

World Aero Markets: Looking Up, From The Bottom of a Pit

World Aircraft Overview

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Aviation Segments By Damage

Most to Least
Annotated,
Ten Months In

Twin aisle jetliners	<p>International traffic hit hardest and longest. Already an overcapacity situation. Secular shift towards single aisles already underway.</p> <p>It's just that bad.</p>
Single aisle jetliners	<p>Fuel prices a big problem. China comeback uncertain. Some relief due to deferred Airbus ramp, and MAX stop.</p> <p>Same.</p>
Business Jets	<p>Large cabin strongly correlated with oil prices. Small/medium strongly correlated with corporate profits, equities indices.</p> <p>Might recover quickly; still a 2020/21 downturn</p>
Civil Rotorcraft	<p>Oil and gas segment (large) hit again, before recovery even began.</p> <p>About right...wait and see.</p>
Military Programs	<p>Emphasis on "shovel-ready." Advance development programs at greater risk. Pure-play contractors in best shape; suppliers with most defense in best shape.</p> <p>All good. In fact, better.</p>

Aircraft Markets, In Good And Bad Years

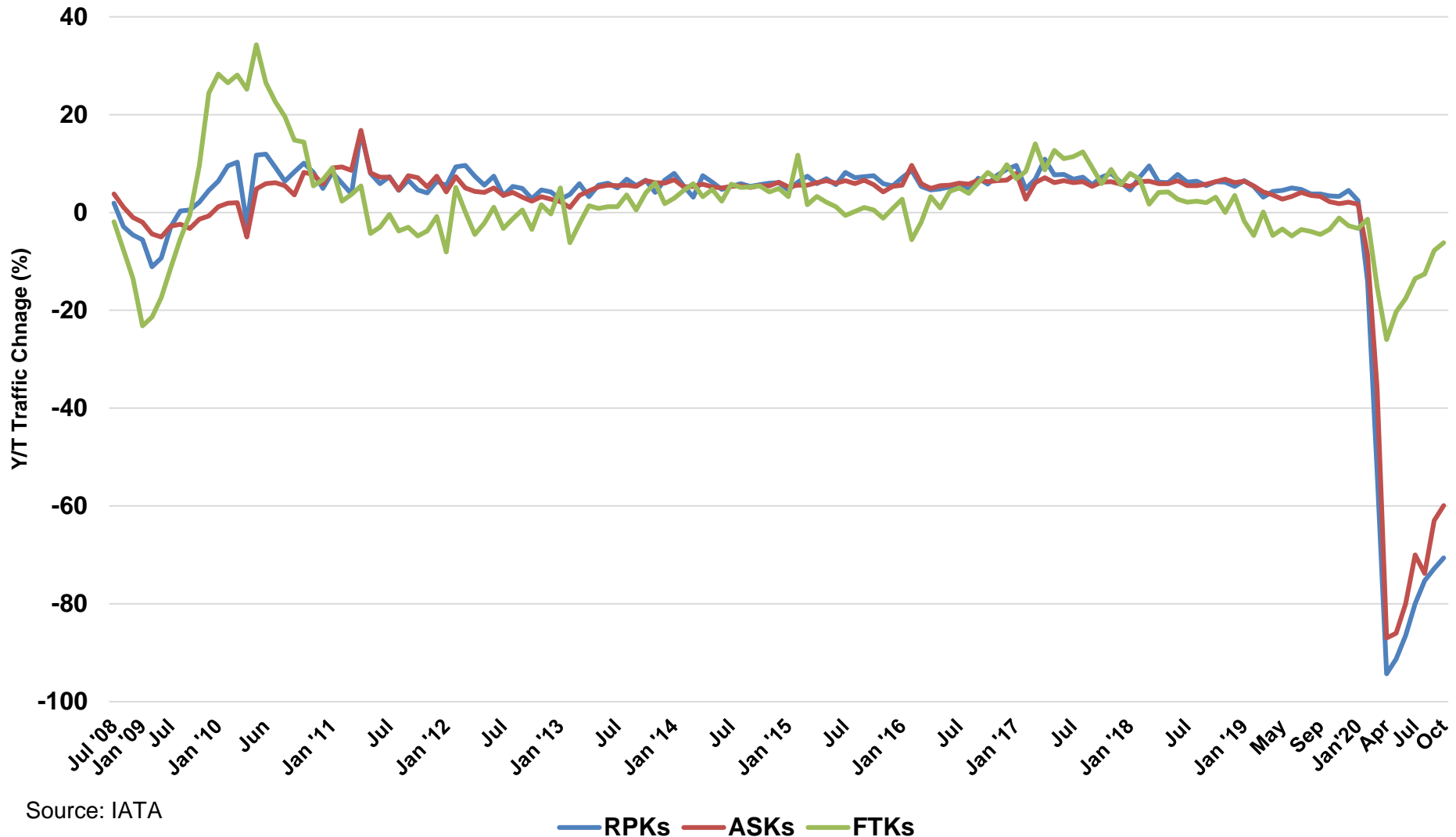
(last year was not good)

<u>World New Deliveries</u>	<u>CAGR</u>	<u>CAGR</u>	<u>CAGR</u>	<u>Change</u>
<u>In 2020 (2021 \$)</u>	<u>'03-'08</u>	<u>'08-'14</u>	<u>'14-'19</u>	<u>'19-'20</u>
Jetliners-SA (\$27 b)	9.7%	6.9%	-2.0%	-55.2%
Jetliners-TA (\$27.8 b)	5.0%	13.5%	2.1%	-49.1%
Regionals (\$3.4 b)	3.9%	-3.1%	-6.3%	-36.6%
Business Aircraft (\$18.2 b)	16.7%	-2.2%	-1.2%	-18.4%
Civil Rotorcraft (\$3.1 b)	18.5%	-2.5%	-7.2%	-13.0%
Military Rotorcraft (\$10.7 b)	10.6%	9.7%	-7.0%	-15.1%
Military Transports (\$4.1 b)	3.2%	-0.9%	0.0%	-30.0%
Fighters (\$18.3 b)	1.6%	0.8%	6.1%	-21.8%
<u>All Civil (\$79.9 b)</u>	<u>9.7%</u>	<u>5.6%</u>	<u>-0.5%</u>	<u>-40.0%</u>
<u>All Military (\$36.9 b)</u>	<u>3.9%</u>	<u>4.1%</u>	<u>0.0%</u>	<u>-18.1%</u>
<u>Total (\$116.7 b)</u>	<u>8.0%</u>	<u>5.2%</u>	<u>-0.4%</u>	<u>-34.5%</u>

Traffic: Like Nothing We've Ever Seen Before

66% Decline in 2020?

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%



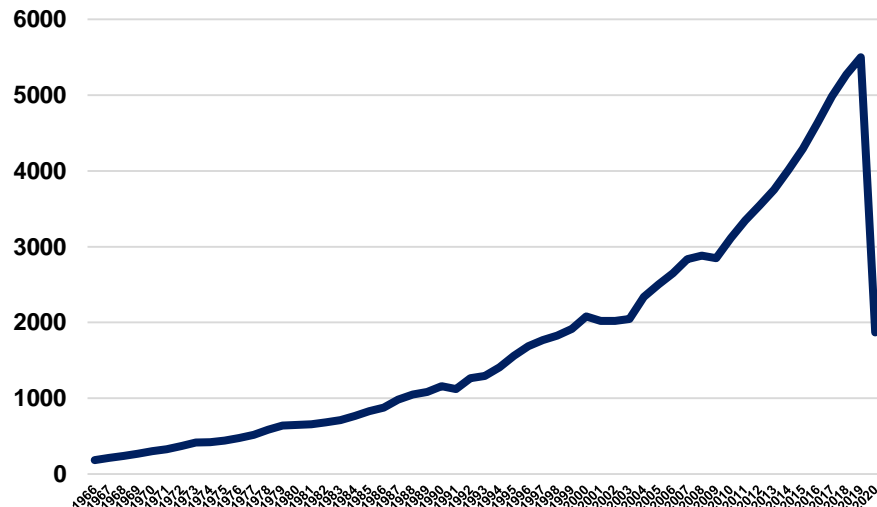
Source: IATA

— RPKs — ASKs — FTKs

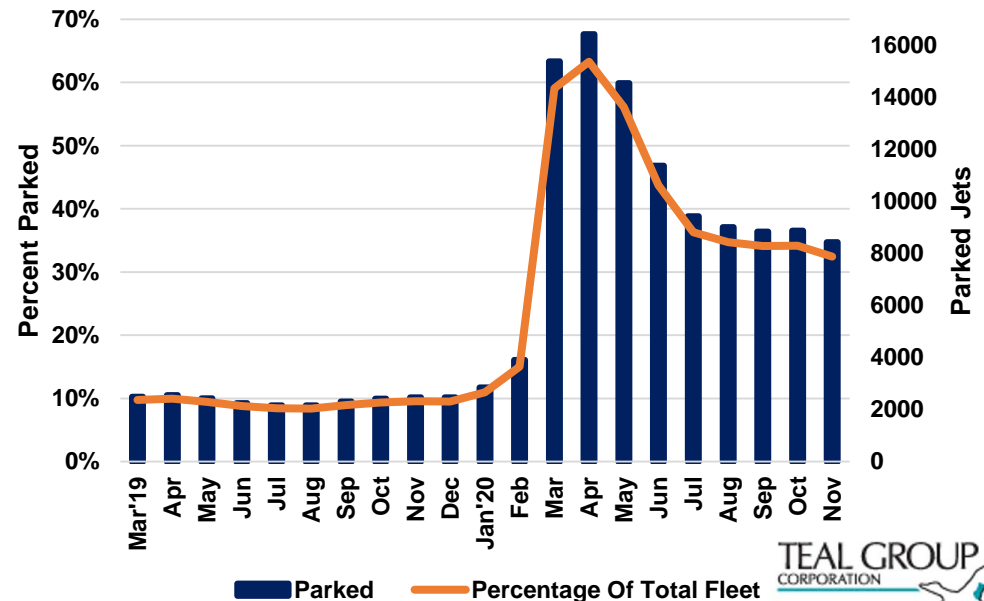
More Unprecedented Numbers

- Traffic decline, parked fleet like no previous shock.
 - Per Paul Krugman, reflect a world economy in a “medically-induced coma.”
- 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 – ASK decline, plus de-stocking, deferred maintenance, early retirements, USM, engine swapping, etc.

