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

World Aircraft Overview
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Aircraft Markets, In Good And Bad Years

(last year was not good)

World New Deliveries In 2020 (2021 $)	CAGR '03-'08	CAGR '08-'14	CAGR '14-'19	Change '19-'20
Jetliners-SA ($27 b)	9.7%	6.9%	-2.0%	-54.8%
Jetliners-TA ($27.8 b)	5.0%	13.5%	2.1%	-49.1%
Regionals ($3.4 b)	3.9%	-3.1%	-6.3%	-47.8%
Business Aircraft ($18.2 b)	16.7%	-2.2%	-1.2%	-15.7%
Civil Rotorcraft ($3.1 b)	18.5%	-2.5%	-7.2%	-11.4%
Military Rotorcraft ($10.7 b)	10.6%	9.7%	-7.0%	-16.3%
Military Transports ($4.1 b)	3.2%	-0.9%	0.0%	-27.0%
Fighters ($18.3 b)	1.6%	0.8%	6.1%	-22.6%
All Civil ($79.9 b)	9.7%	5.6%	-0.5%	-40.0%
All Military ($36.9 b)	3.9%	4.1%	0.0%	-18.4%
Total ($116.7 b)	8.0%	5.2%	-0.4%	-34.5%

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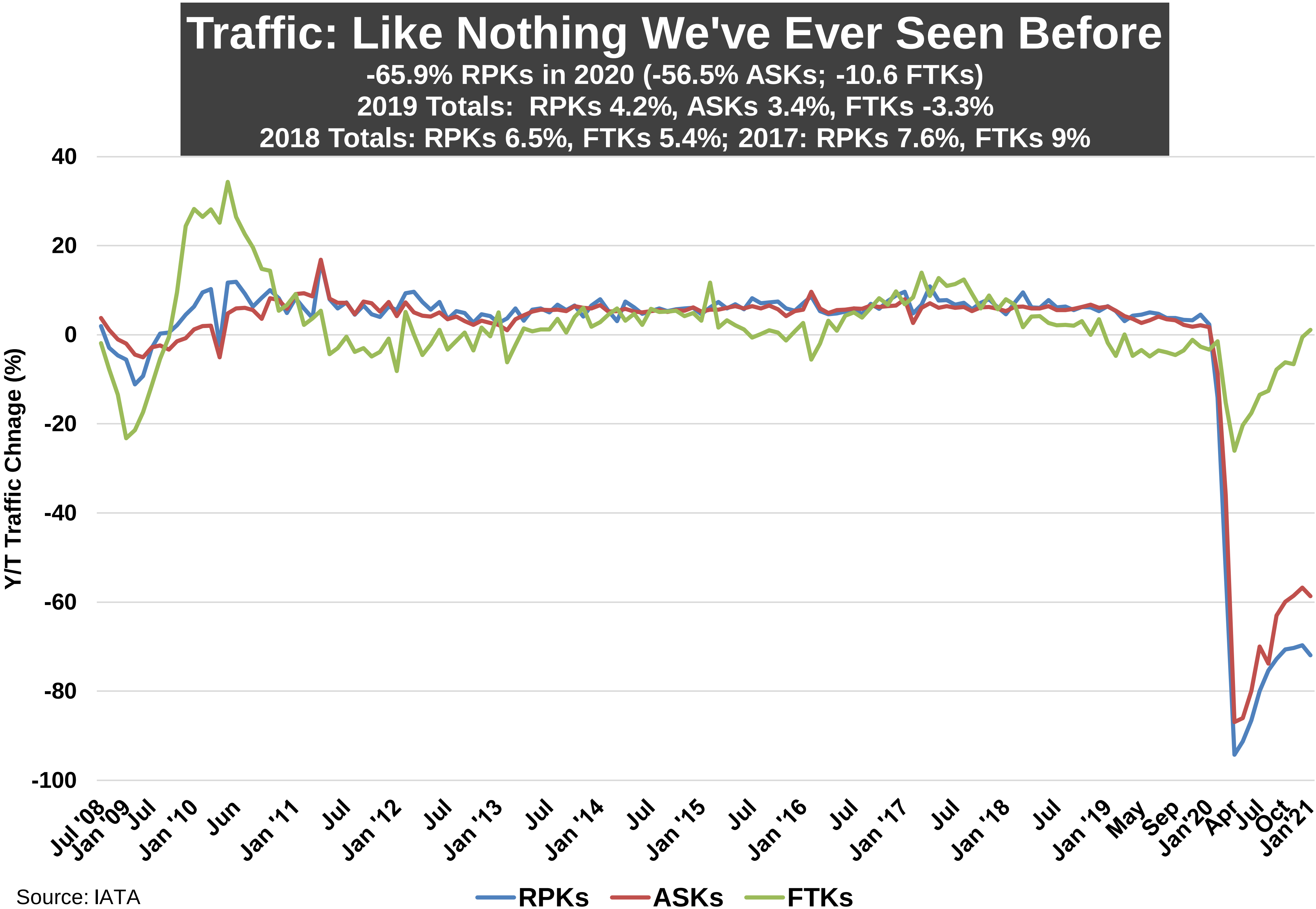
Aviation Segments By Damage

Most to Least

Annotated, Ten Months In

Twin aisle jetliners	International traffic hit hardest and longest. Already an overcapacity situation. Secular shift towards single aisles already underway. It's just that bad.
Single aisle jetliners	Fuel prices a big problem. China comeback uncertain. Some relief due to deferred Airbus ramp, and MAX stop. Same.
Business Jets	Large cabin strongly correlated with oil prices. Small/medium strongly correlated with corporate profits, equities indices. Might recover quickly; still a 2020/21 downturn
Civil Rotorcraft	Oil and gas segment (large) hit again, before recovery even began. About right…wait and see.
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. All good. In fact, better.



Source: IATA

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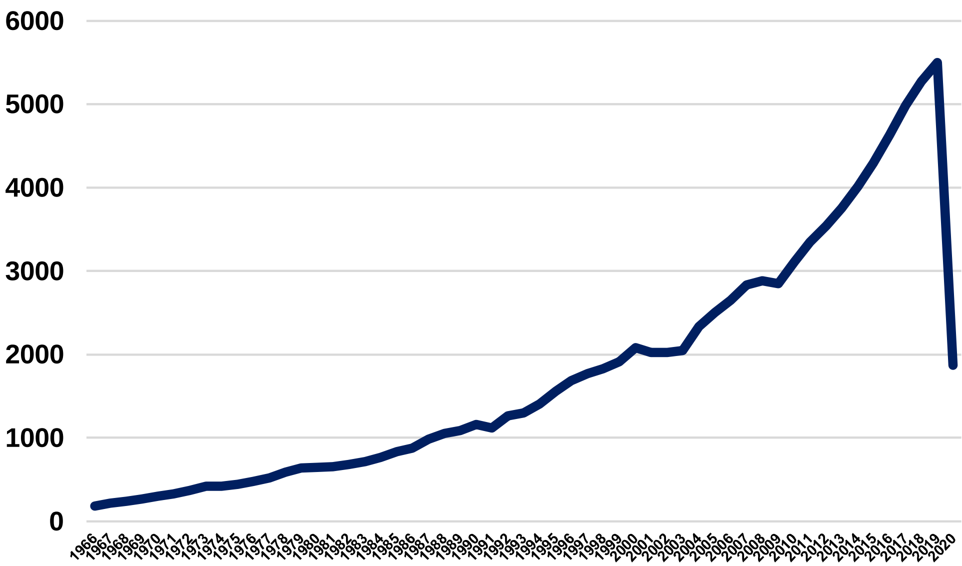
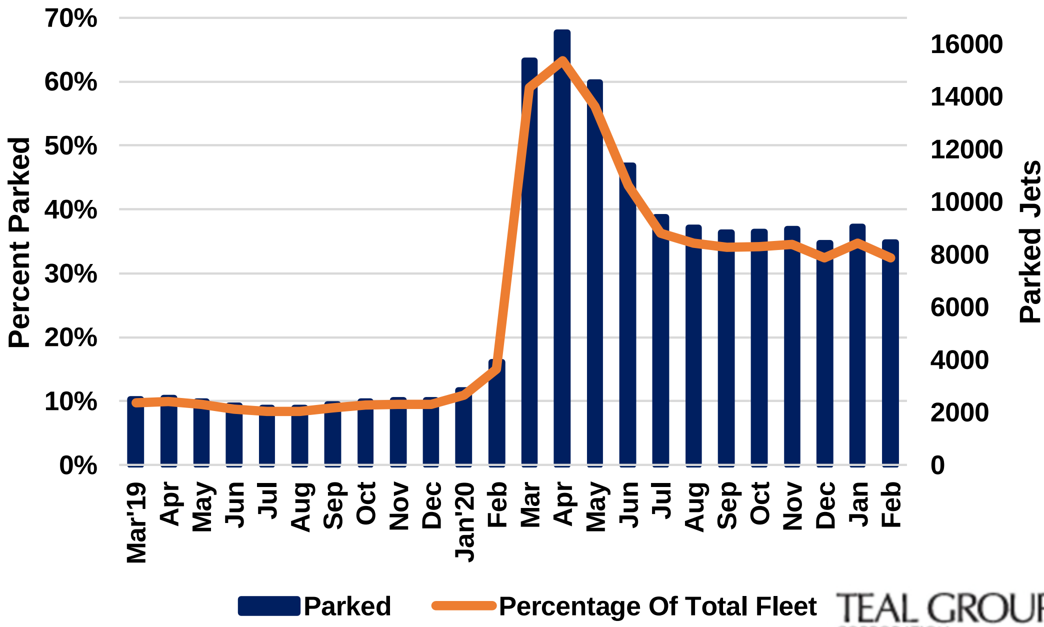
More Unprecedented Numbers

