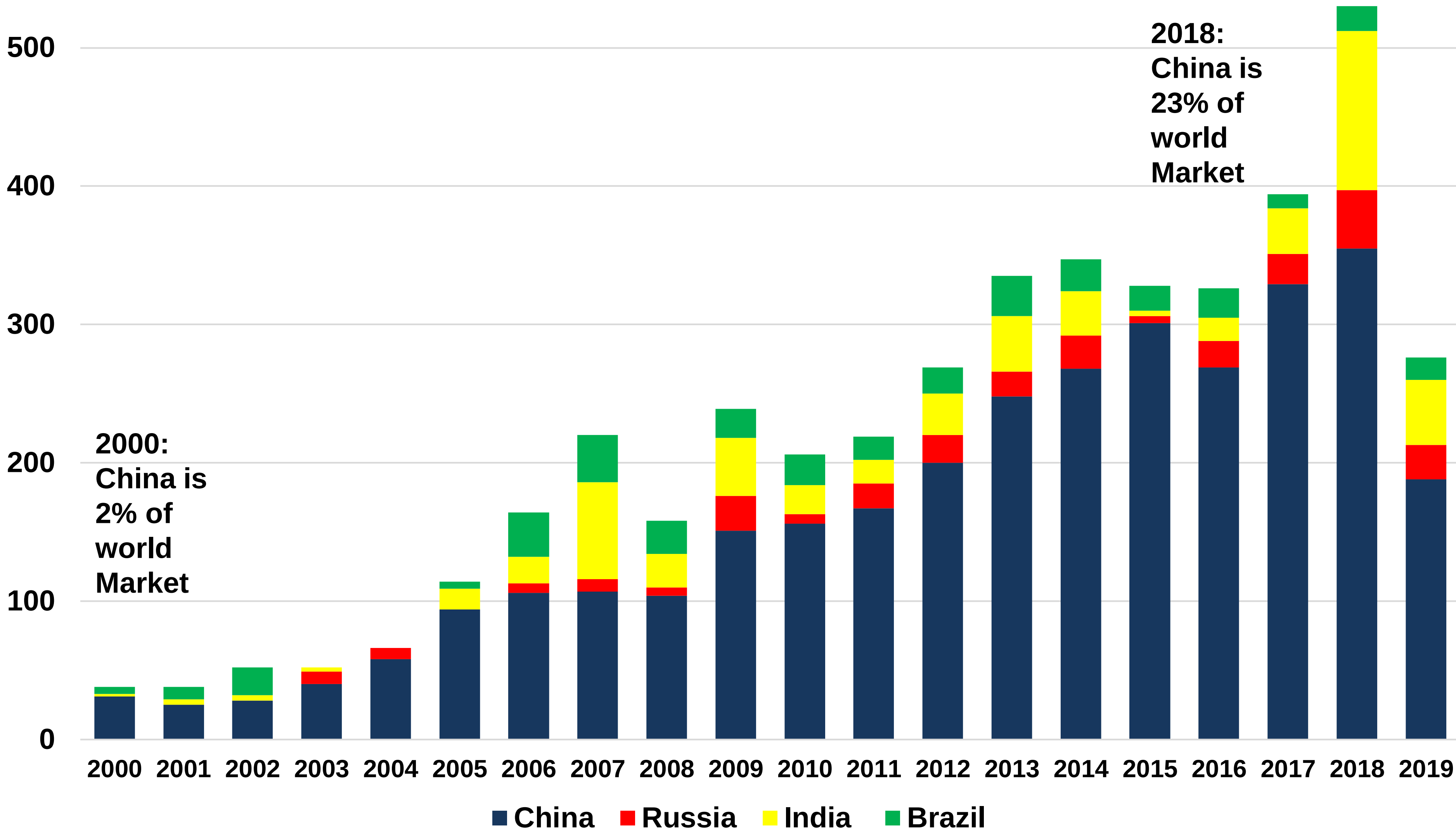
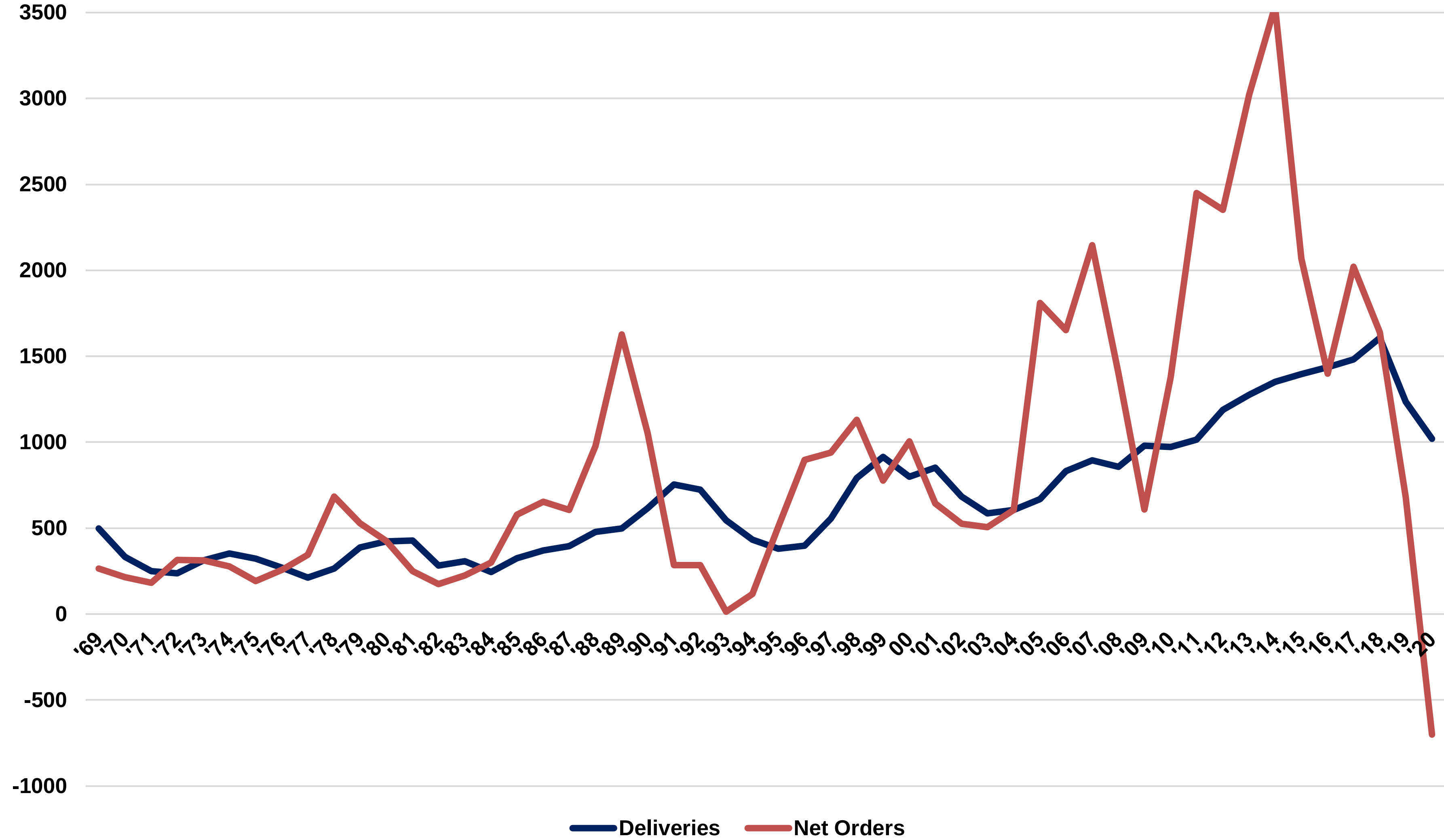
BRIC Deliveries: Peaked; Watch China