World Air Traffic (RPM Bns)



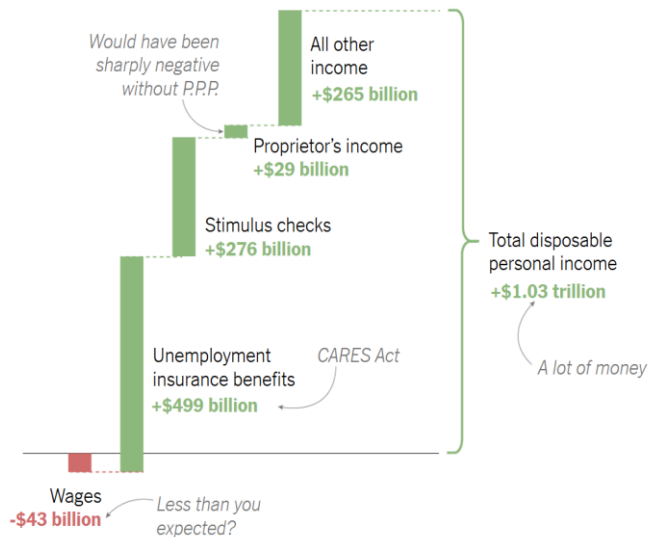
World Jet Fleet: Now ~32% Unemployed



Traffic Peak Recovery By Late 2022. Why?

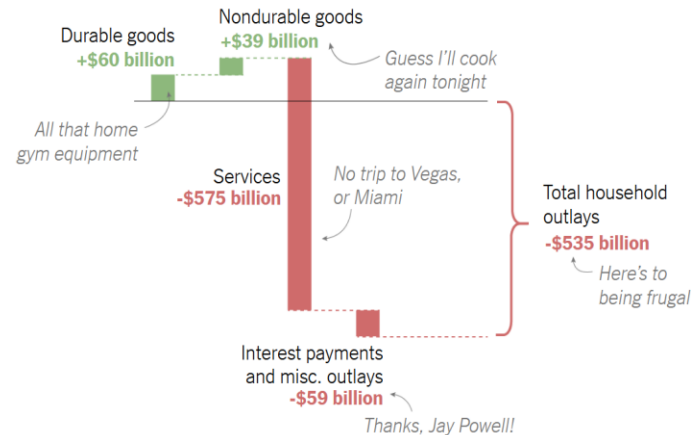
- Better-than-expected vaccine efficacy.
- Better-than-expected economic outlook.
- The China domestic comeback.
- Business travel resurgence.
- Vacation travel resurgence, fueled by record savings rates.

Personal income increased



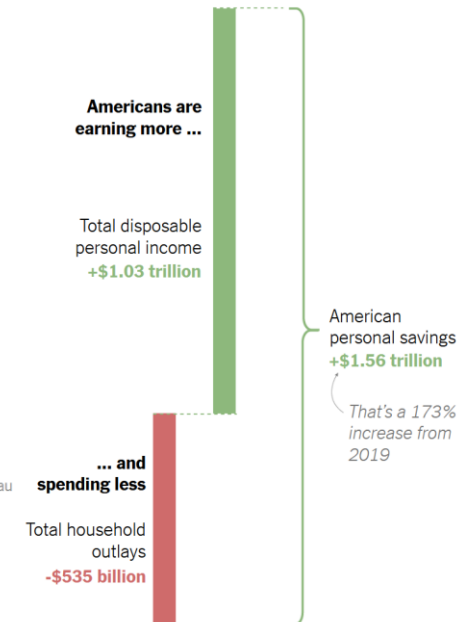
Note: Data from March to November 2020 compared with the same time period in 2019. Source: Bureau of Economic Analysis

Spending decreased



Note: Data from March to November 2020 compared with the same time period in 2019. Source: Bureau of Economic Analysis