- Traffic decline, parked fleet like no previous shock.
  - Per Paul Krugman, reflect a world economy recovering from 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: Stuck At ~30% Unemployed



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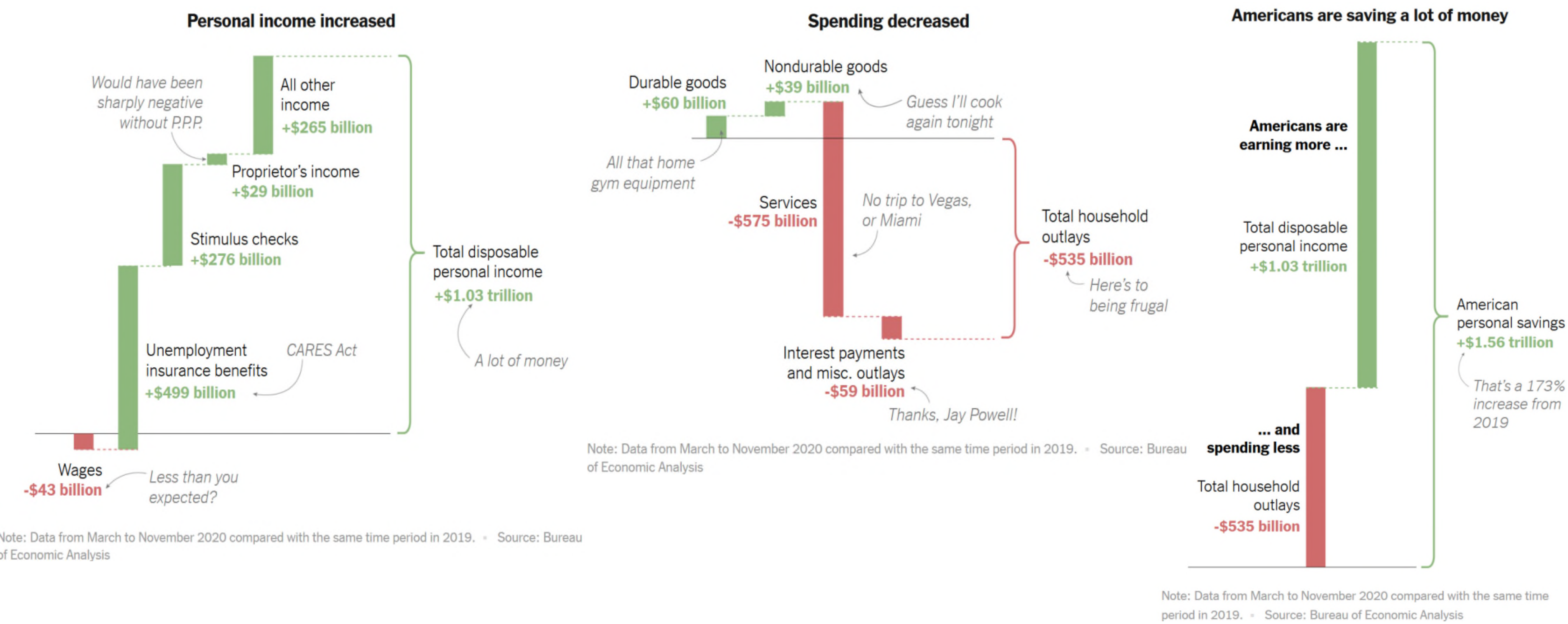
Traffic Peak Recovery By Late 2022. Why?

- 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.



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

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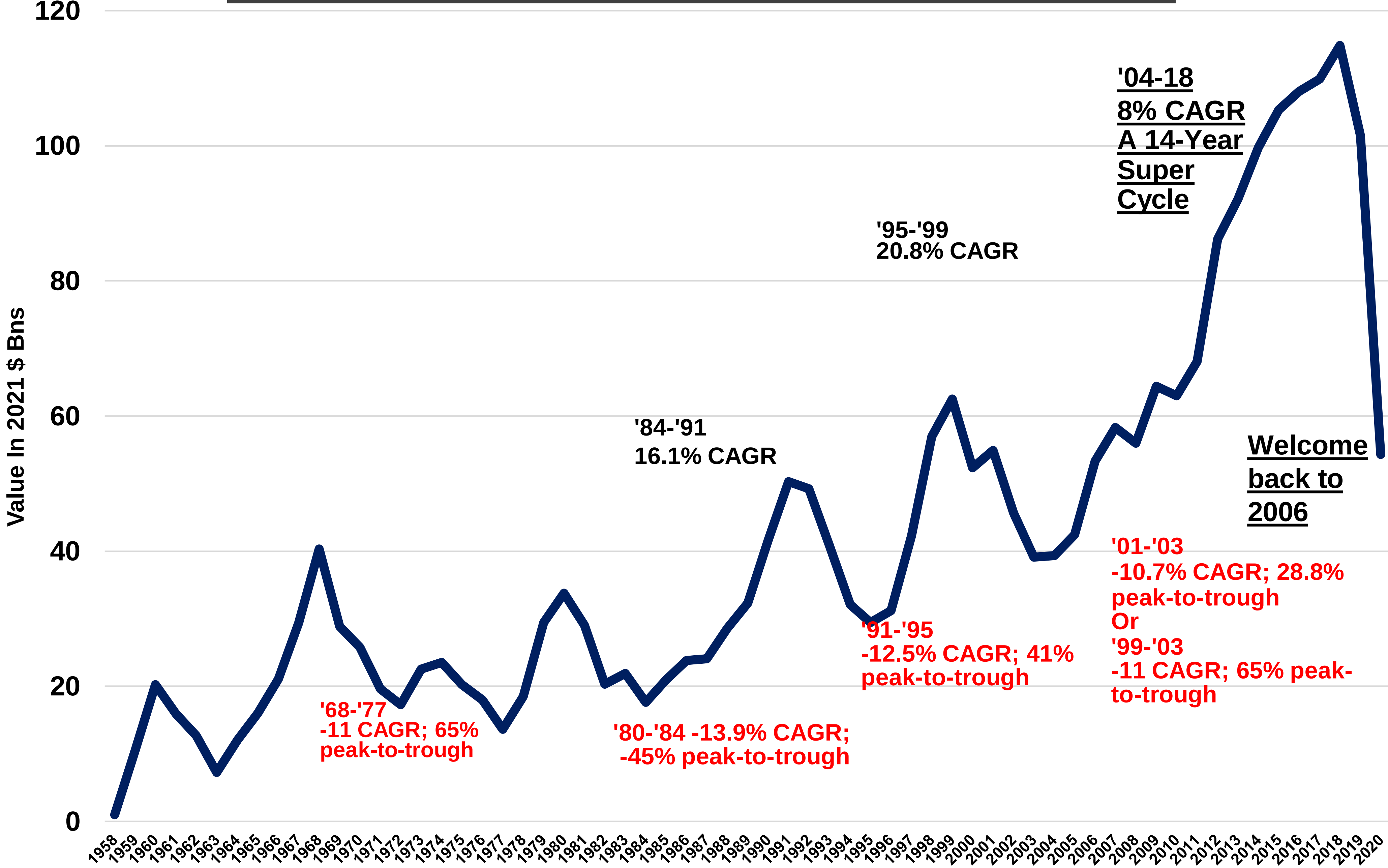
Here It Is, The Chart I Was Dreading