Growth May Not Resume For A Few Years



Large Jetliner Orders And Deliveries Book-To-Bill No Longer A Thing



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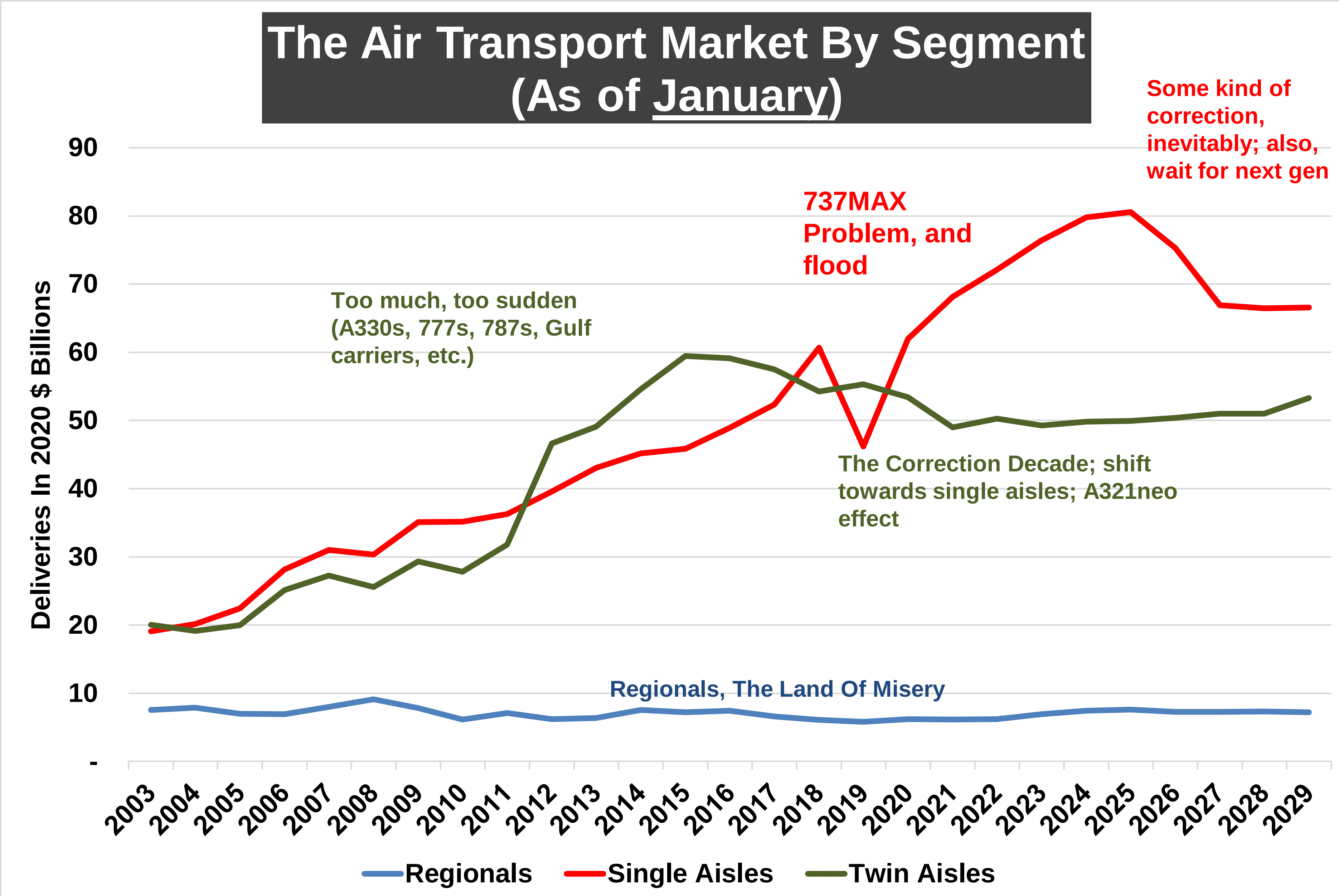

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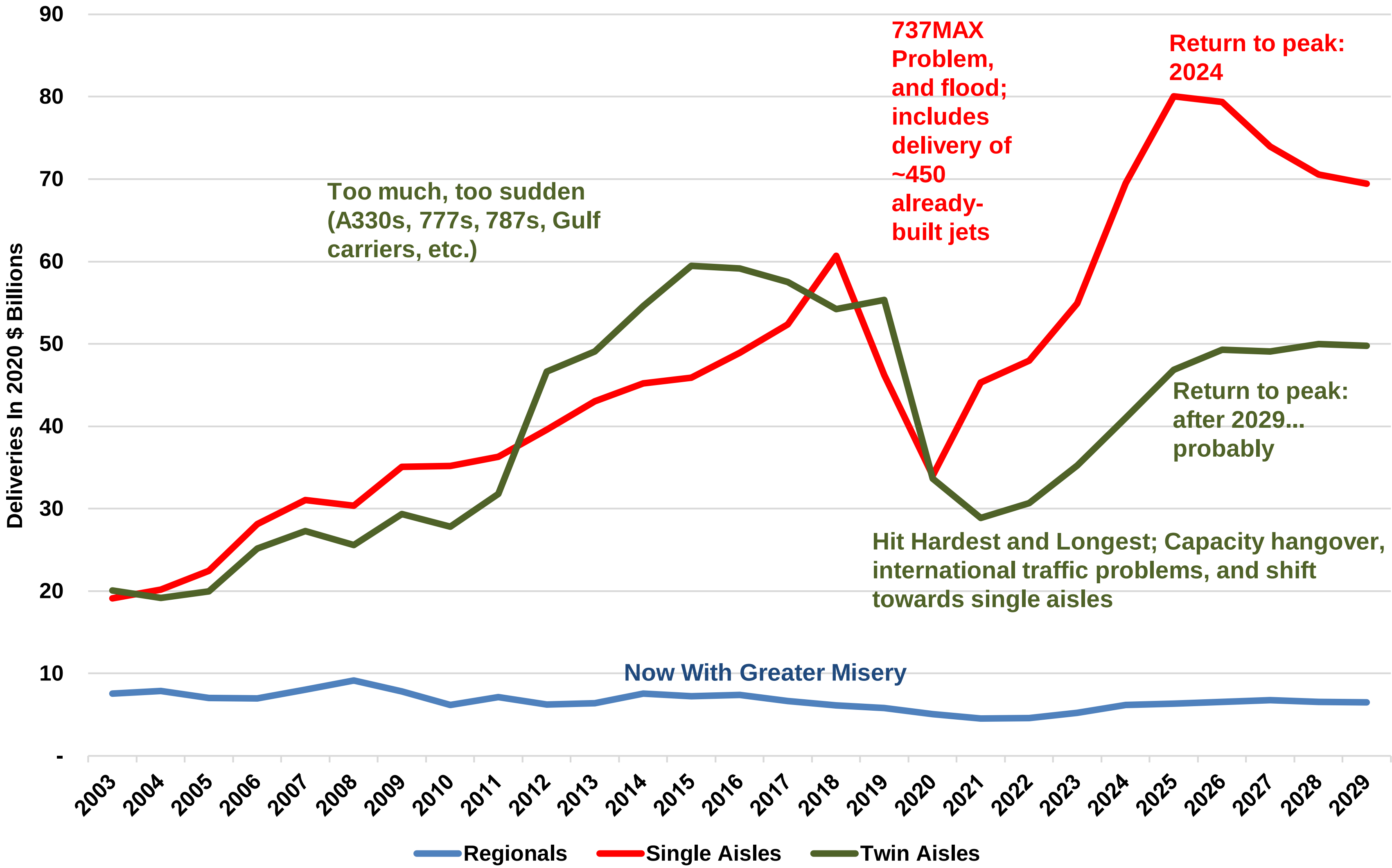
The Air Transport Market By Segment (June 8)