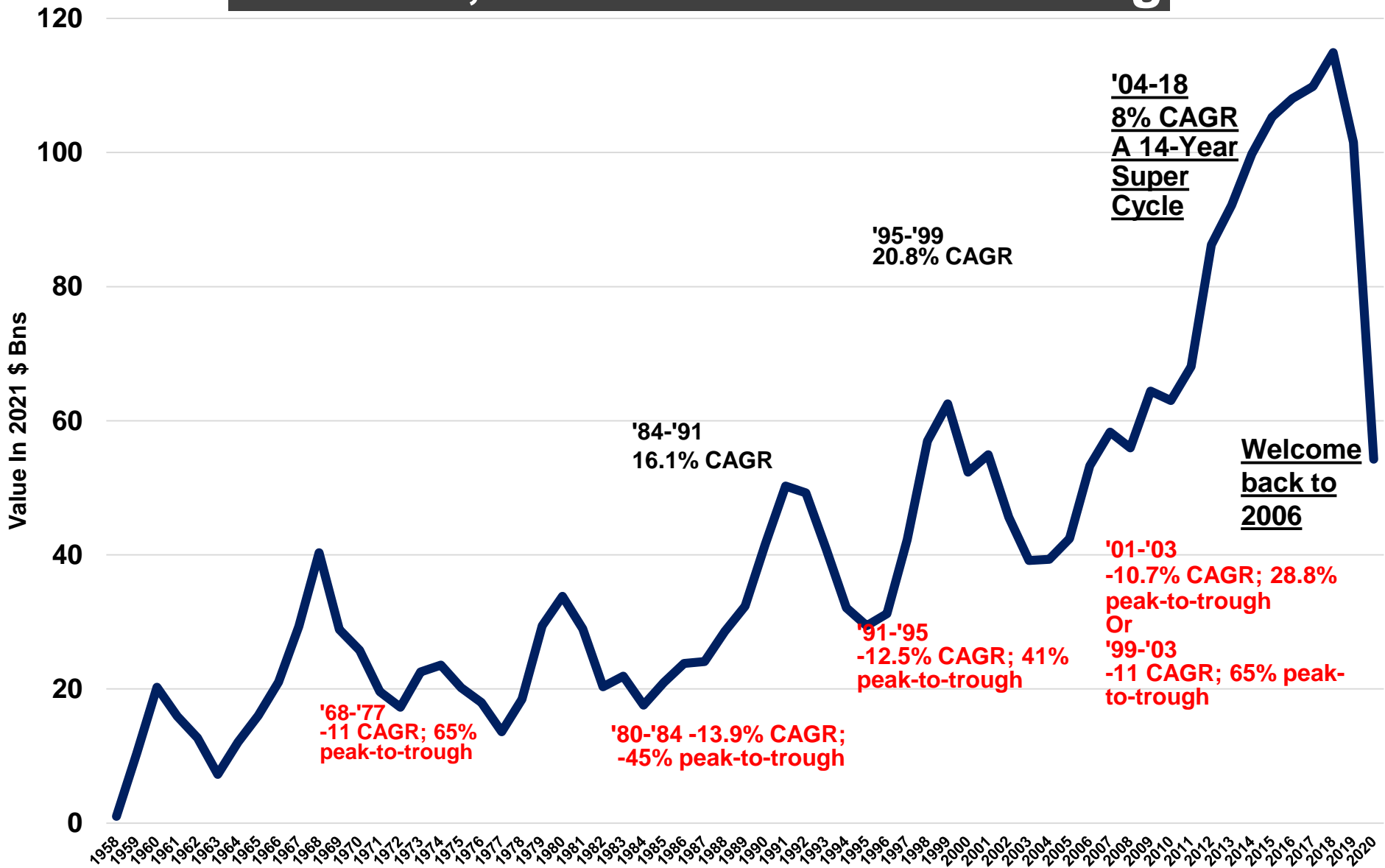
Americans are saving a lot of money



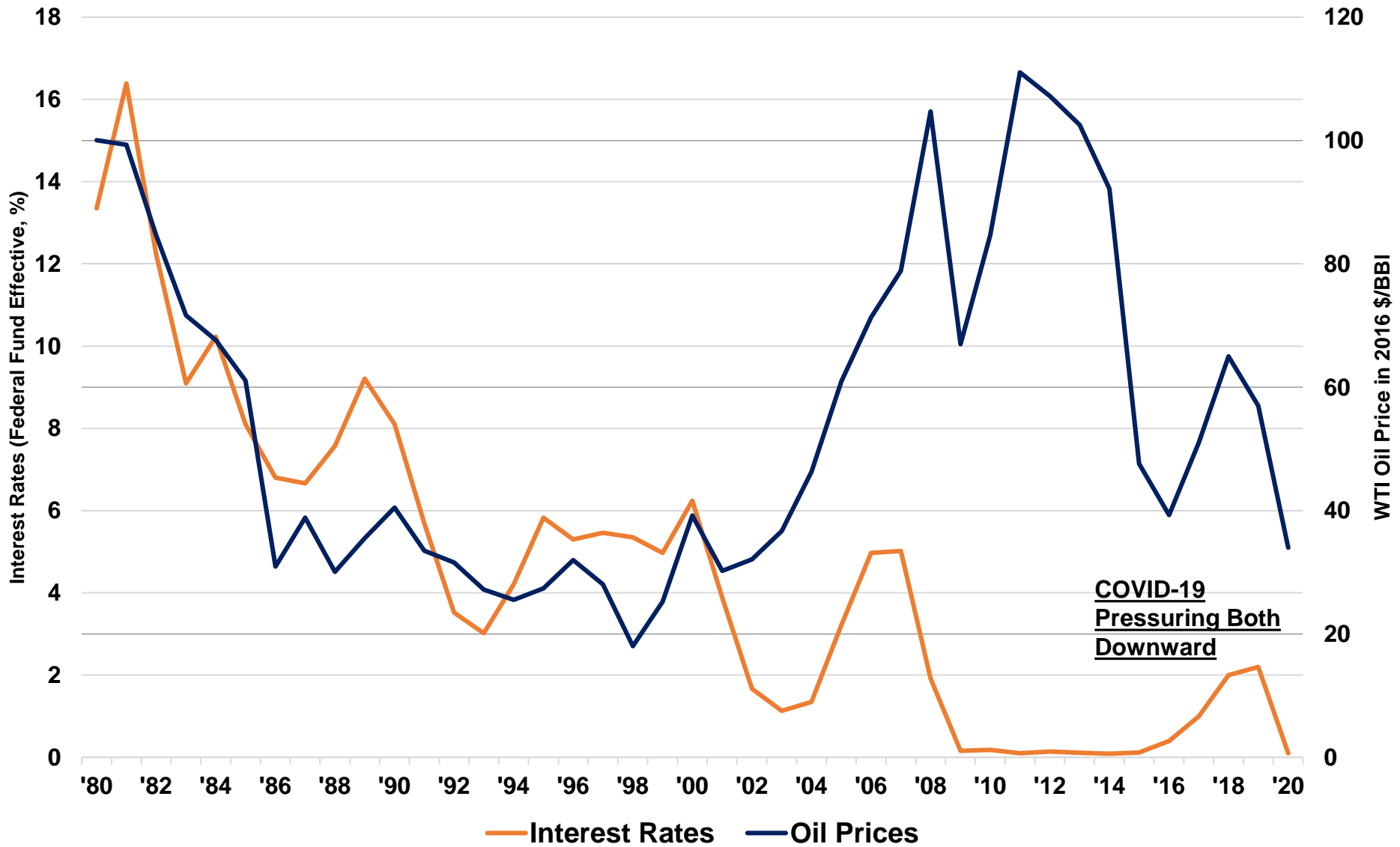
Note: Data from March to November 2020 compared with the same time period in 2019. Source: Bureau of Economic Analysis

<https://www.nytimes.com/2021/01/01/upshot/why-markets-boomed-2020.html>

Here It Is, The Chart I Was Dreading

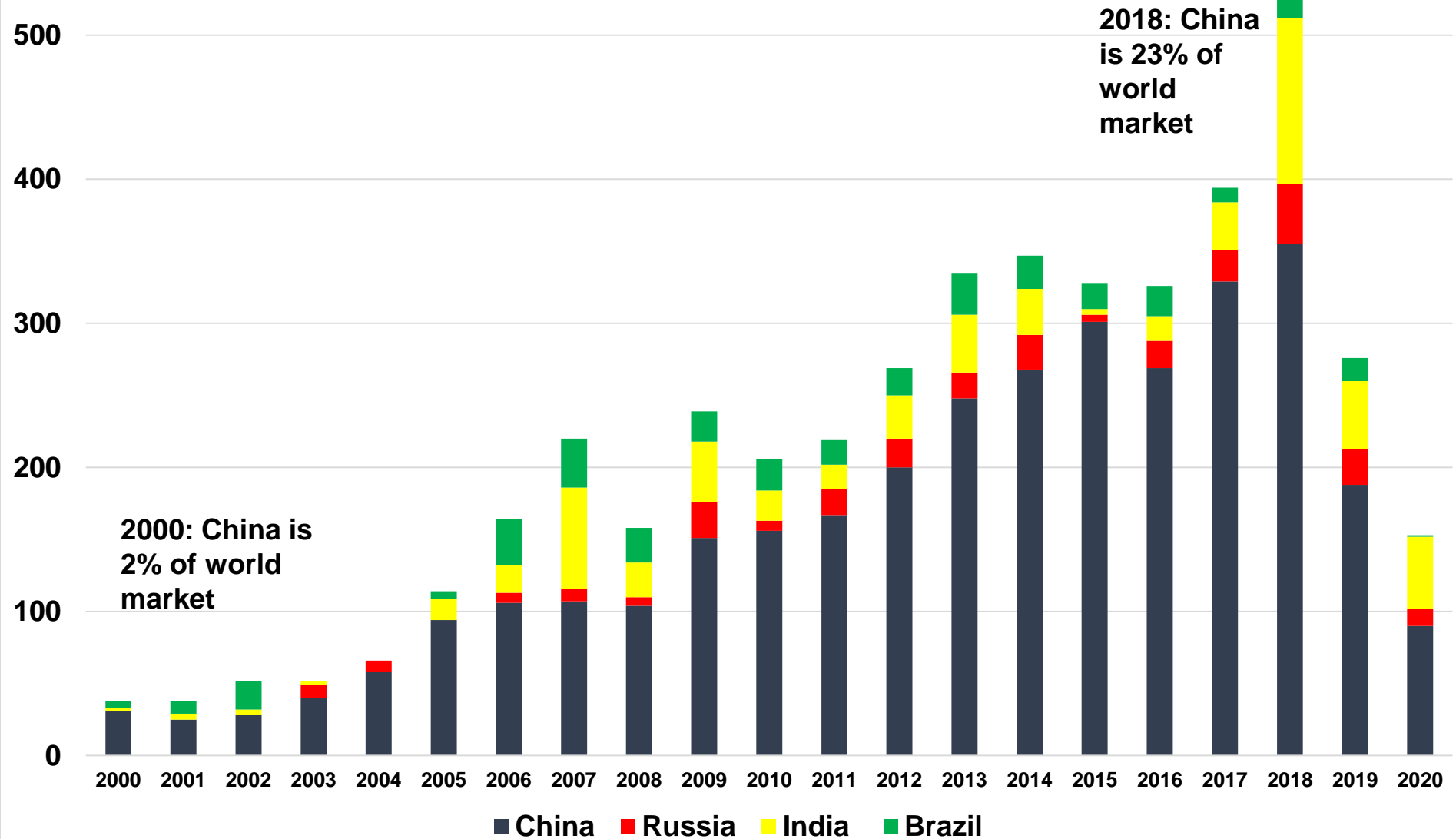


Interest Rates And Oil Prices: Less Than 4%, And \$50-85/bbl, Ideally; But The Ratio Matters Most