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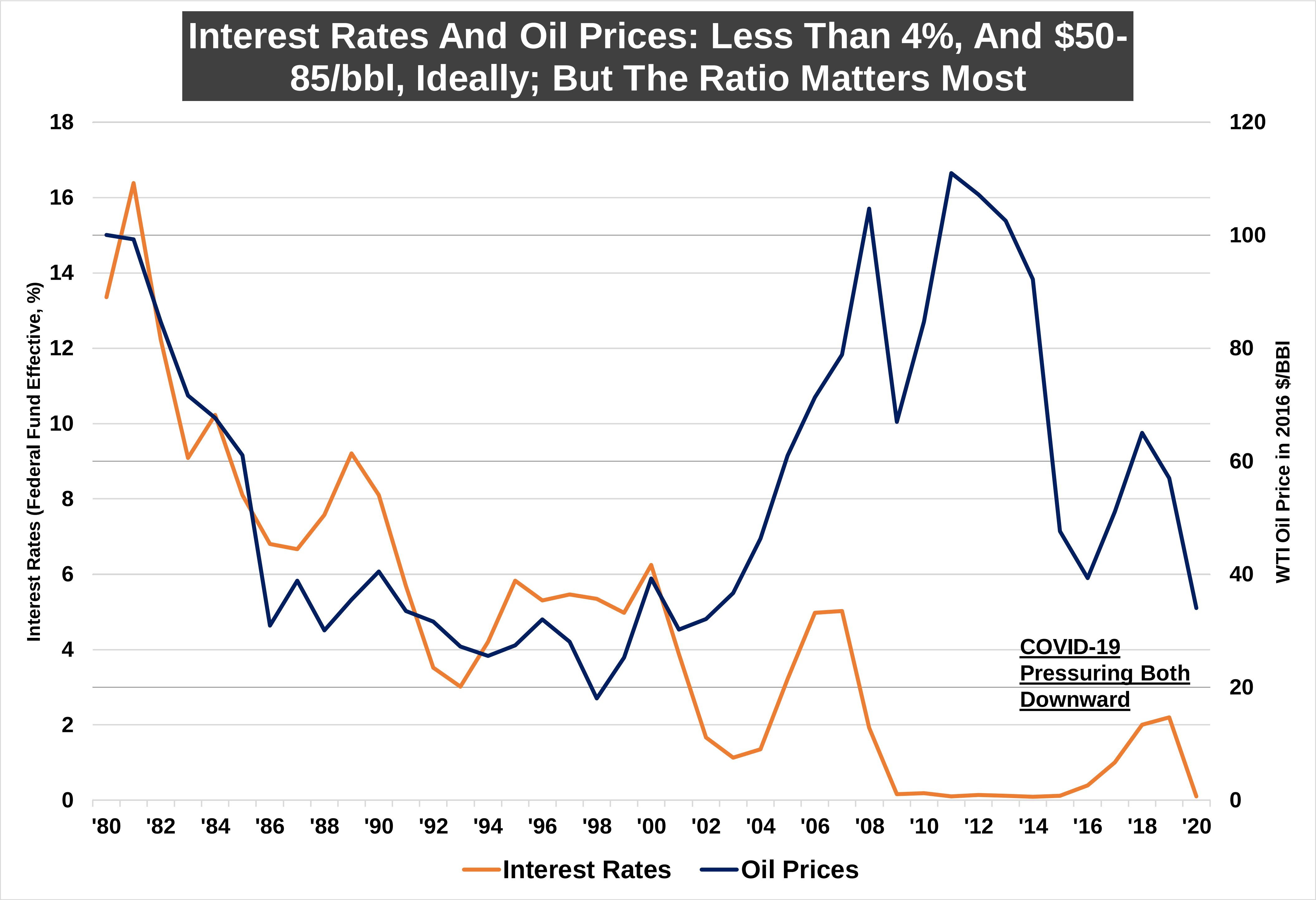