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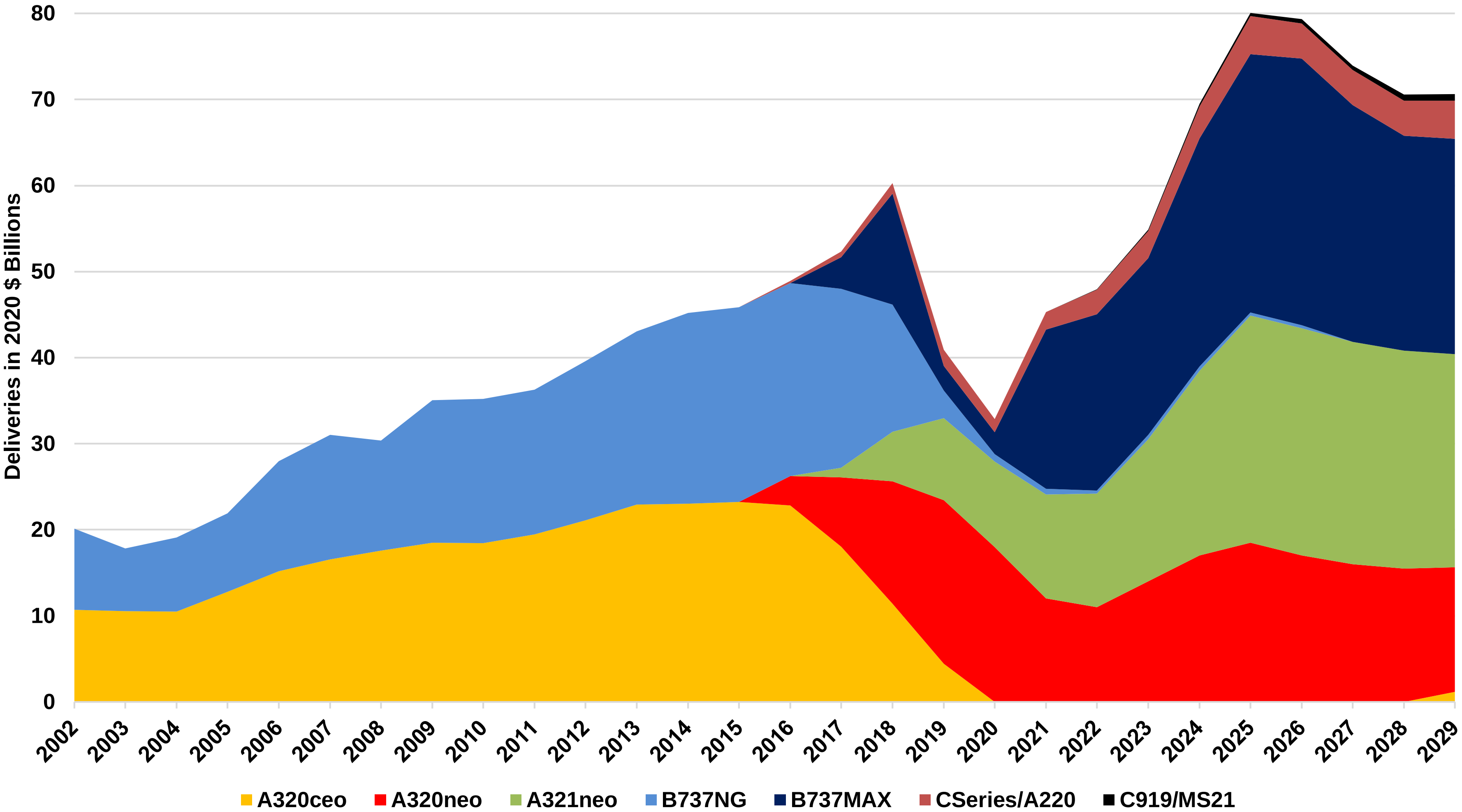
Single Aisle Deliveries: : Protected By MAX Return, and By Shift Away From Twin Aisles



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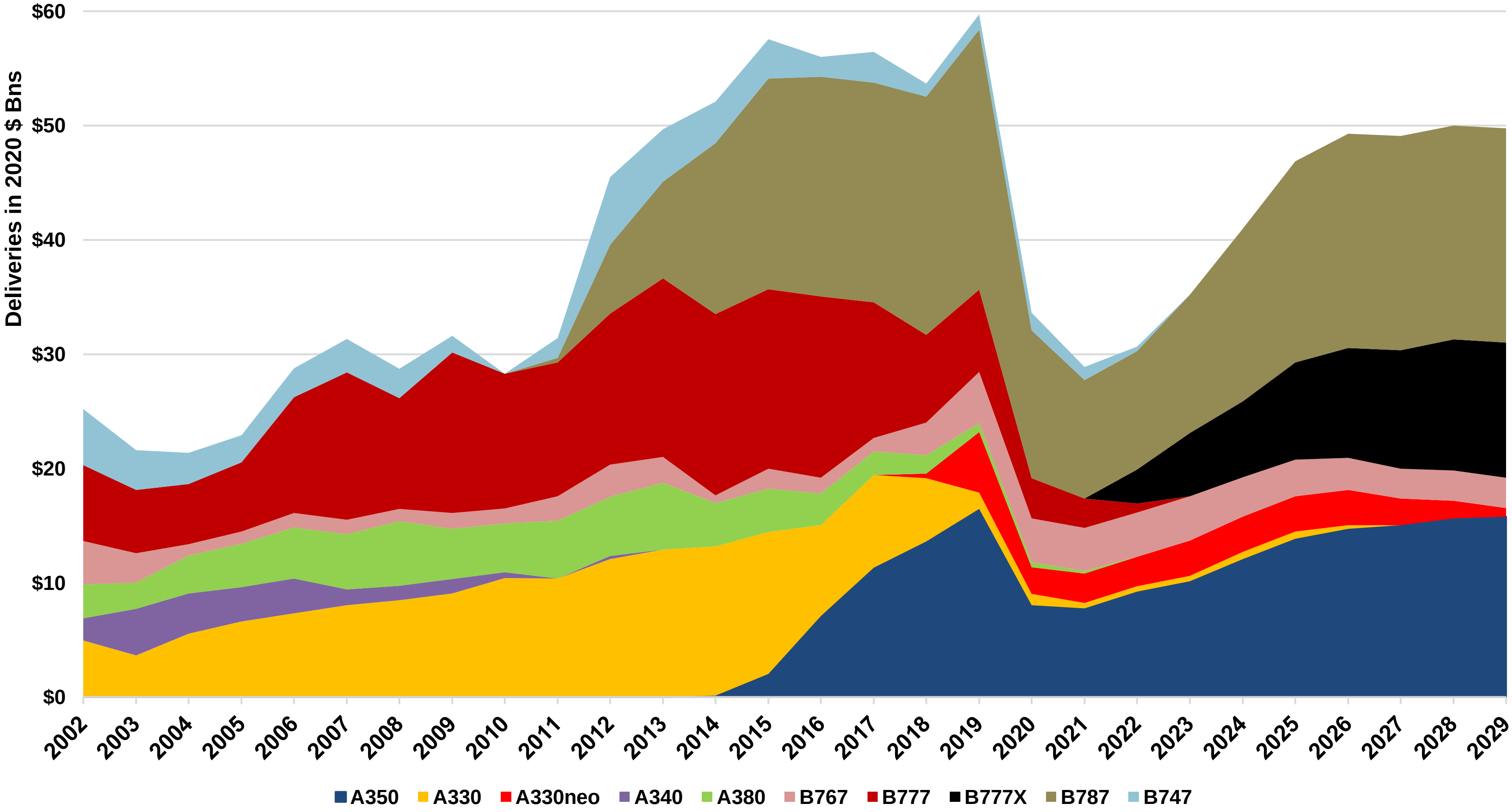
Twin Aisles: Formerly Hot; Now Crowded And Depressed