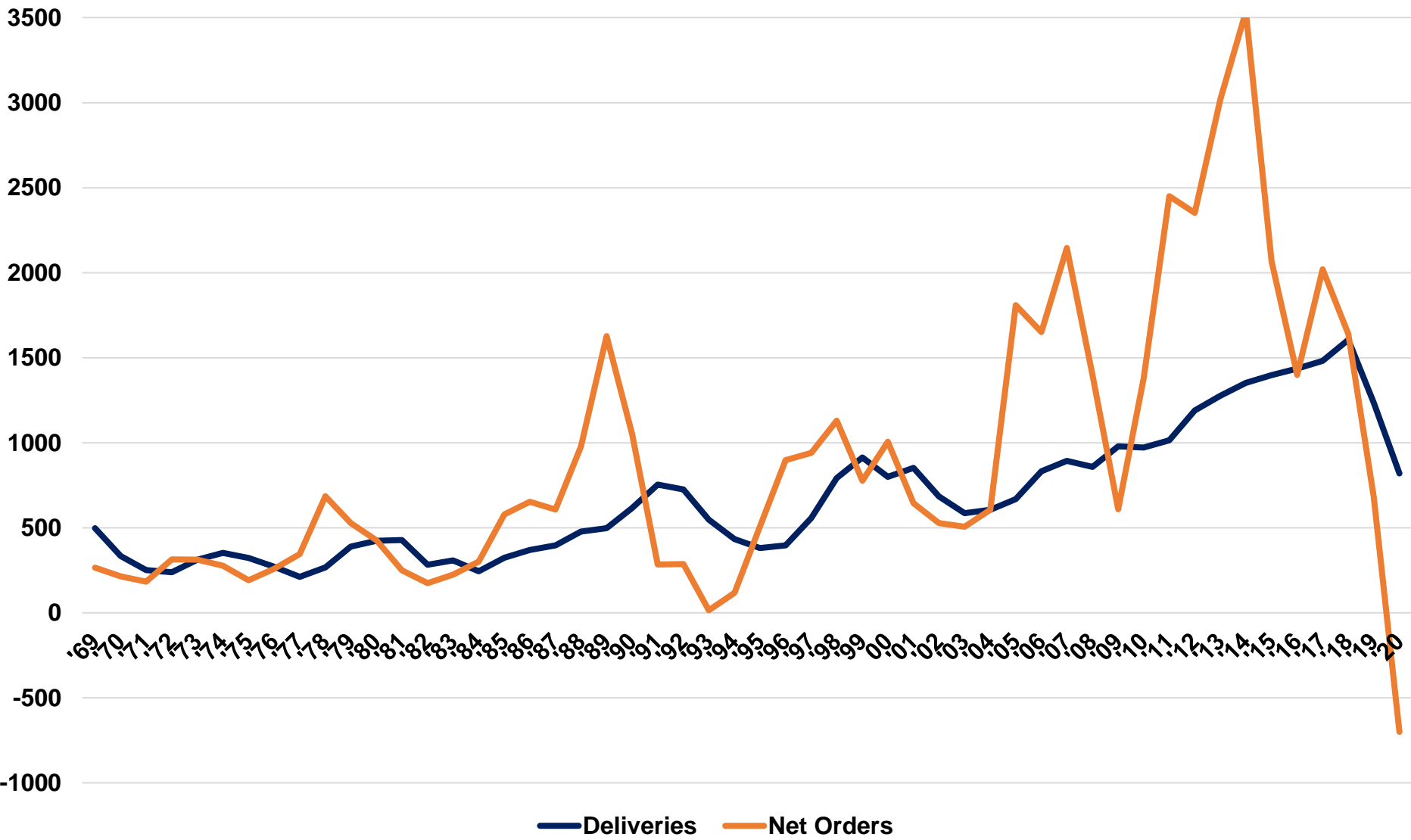
COVID-19
Pressuring Both
Downward

BRIC Deliveries: All About China

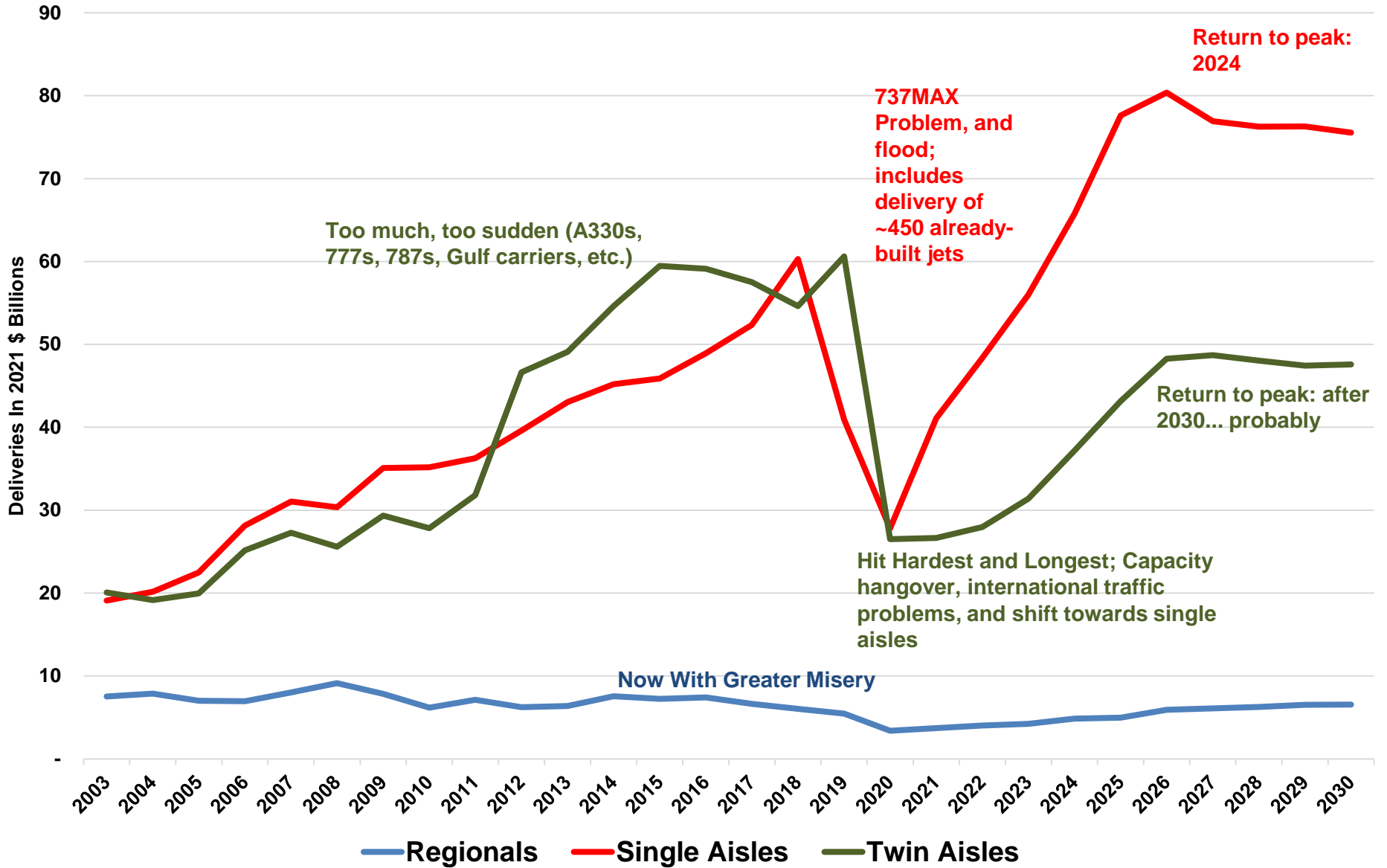


Large Jetliner Orders And Deliveries

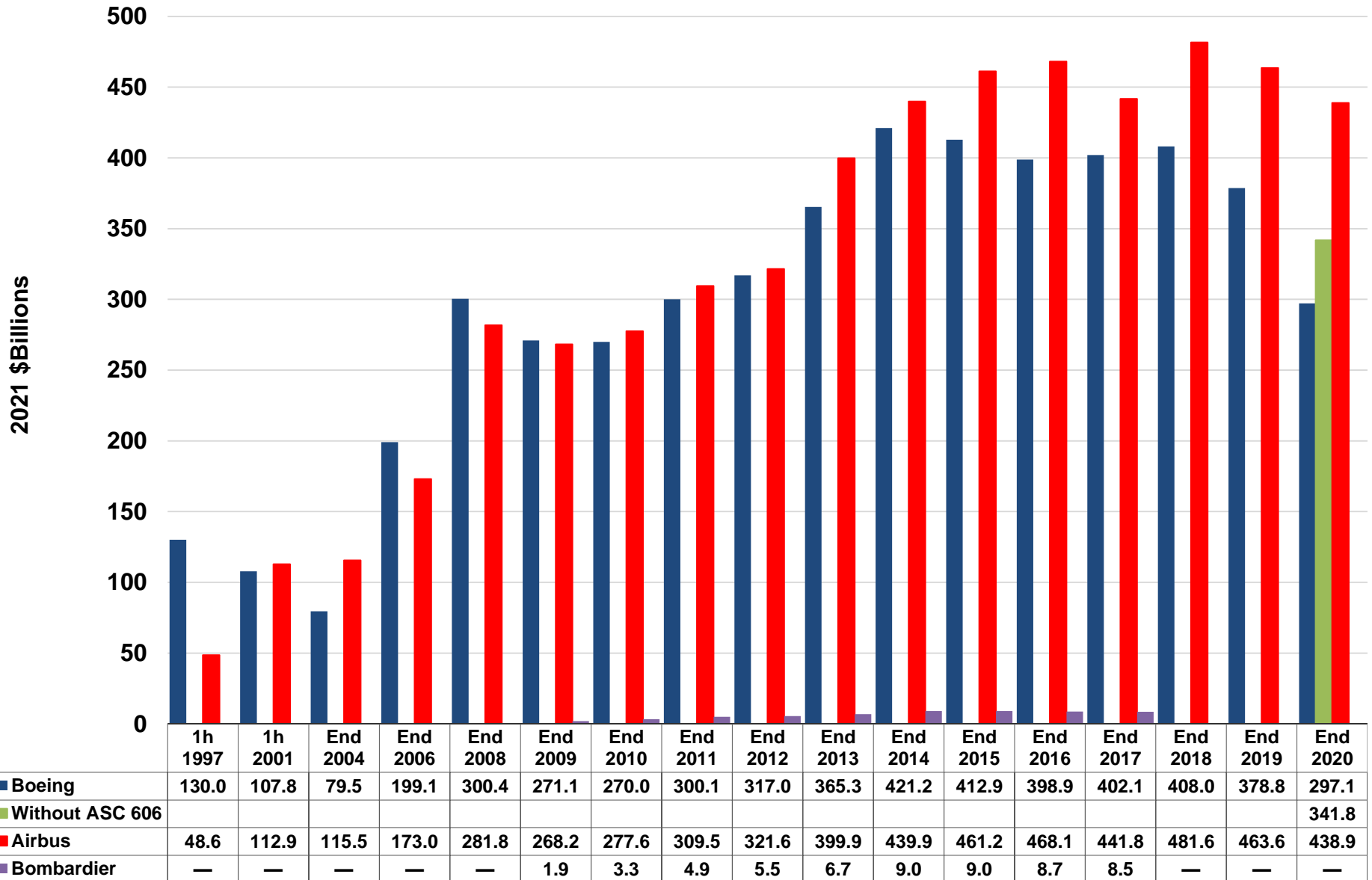