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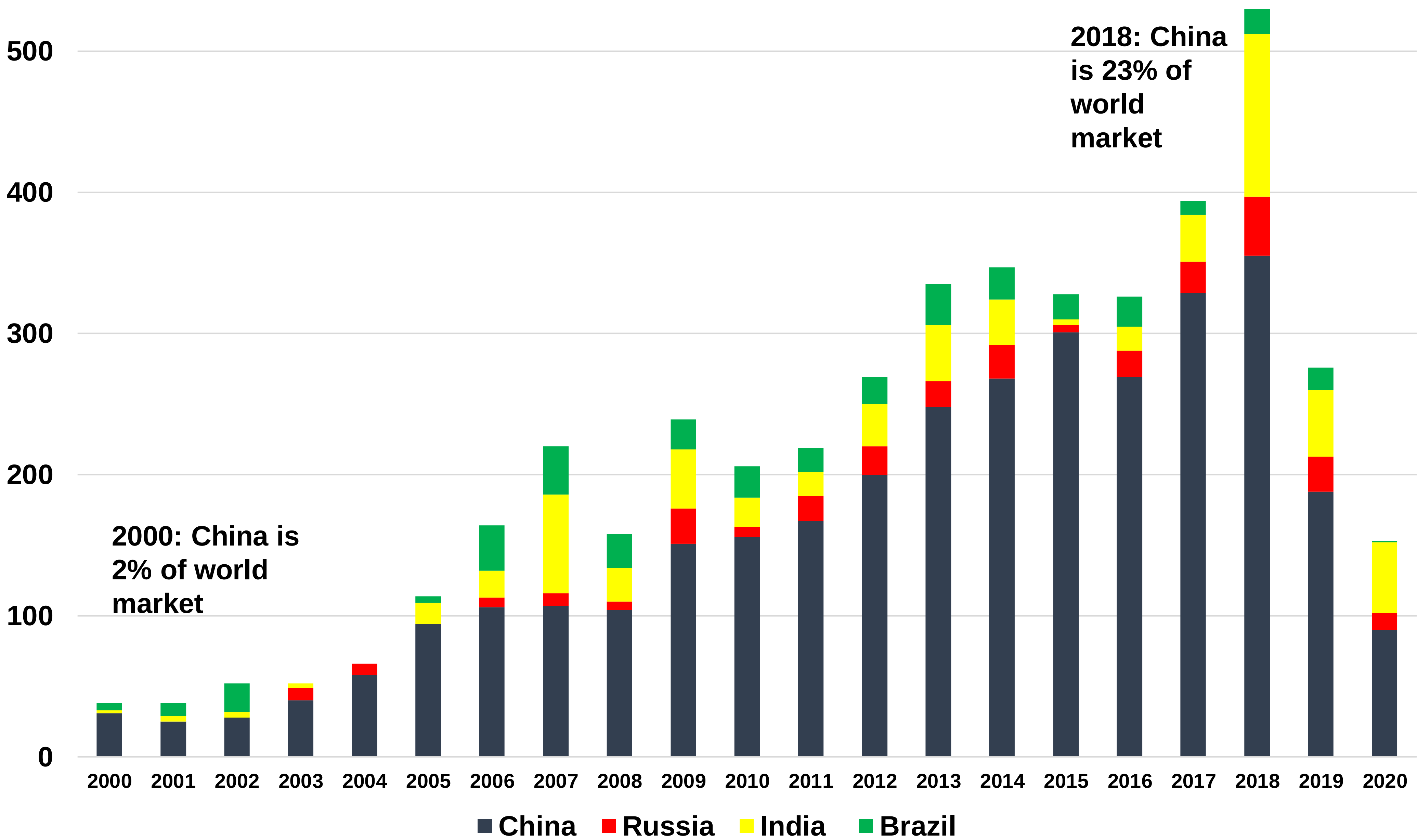
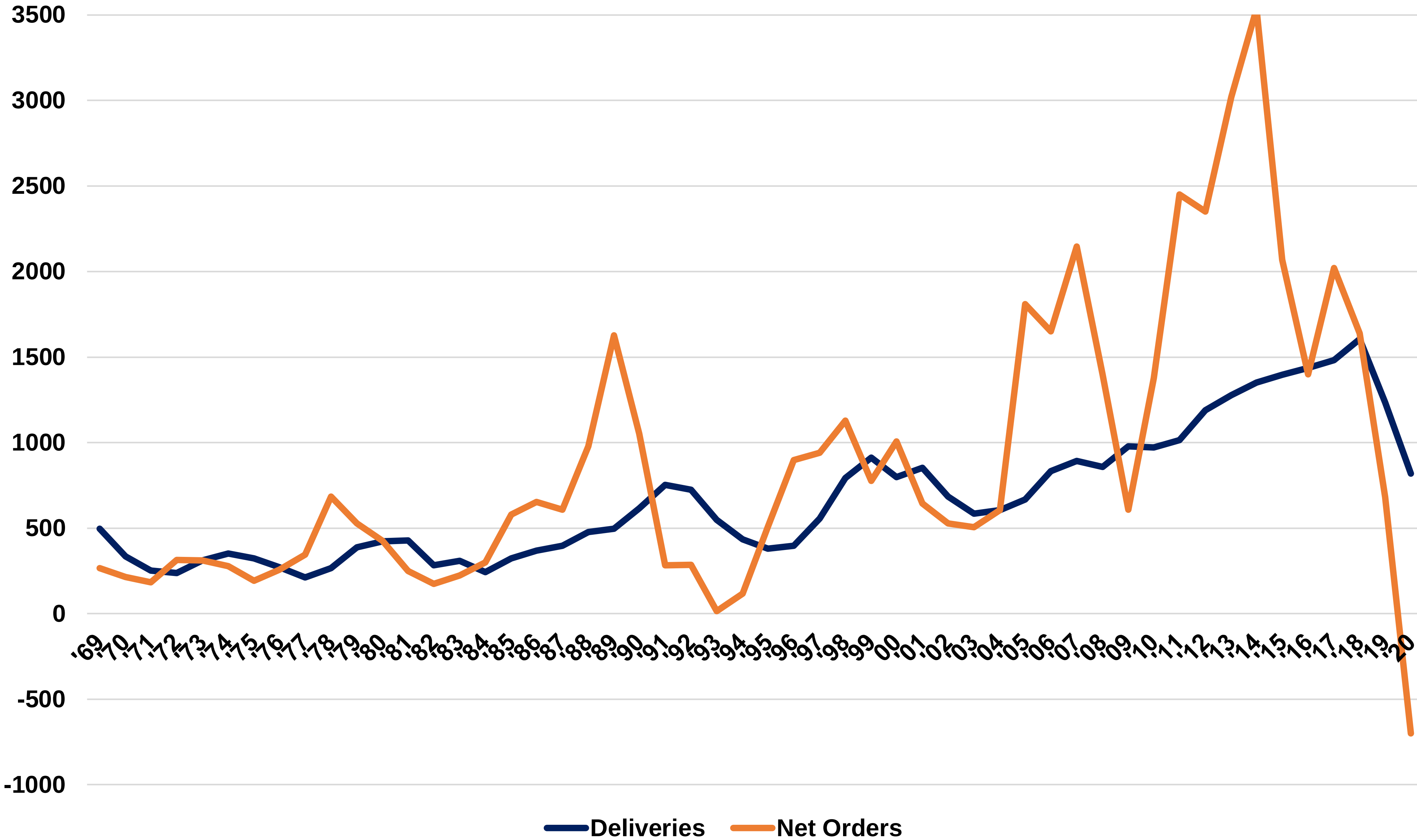
BRIC Deliveries: All About China



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



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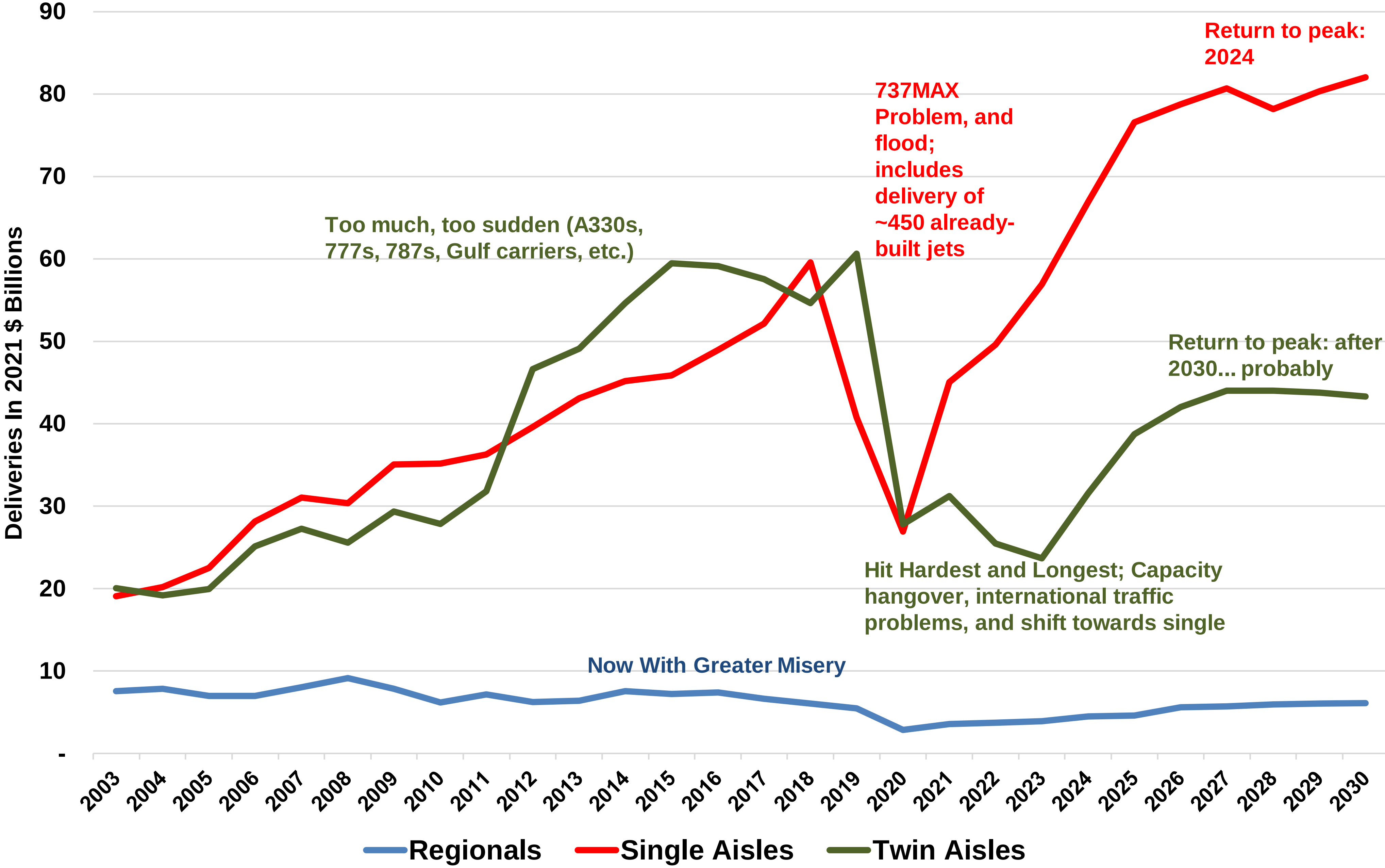
The Air Transport Market By Segment