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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.**
  - **<u>Boeing, in short, is therefore at risk of losing out due to airline downsizing.</u>**
- **E-Jets will lose market share and/or profit without a large partner against A220, but E175 might control its segment.**
- **A330neo increasingly at risk of MD-11-like fate.**
- **Almost all remaining quadjet fleets look set to retire young (1/3 of 380 fleet so far).**
- **Large twins (777X, A350-1000) look marginal for most of decade.**

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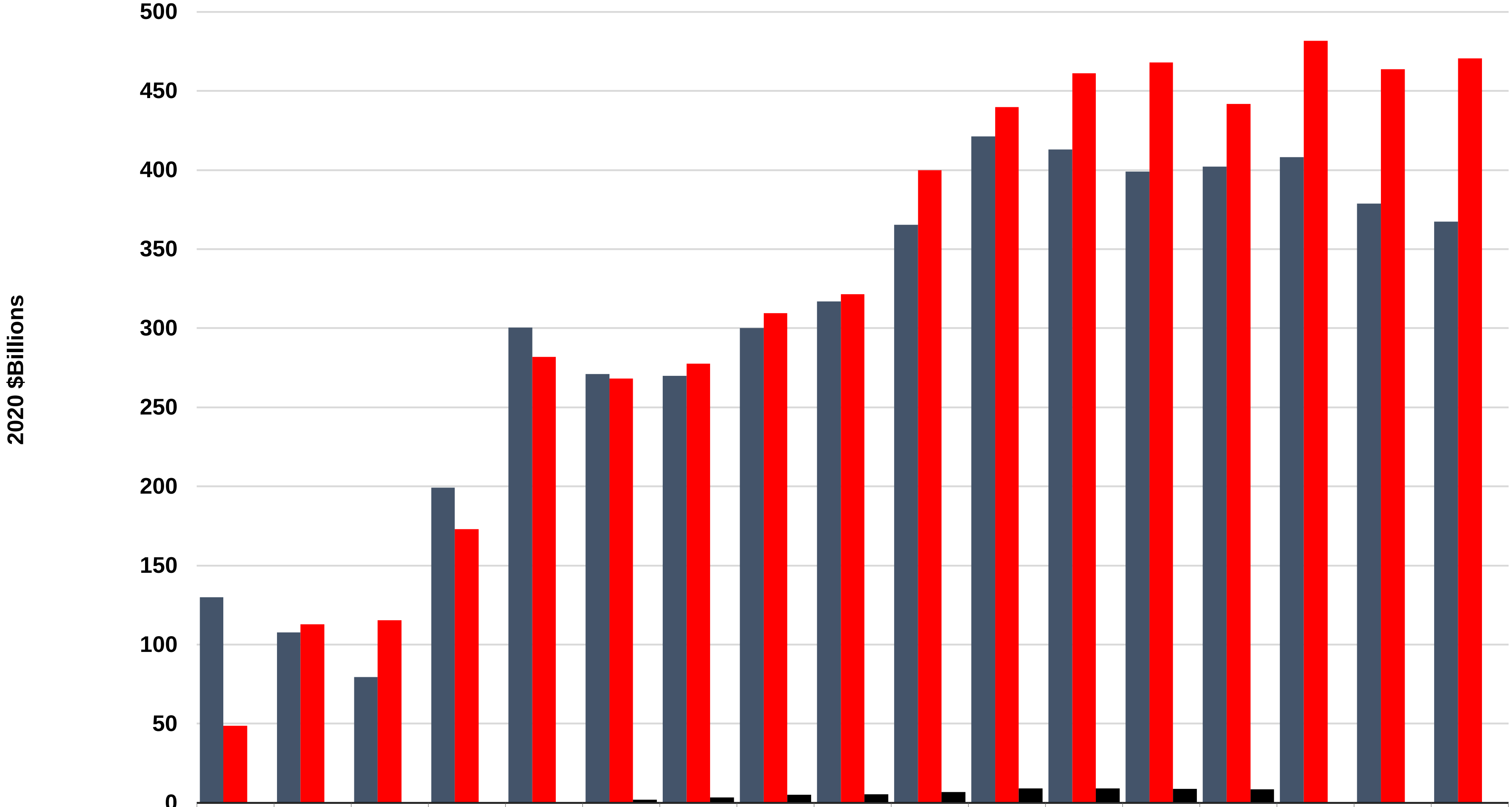
Firm Order Backlog Values: Boeing Taking A Hit



	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	1Q 2020
Boeing	130.0	107.8	79.5	199.1	300.4	271.1	270.0	300.1	317.0	365.3	421.2	412.9	398.9	402.1	408.0	378.8	367.3
Airbus	48.6	112.9	115.5	173.0	281.8	268.2	277.6	309.5	321.6	399.9	439.9	461.2	468.1	441.8	481.6	463.6	470.6
Bombardier	—	—	—	—	—	1.9	3.3	4.9	5.5	6.7	9.0	9.0	8.7	8.5	—	—	—