Book-To-Bill No Longer A Thing



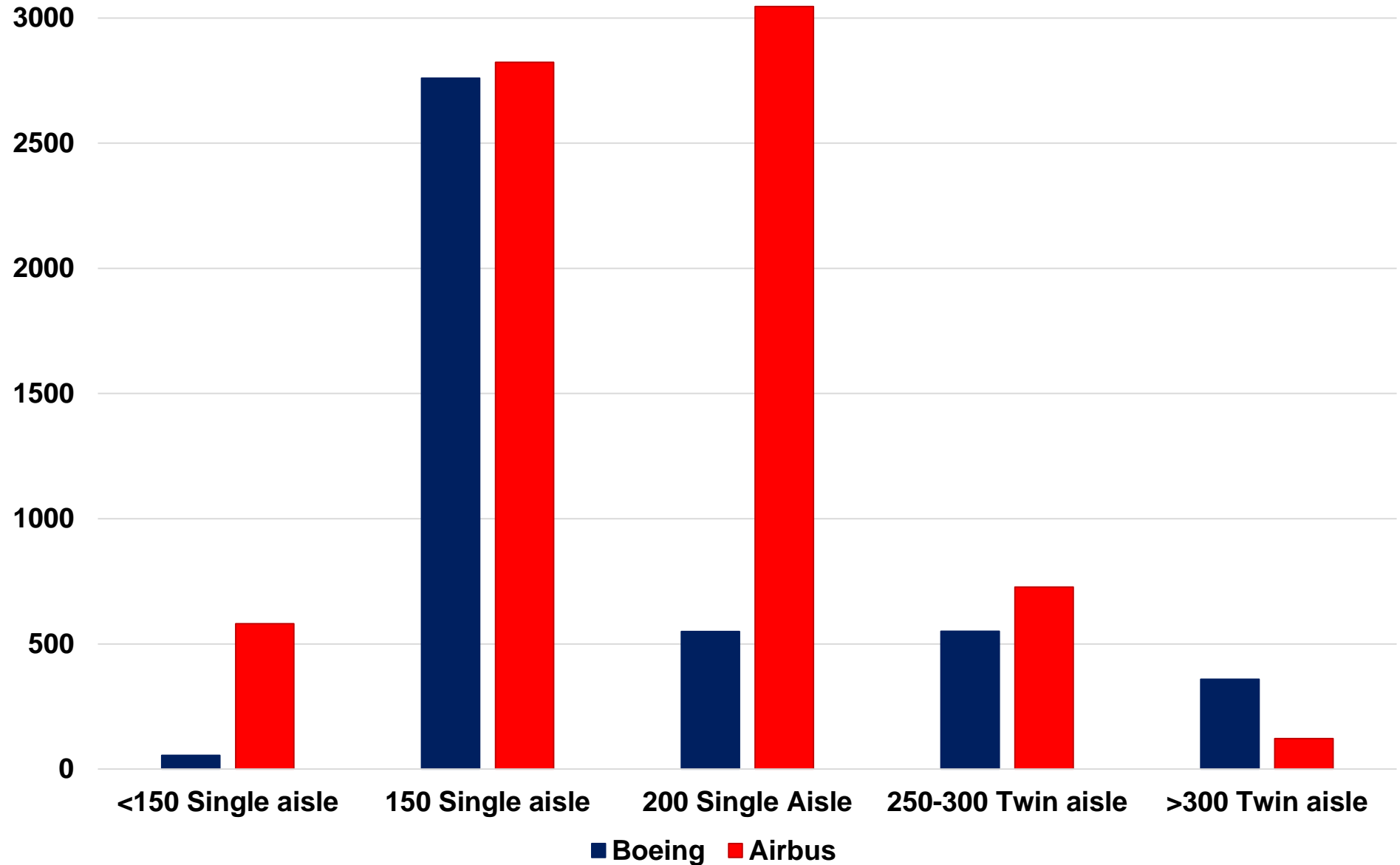
The Air Transport Market By Segment



Firm Order Backlog Values: Boeing Taking A Hit

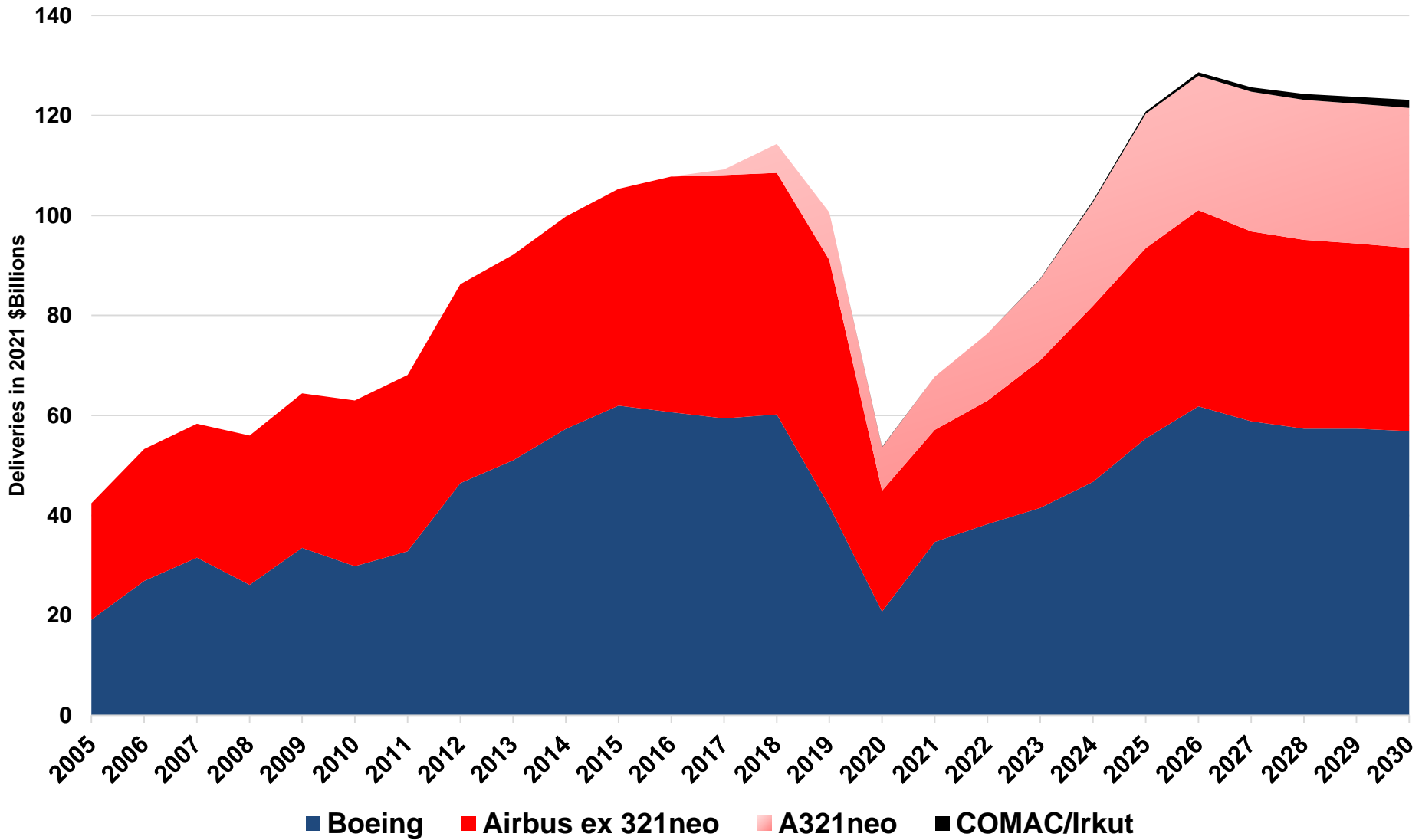


Airbus, Boeing Backlogs (November, w/ ASC 606)