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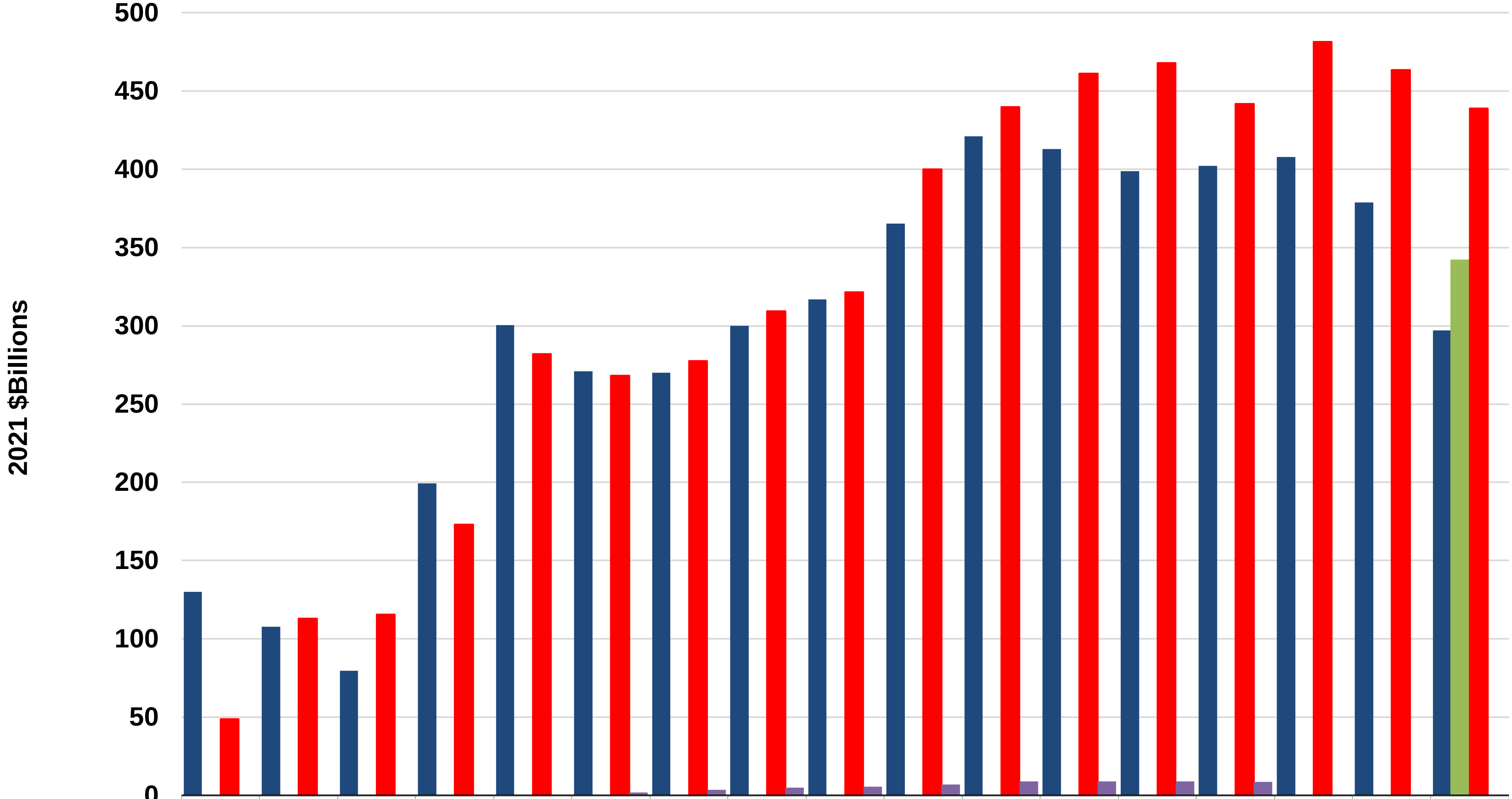
Firm Order Backlog Values: Boeing Taking A Hit



	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	End 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	297.1
Without ASC 606																	341.8
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	438.9
Bombardier	—	—	—	—	—	1.9	3.3	4.9	5.5	6.7	9.0	9.0	8.7	8.5	—	—	—