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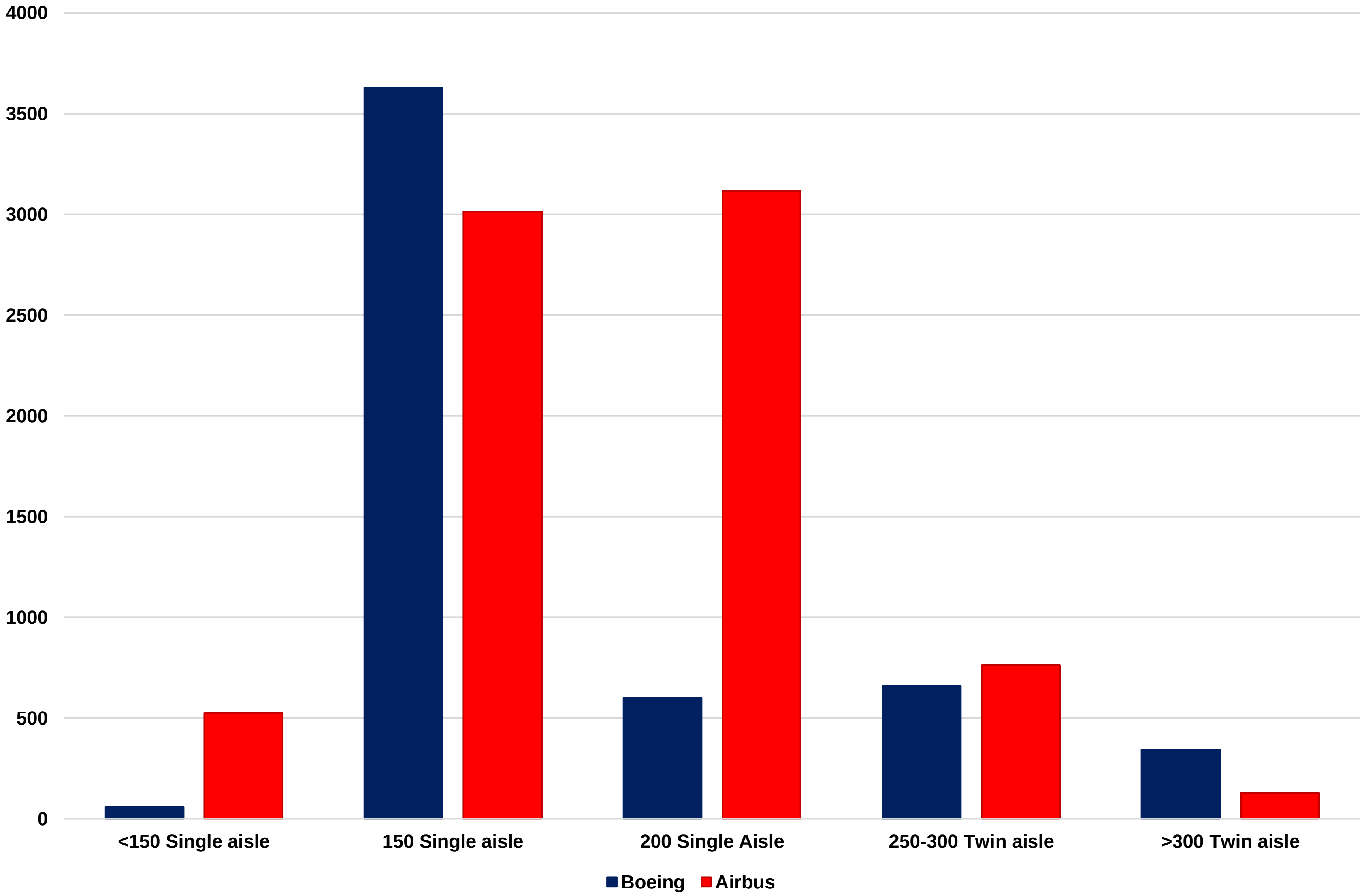
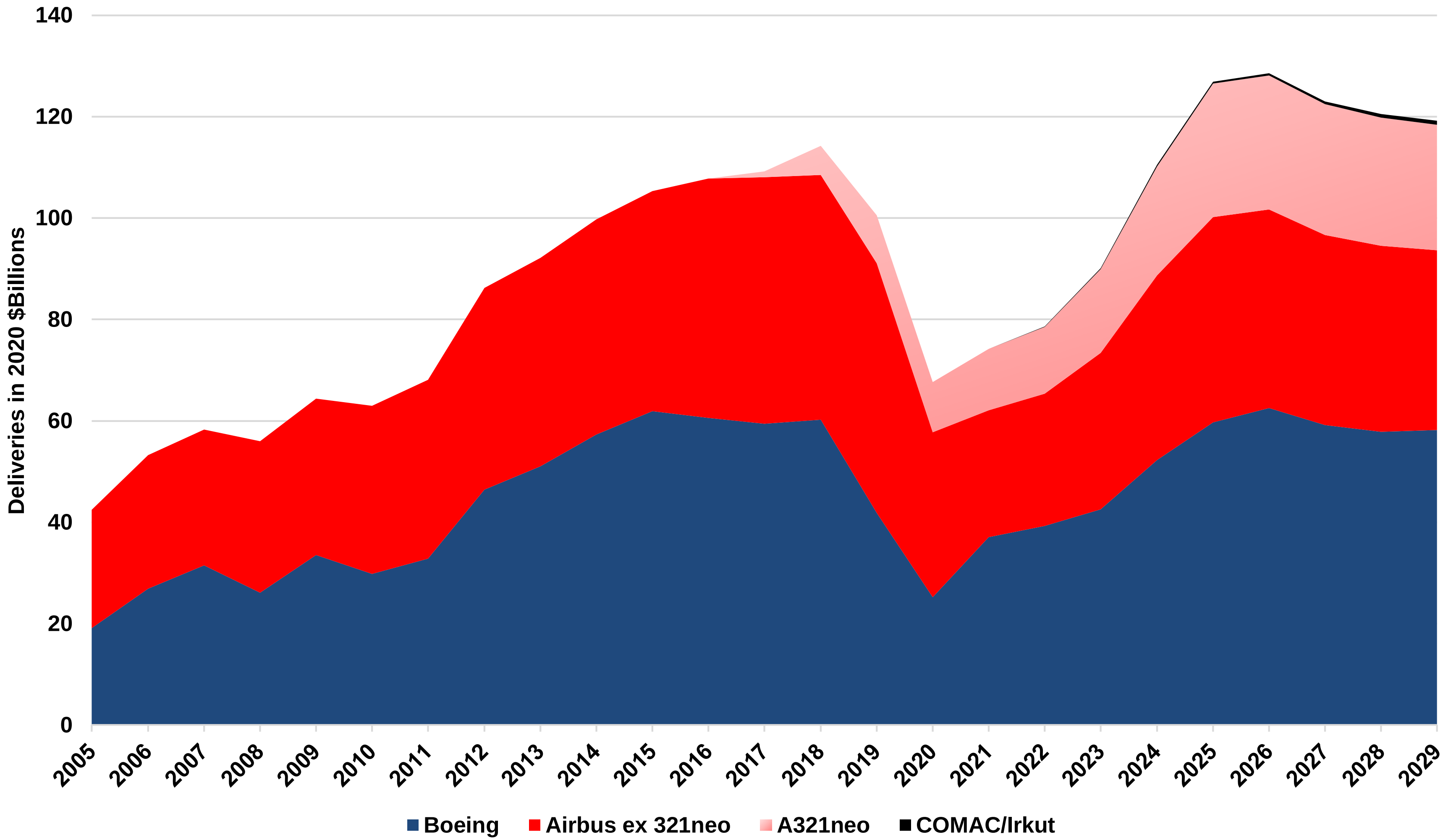
Airbus, Boeing Jetliner Backlogs (April 1)



Jetliner Market Shares By Deliveries

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



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Embraer JV Fallout
Winners, Losers, Questions

- **Winners**
  - Airbus.
  - Mitsubishi, unless they decide to exit.
- **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. But E175 might now be in a very strong position and faces no competitive threat from Airbus.
- **Big Questions**
  - 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.