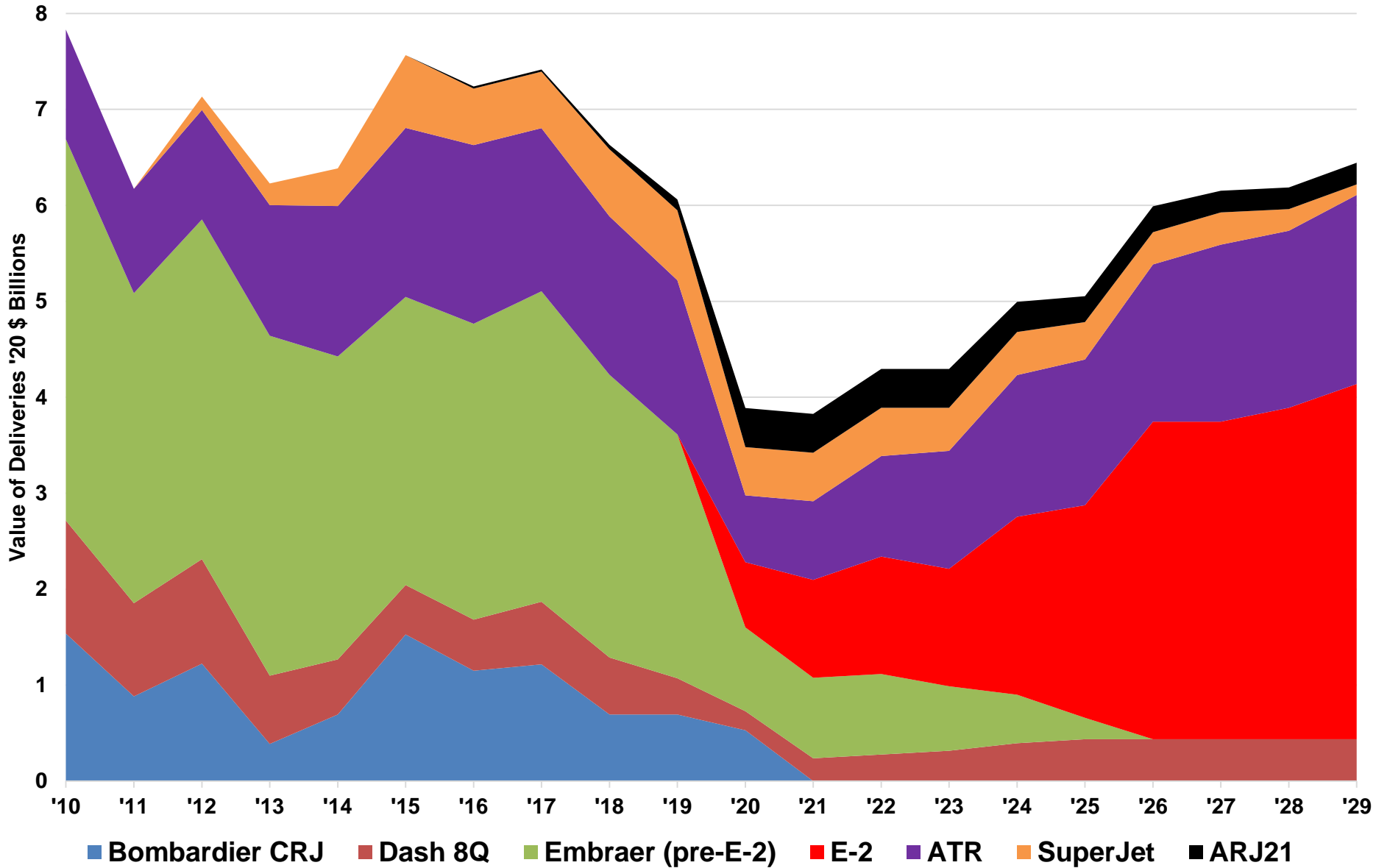
Jetliner Market Shares By Deliveries

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

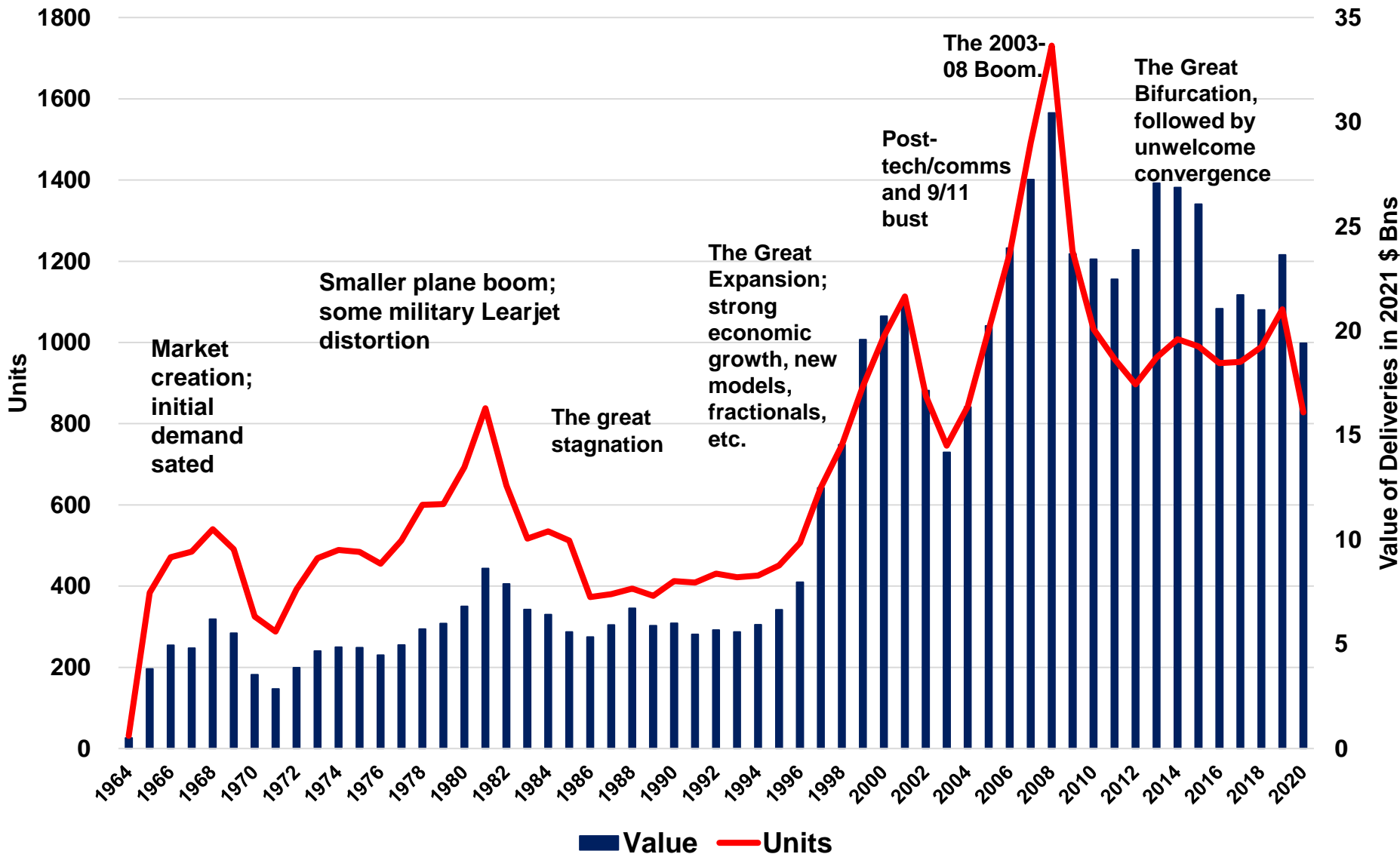


■ Boeing ■ Airbus ex 321neo ■ A321neo ■ COMAC/Irkut

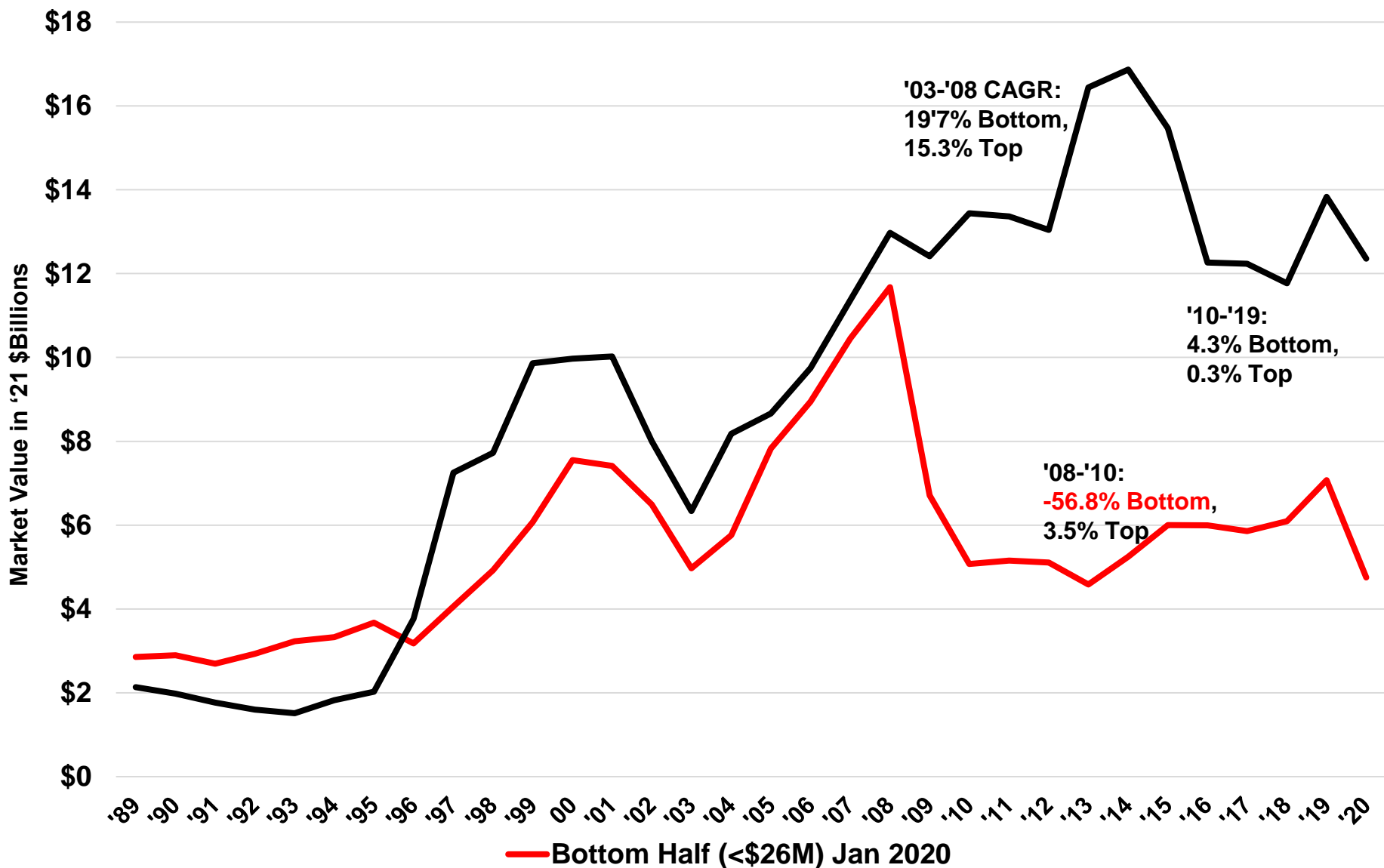
Regional Deliveries By OEM (Value)