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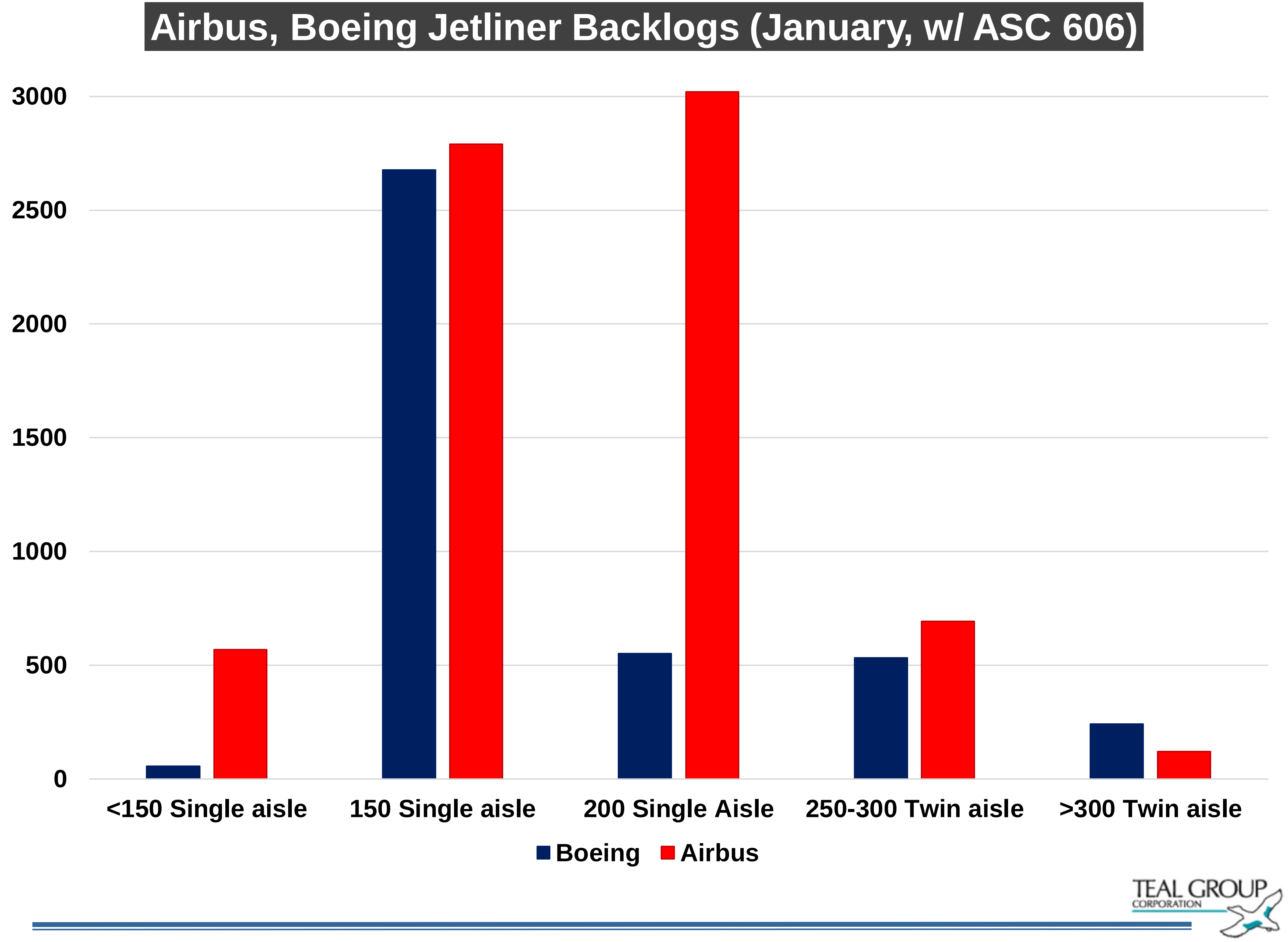
Airbus, Boeing Jetliner Backlogs (January, w/ ASC 606)
3000
2500
2000
1500
1000
500
0
<150 Single aisle
150 Single aisle
200 Single Aisle
250-300 Twin aisle
>300 Twin aisle
Boeing
Airbus
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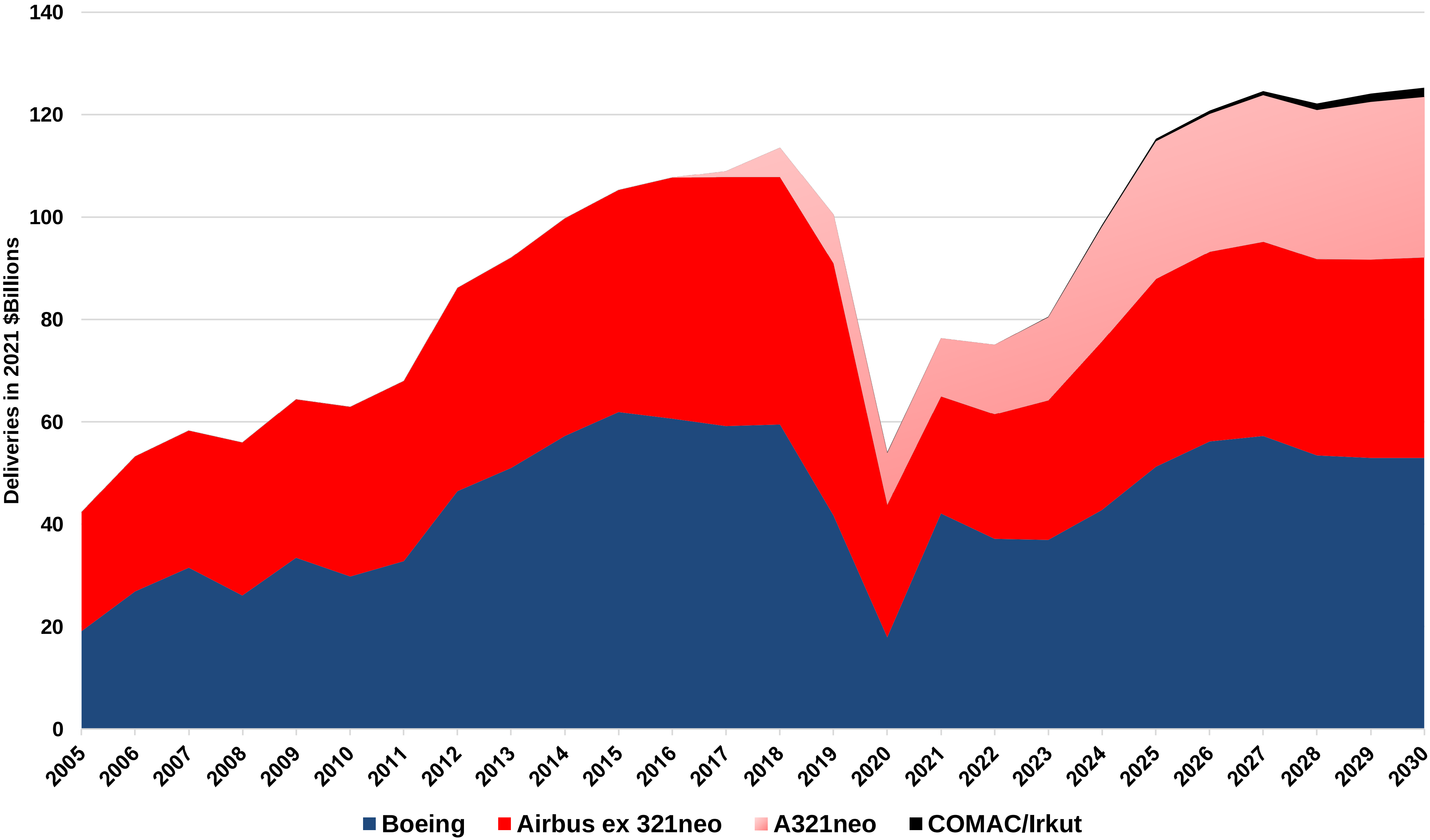
Jetliner Market Shares By Deliveries

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



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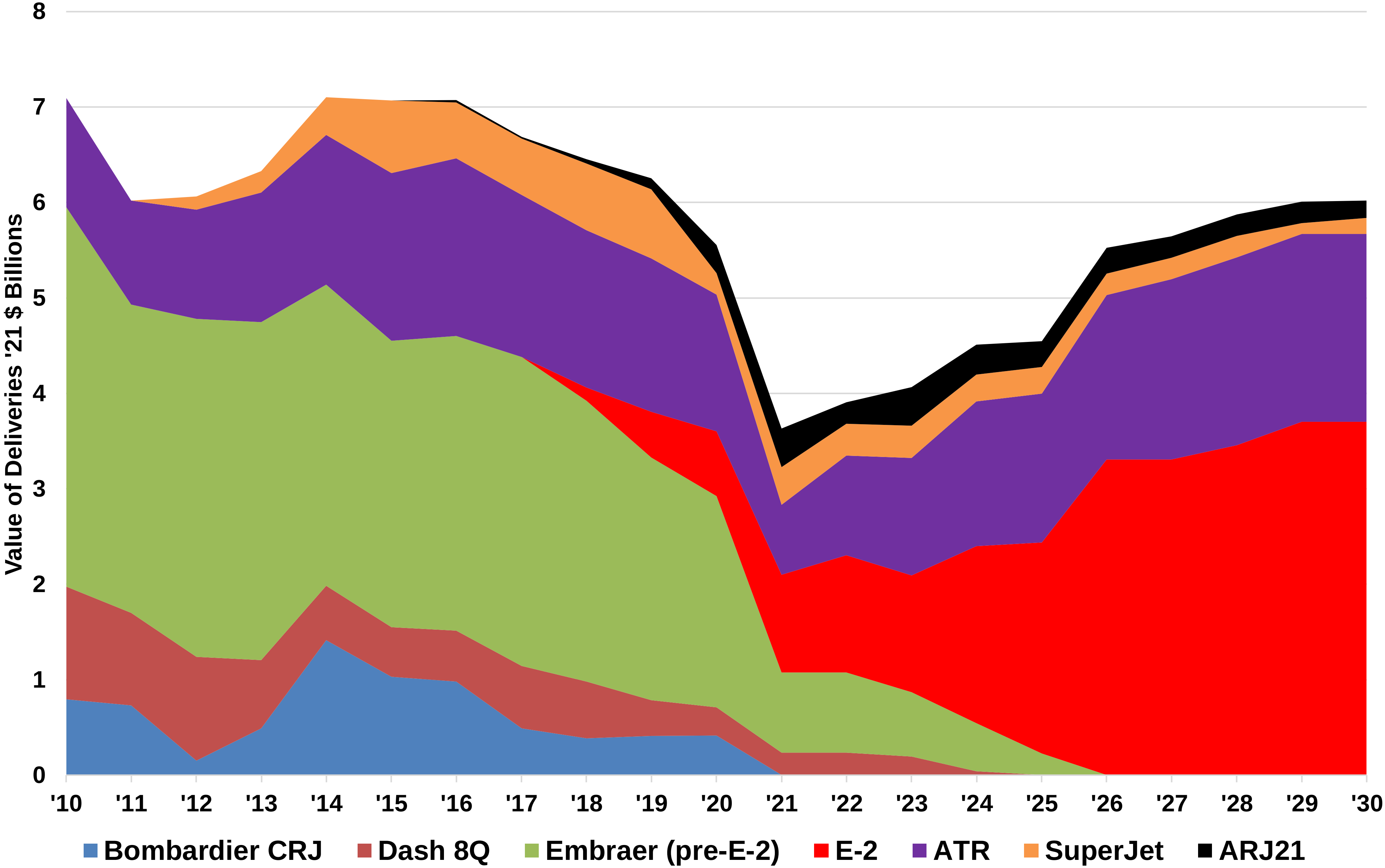
Regional Deliveries By OEM (Value)