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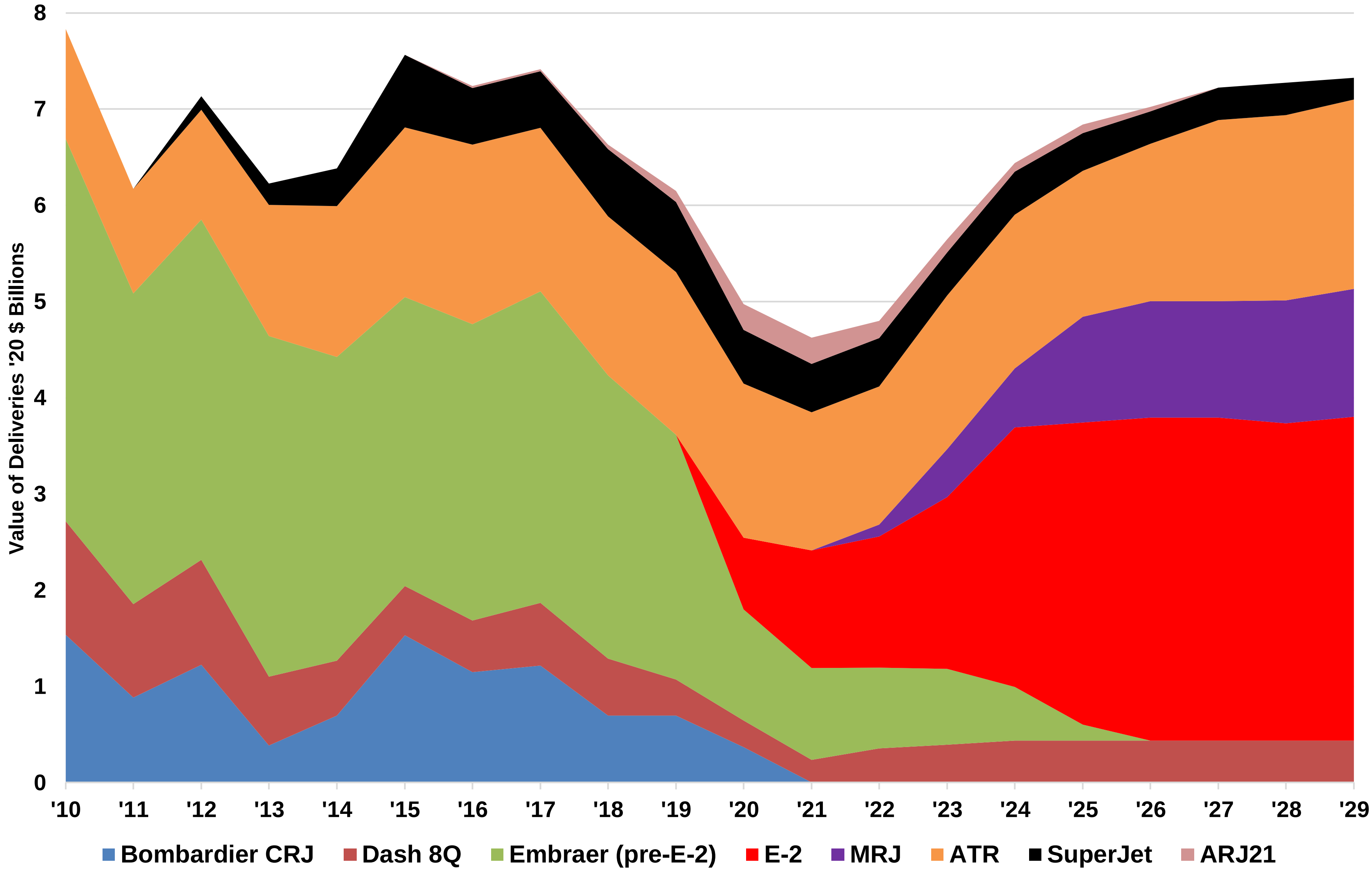
Regional Deliveries By OEM (Value)



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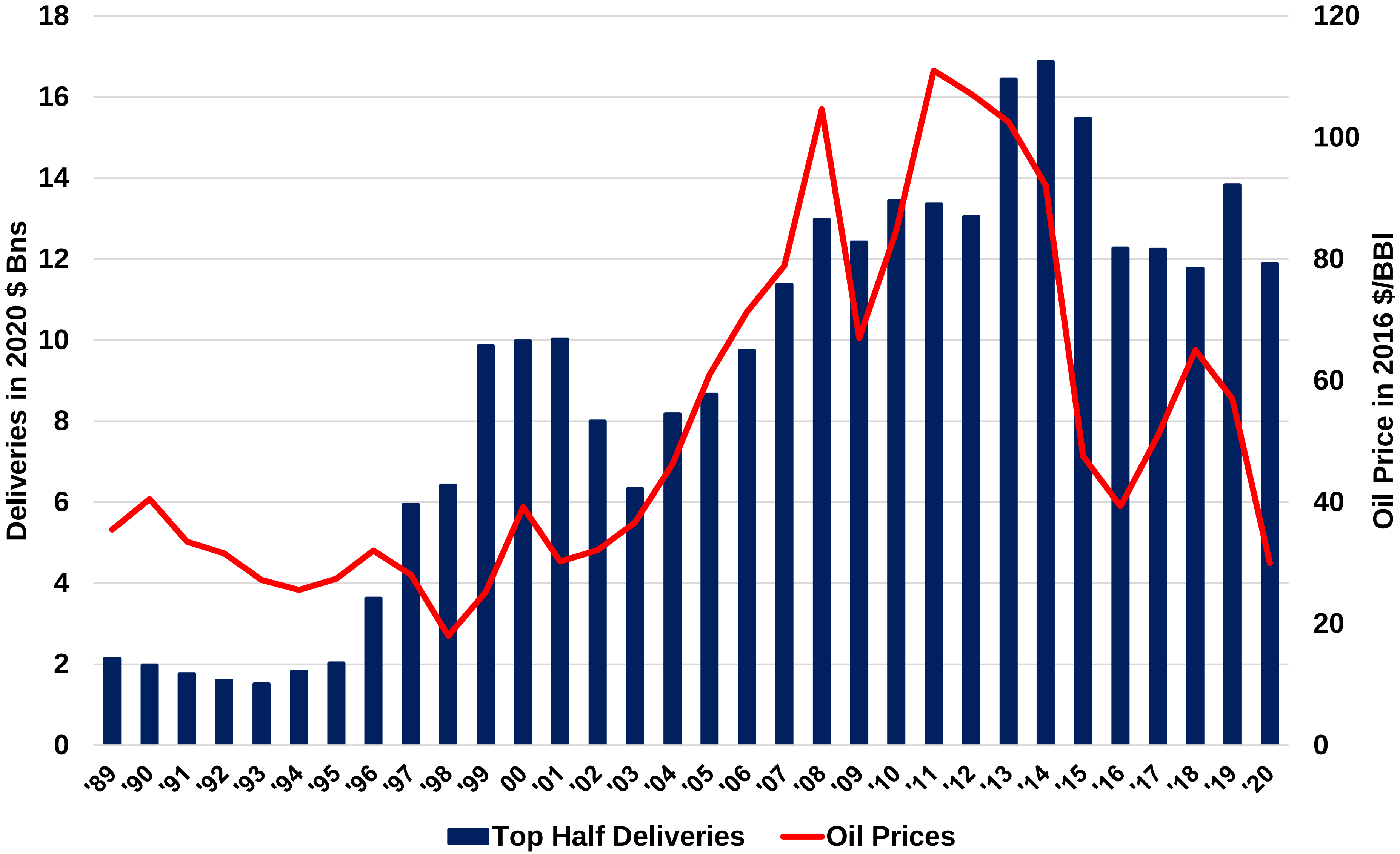
Oil Prices And Top Half Business Jet Deliveries