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



Bottom Half Bizjet Segment vs. Top Half



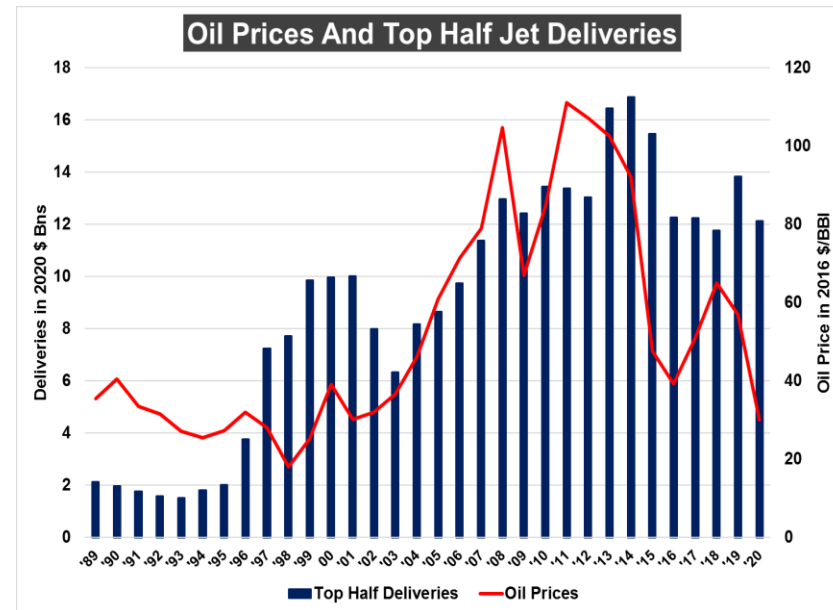
Eight Contradictory Bizav Indicators

- **Three Mixed Leading Market Indicators:**

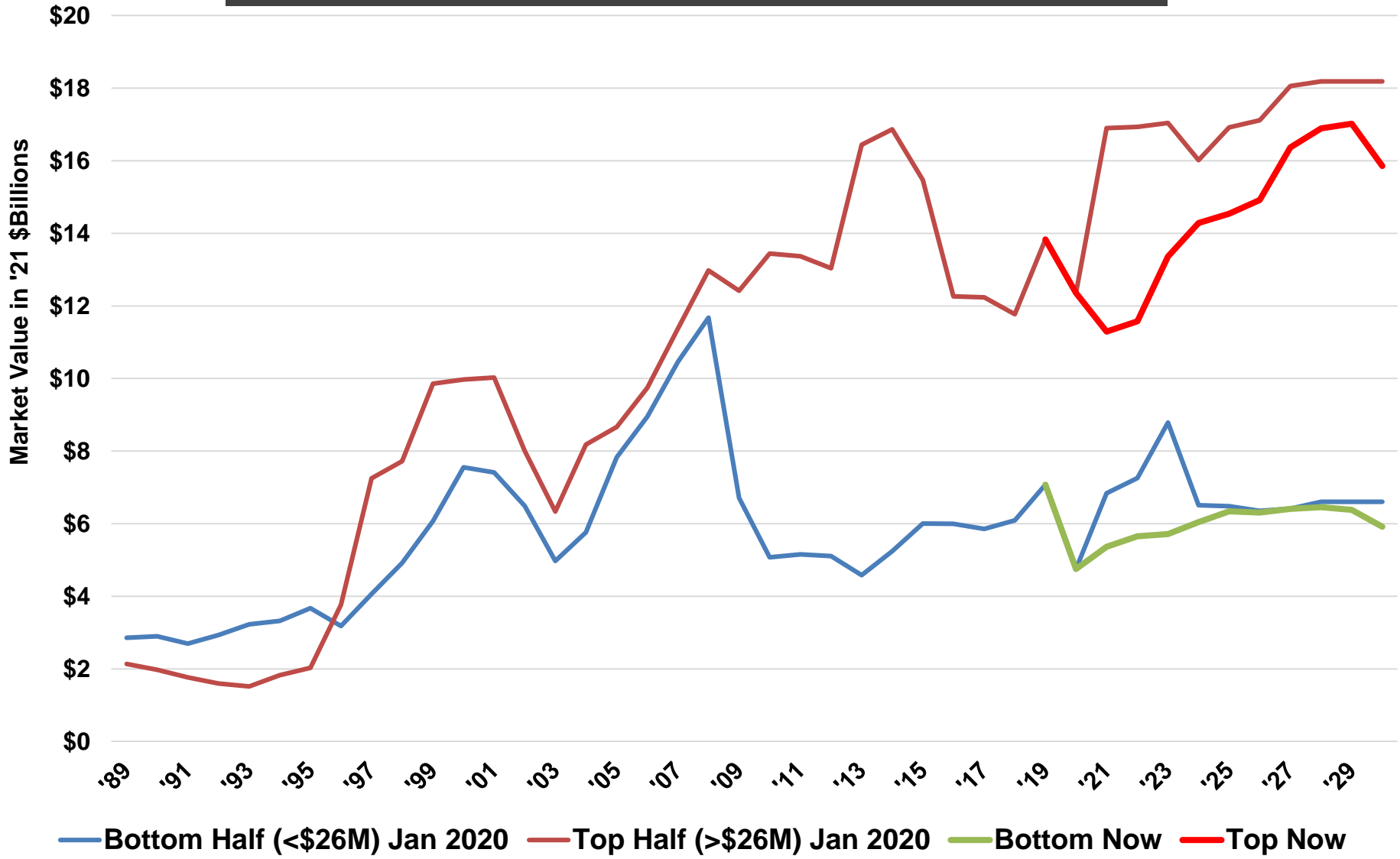
- Corporate profits (bad).
- Equities markets (good).
- Oil prices (bad).

- **Five Mixed Immediate Market Health Indicators:**

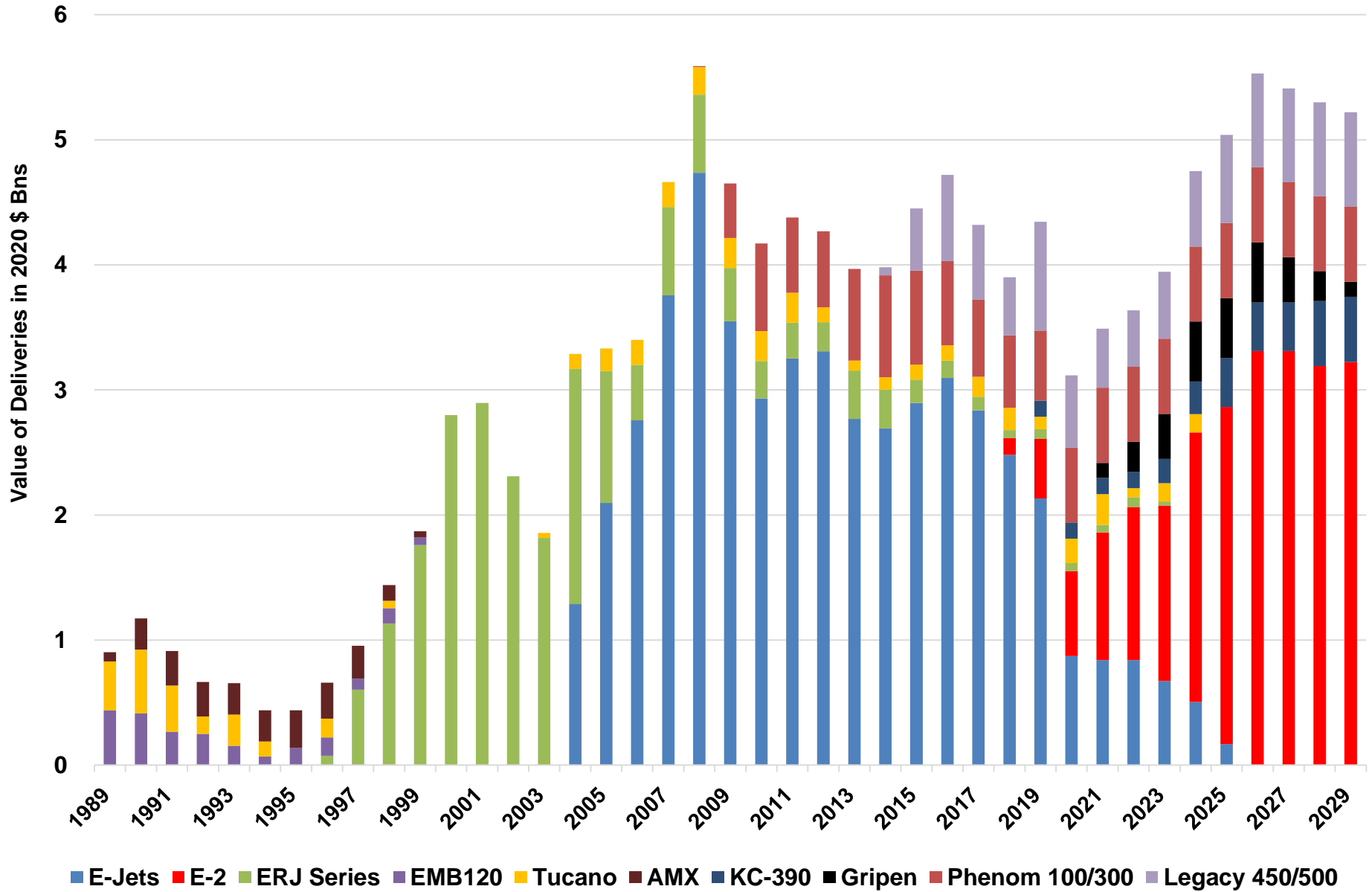
- Deliveries (bad)
- Aircraft available for sale (just modestly up...very good news).
- Aircraft prices (down somewhat).
- Company layoffs (GD, BBD, TXT).
- Utilization (down, but recovering much faster than airline travel, with charter and fractionals looking great).