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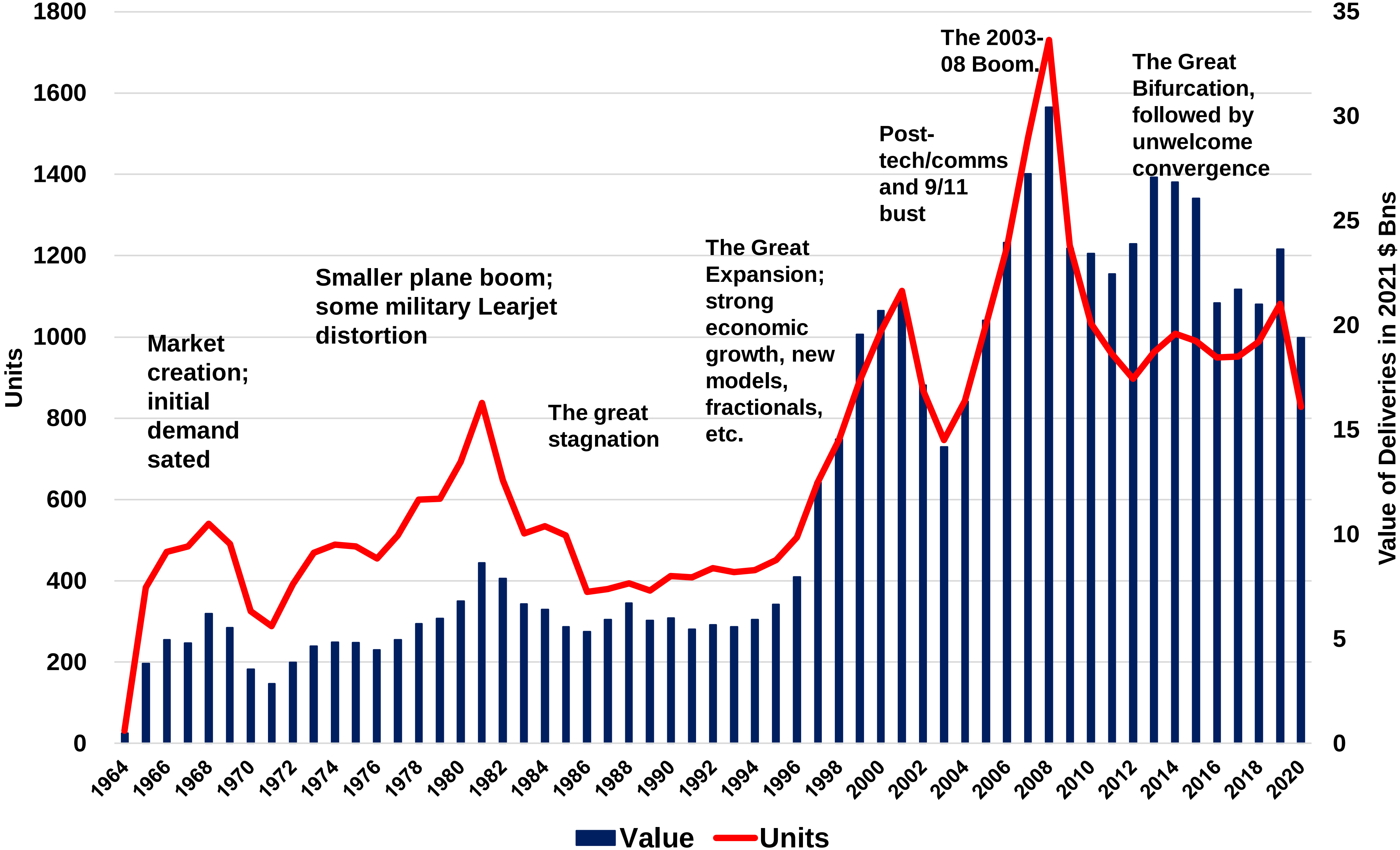
Business Aircraft Market History (w/jetliners, RJs, turboprops)