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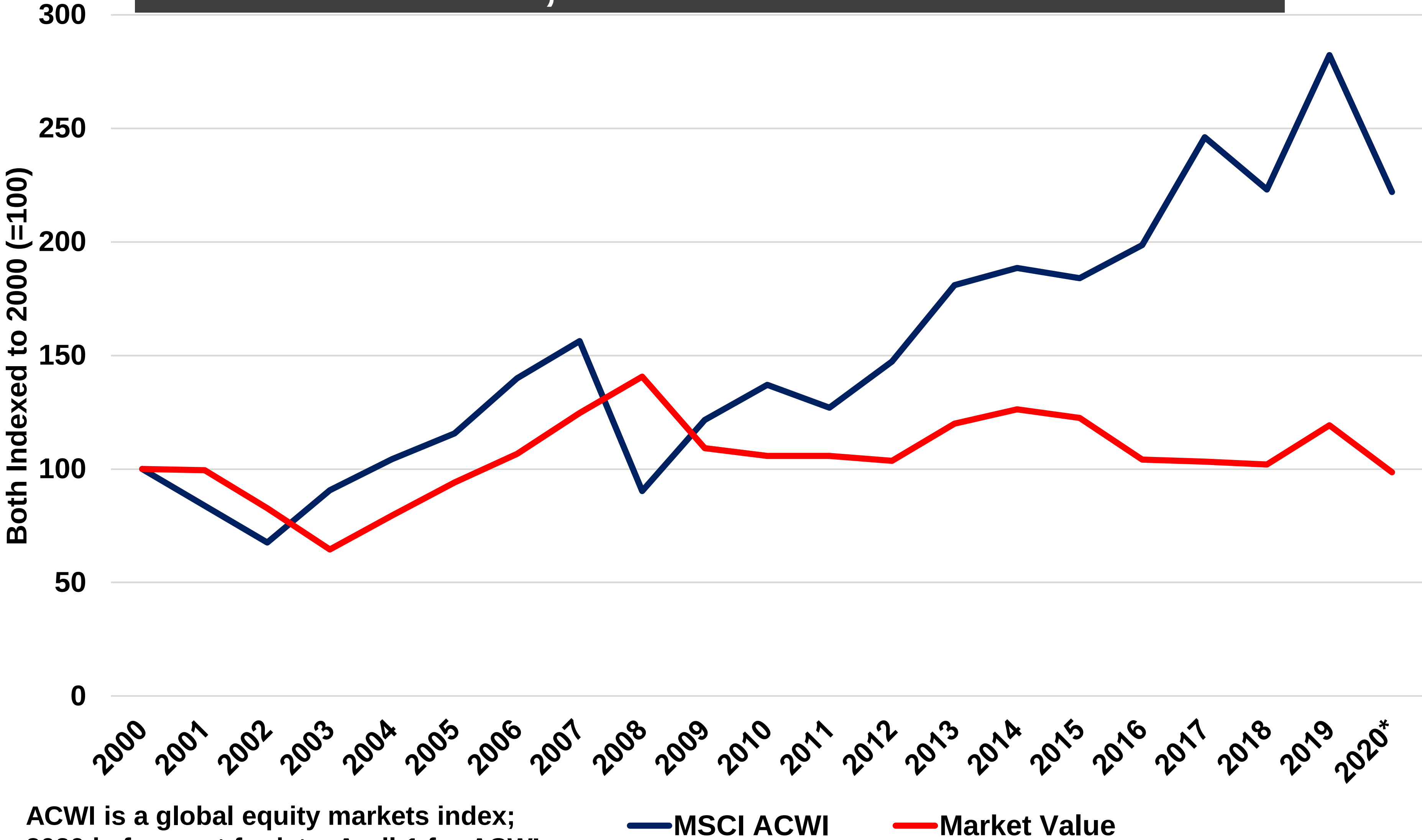
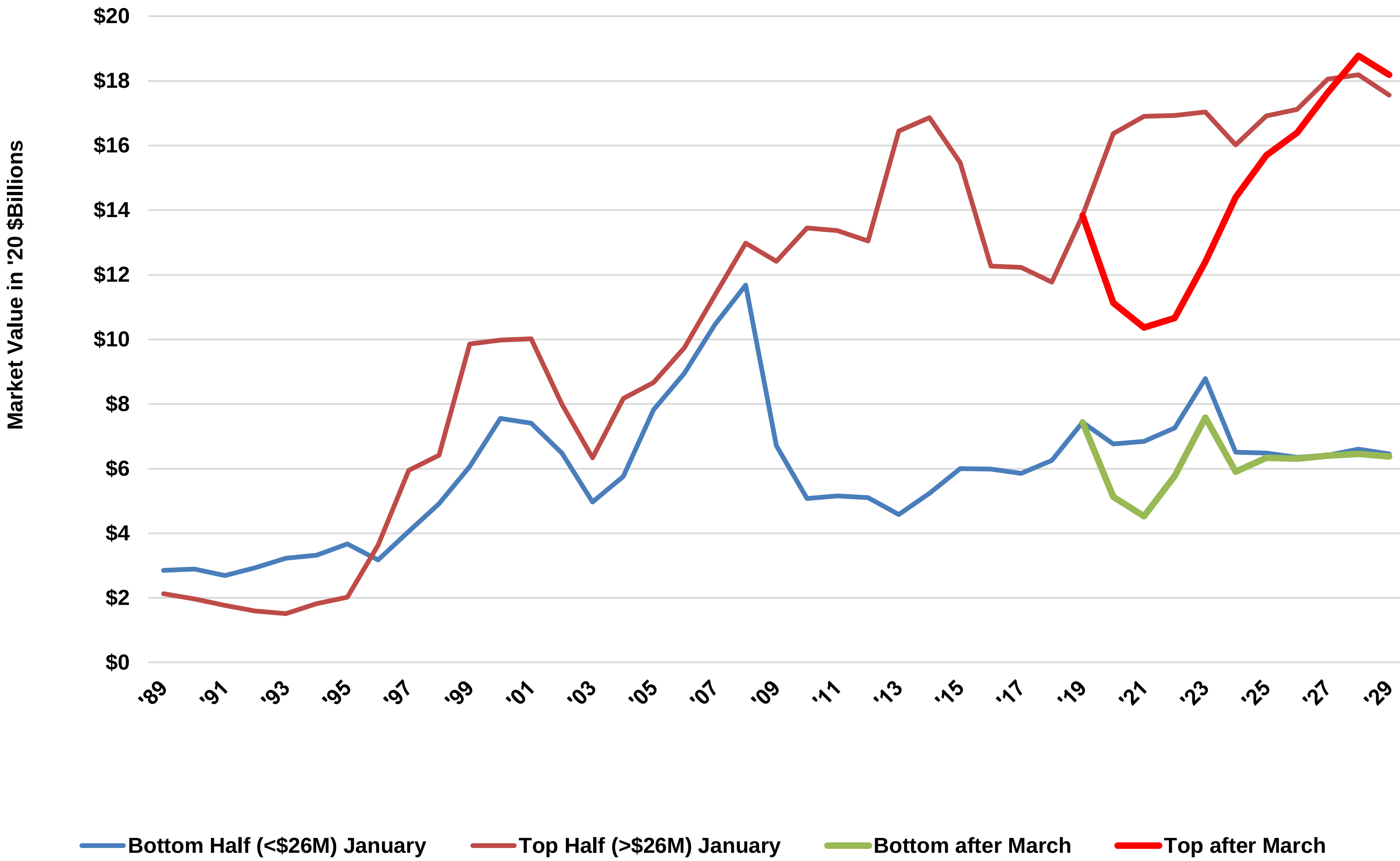
Business Jet Market Has Lagged Global Equities For Last Decade, But A Downturn Will Still Hurt