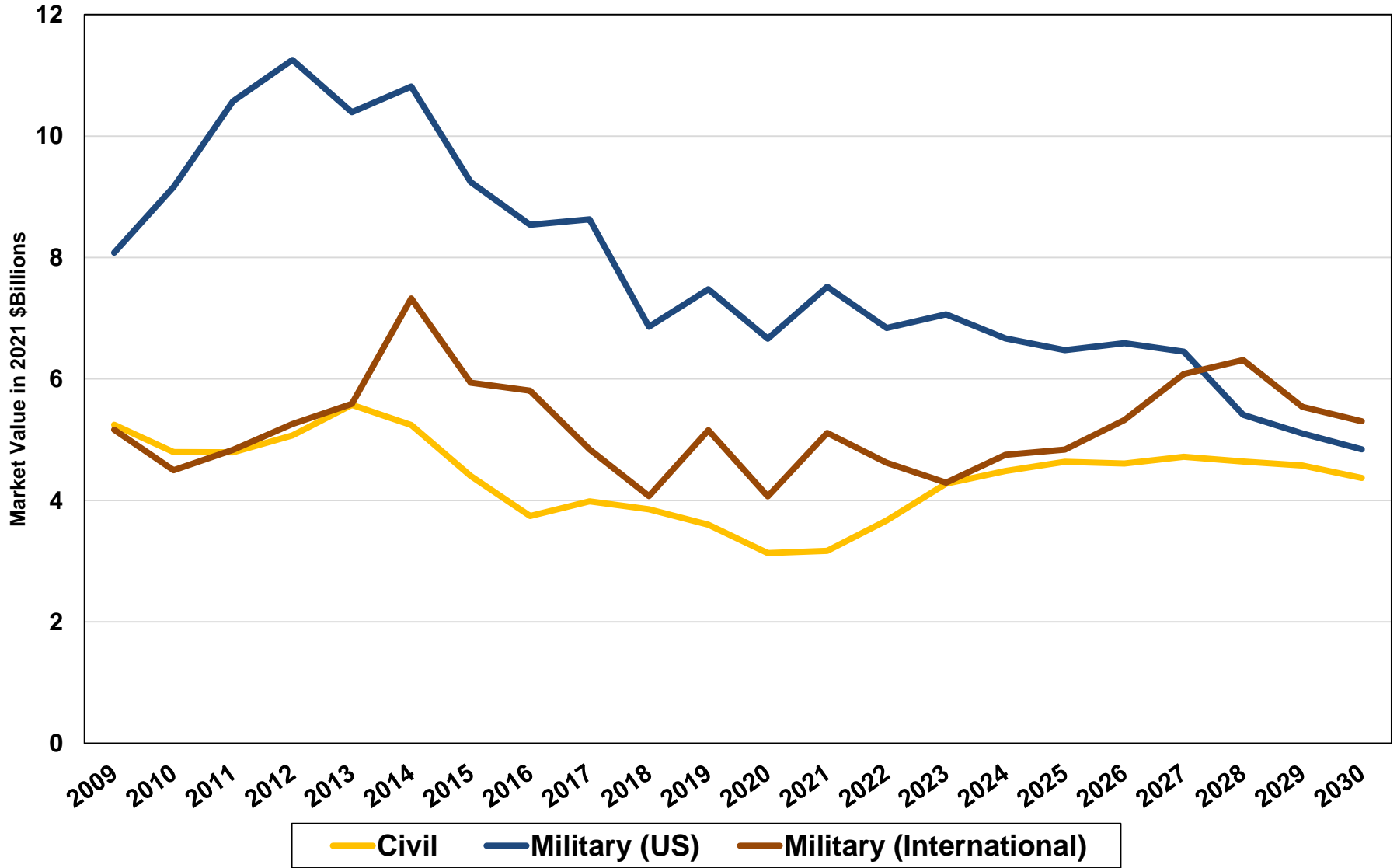
Bottom Half Bizjet Segment vs. Top Half Pre- and Post-Covid Forecasts



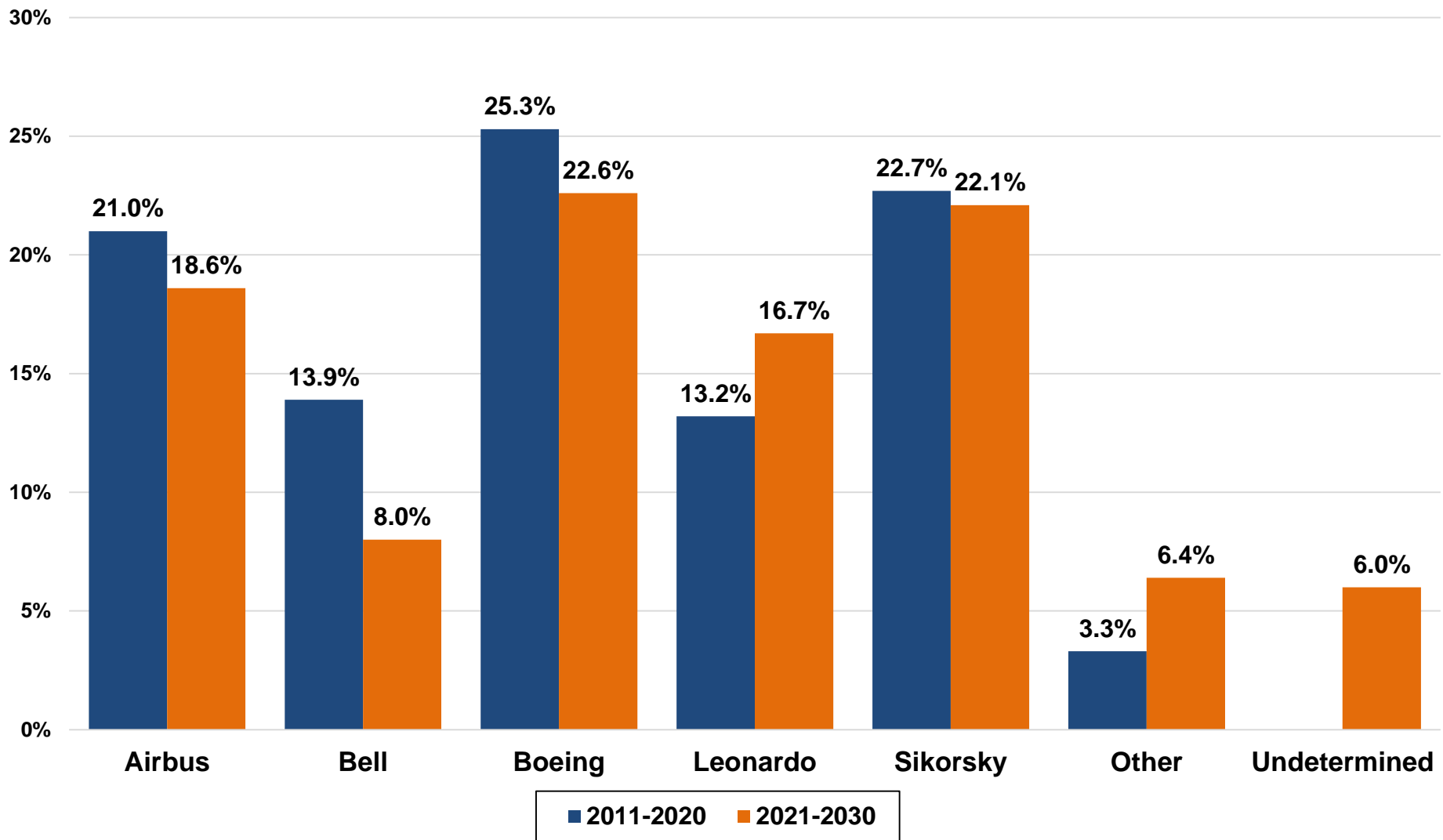
Embraer: Searching For Growth After The E-Jet Revolution



US Military Rotorcraft Market Falling; International Military and Civil Stable



Rotorcraft Manufacturer Market Shares 2021-2030 vs 2011-2020



Global Aircraft Market Outlook In One Page

(Deliveries, *not* Production)

<u>Segment</u>	<u>2021</u>	<u>'21-'22</u>	<u>Risk</u>	<u>Elevator Comment</u>
Jetliners-SA	65.3%	10.8%	Yellow	Includes some already-built MAXs. Watch China, fuel, traffic.
Jetliners-TA	-4.1%	7.1%	Red	Overcapacity, slow international recovery, secular shift to SAs
Regionals	6.7%	8.9%	Yellow	No Boeing supply chain effect on E-2; Scope clause de-risked, but little growth.
Business Aircraft	-1.8%	4.2%	Red	Another hit after many false starts over a disappointing decade.
Civil Rotorcraft	1.2%	15.8%	Red	Large civil hit again. Too many new models aimed at a weak segment (oil/gas).
Military Rotorcraft	17.7%	-9.3%	Green	Programs end/slow; no risk of accelerated downturn; FVL beyond forecast, exc FARA.
Military Transports	5.5%	-5.0%	Green	A seriously underperforming market.
Fighters	35.9%	16.5%	Green	I like this market. F-35 (after COVID disruption), plus strong Gen 4.5
<u>All Civil</u>	<u>20.5%</u>	<u>8.7%</u>	Red	SAJetliner snapback due to MAX, weakness in other segments; more overcapacity risk.
<u>All Military</u>	<u>23.7%</u>	<u>7.7%</u>	Green	Global insecurity, Tension, Malice. Special mission (ISR, B-21) also boosts topline.
<u>Total Industry</u>	<u>21.5%</u>	<u>8.4%</u>	Red	<u>Back to peak in late 2024</u>

Covid-19 Impact: Nothing 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 ill-liberal “democracies.”
- **Macroeconomic:** lower 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 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.

Concluding Observations, and A Few Consolations

- **The jetliner market might get worse.**
 - This is a synthetic market, not an organic one.
 - Deliveries driven by exogenous factors: government aid, third-, first party finance. These may not hold (particularly government aid).
 - *But...a very steep decline will lead to record growth numbers in the recovery, with attendant exuberance.*
- **Boeing faces a very serious mid market challenge.**
- **Defense companies can grow their civil side. Will they?**
- ***There is some good news:***
 - ***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, export demand, industrial support.***
 - ***Less business jet frothiness.***
 - ***Financial sector stronger this time (“2008 was worse; you couldn’t print money.”).***
- ***A relatively isolated (severe) jetliner-only downturn?***

World Aircraft Deliveries By Value, 1989-2030