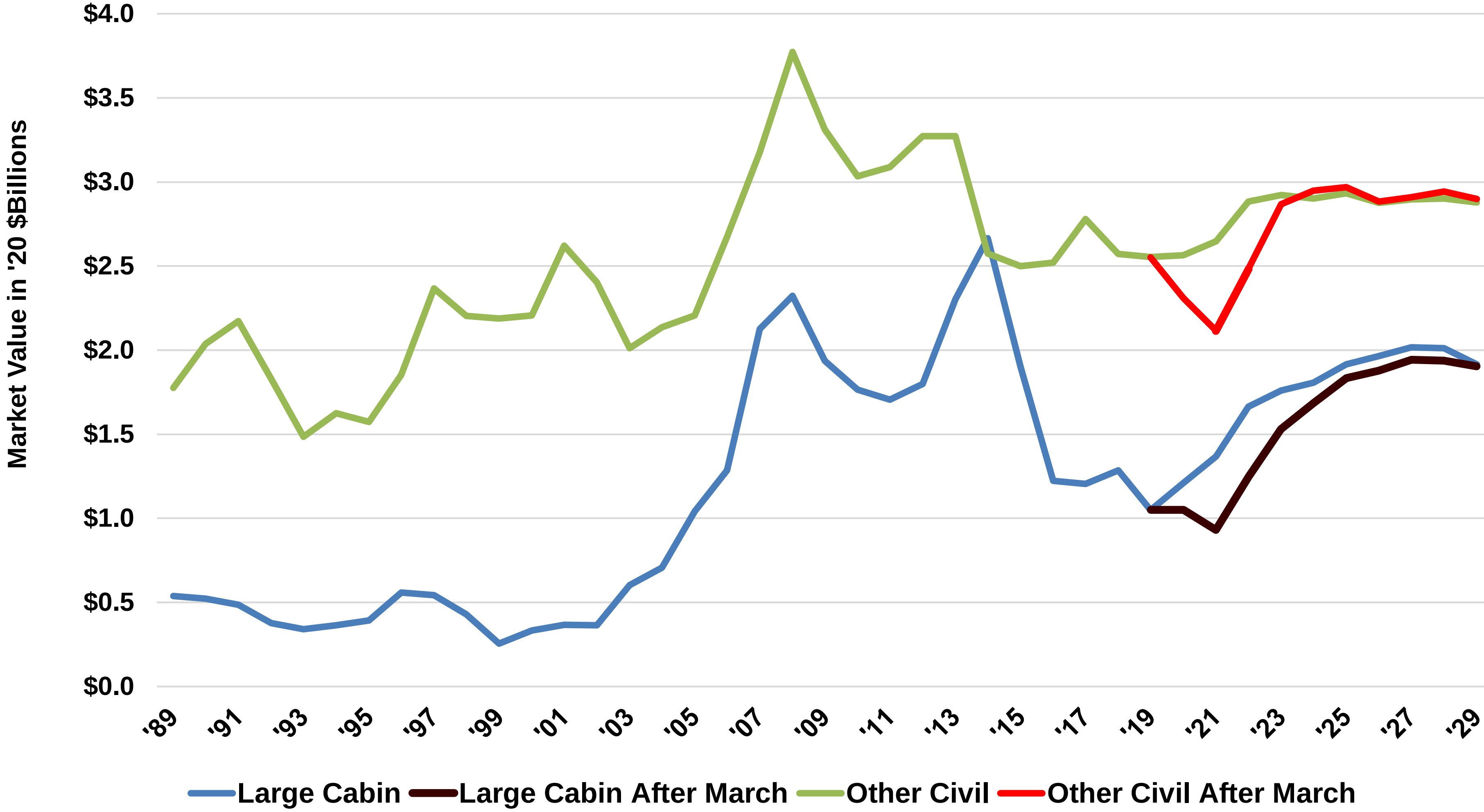


ACWI is a global equity markets index; 2020 is forecast for jets, April 1 for ACWI

Bottom Half Bizjet Segment vs. Top Half



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



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Global Aircraft Market Outlook In One Page

Segment	2020	'20-'21	Risk	Elevator Comment
Jetliners-SA	-26.3%	33.2%		Includes some already-built MAXs. Watch China, fuel, traffic.
Jetliners-TA	-39.2%	-14.1%		Overcapacity, slow international recovery, secular shift to SAs
Regionals	-13.3%	-10.6%		No Boeing supply chain effect on E-2; Scope clause de-risked, but little growth.
Business Aircraft	-21.2%	-7.7%		Another hit after many false starts over a disappointing decade.
Civil Rotorcraft	-6.7%	-9.0%		Large civil hit again. Too many new models aimed at a weak segment (oil/gas).
Military Rotorcraft	-3.5%	3.0%		Programs end/slow; no risk of accelerated downturn; FVL beyond forecast, exc FARA.
Military Transports	-29.5%	4.7%		A seriously underperforming market.
Fighters	-14.7%	34.4%		I like this market. F-35 (after COVID disruption), plus strong Gen 4.5
All Civil	**-29.6%**	**4.6%**		SAJetliner snapback due to MAX, weakness in other segments; more overcapacity risk.
All Military	**-10.5%**	**18.2%**		Global insecurity, Tension, Malice. Special mission also boosts topline.
Total Industry	**-24.7%**	**8.7%**		**No strong recovery until 2023**

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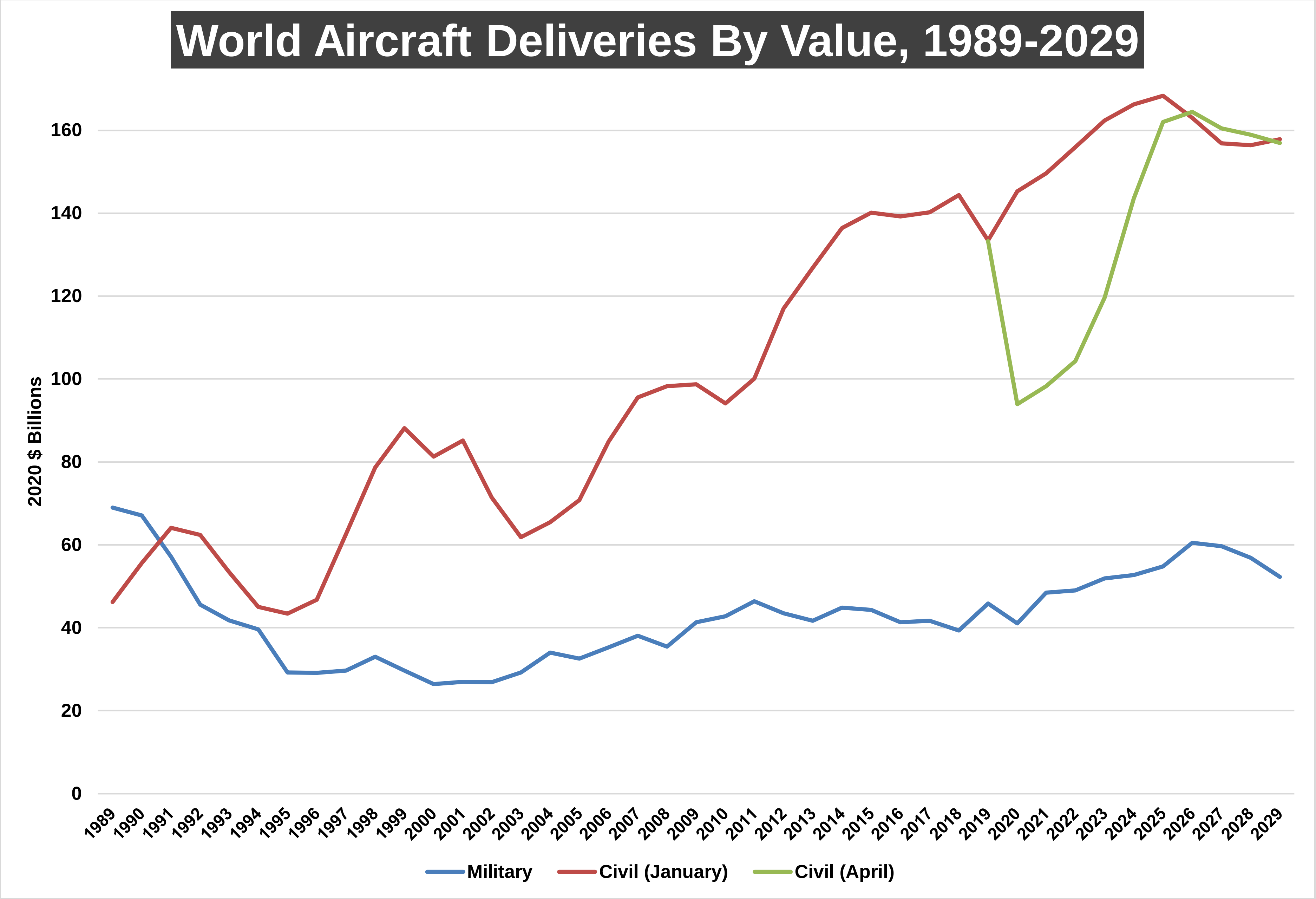

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Believe It Or Not…
There's Good News If You Look Hard Enough

- 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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COVID-19 And Civil Aviation Markets

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