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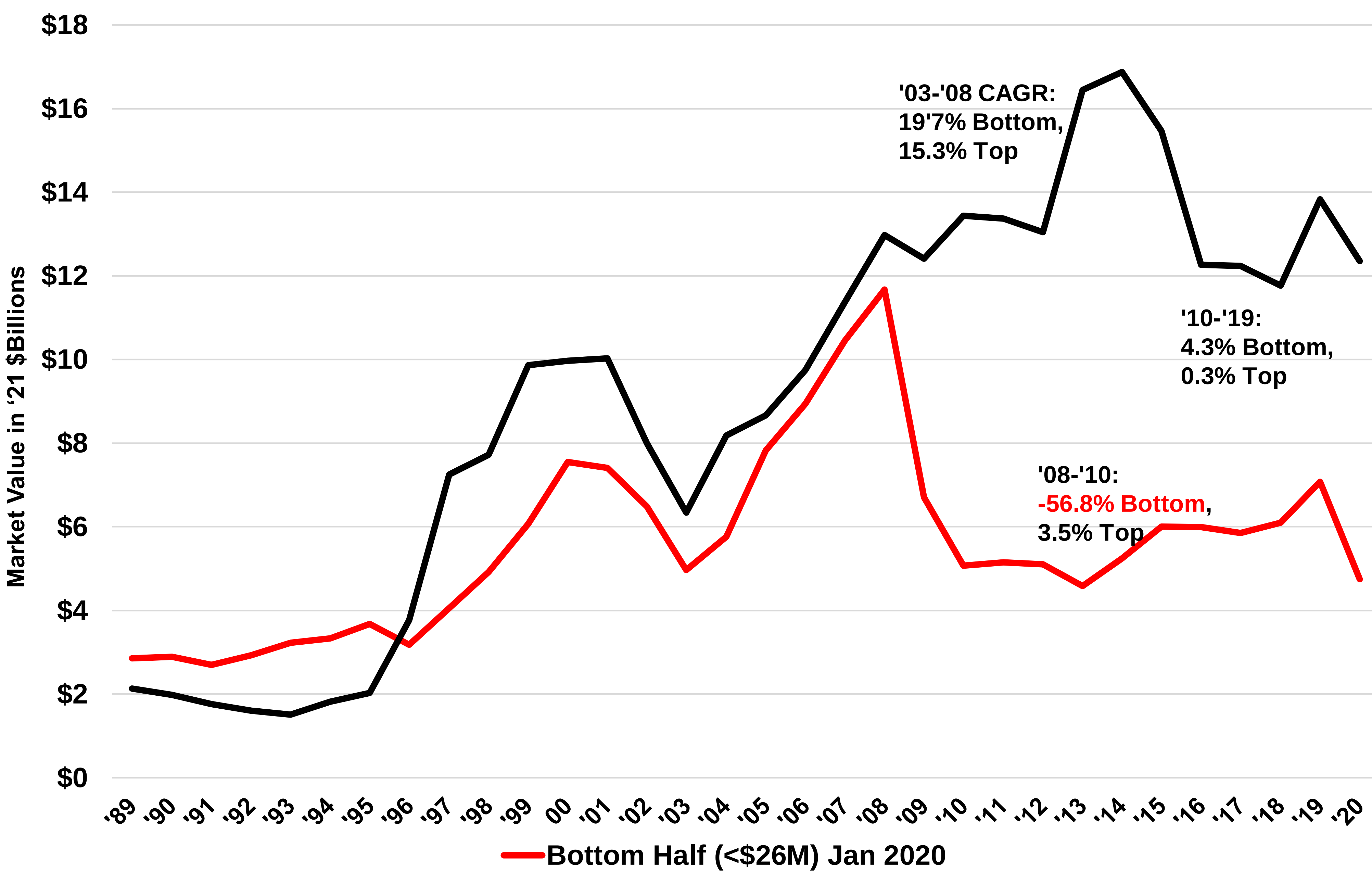
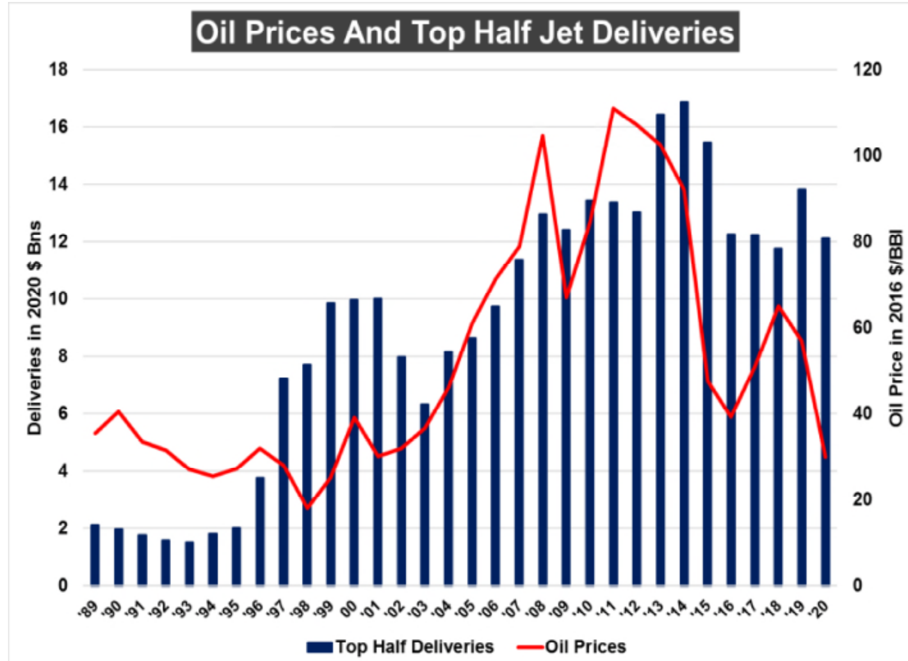
Bottom Half Bizjet Segment vs. Top Half



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).

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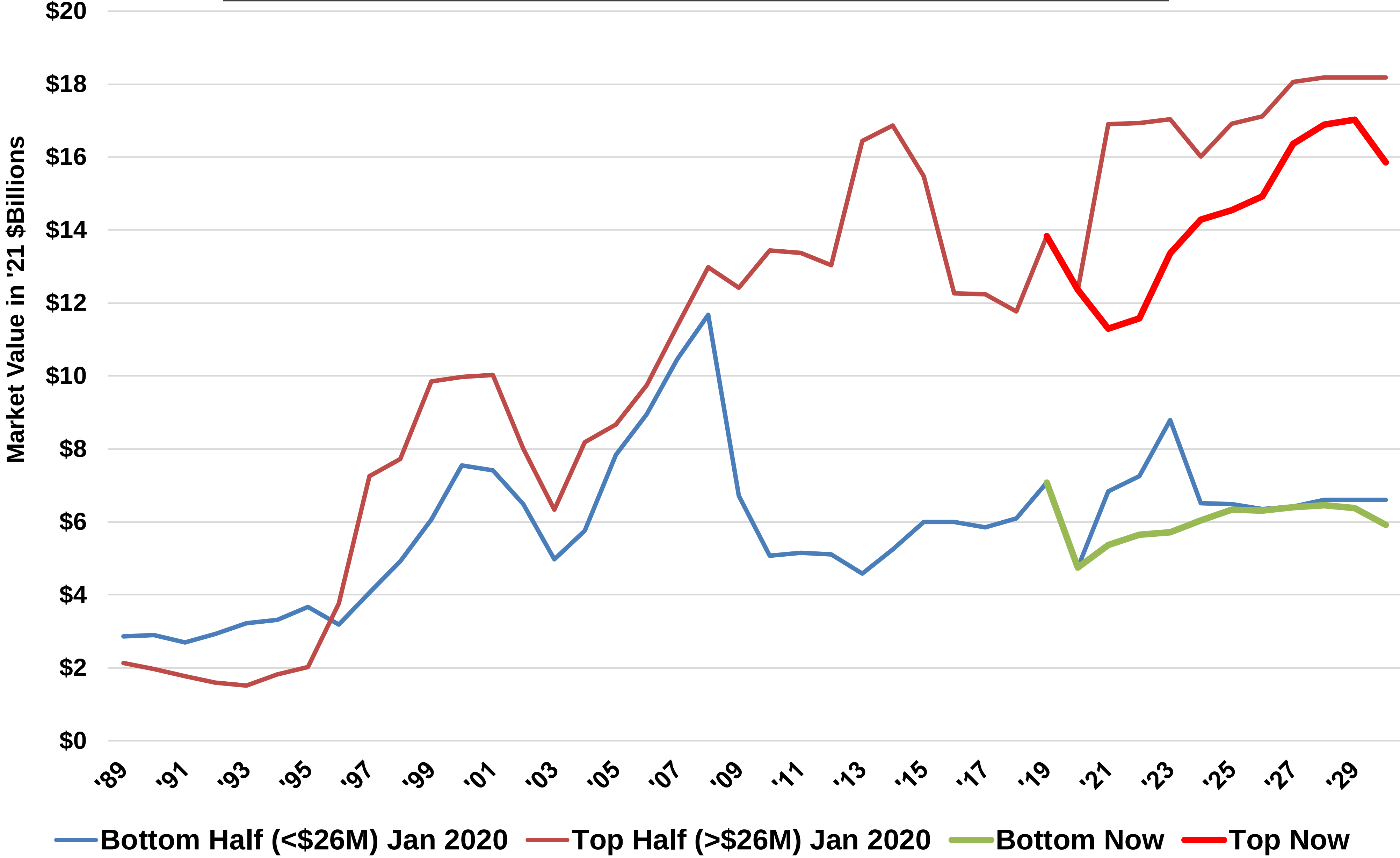
Bottom Half Bizjet Segment vs. Top Half Pre- and Post-Covid Forecasts



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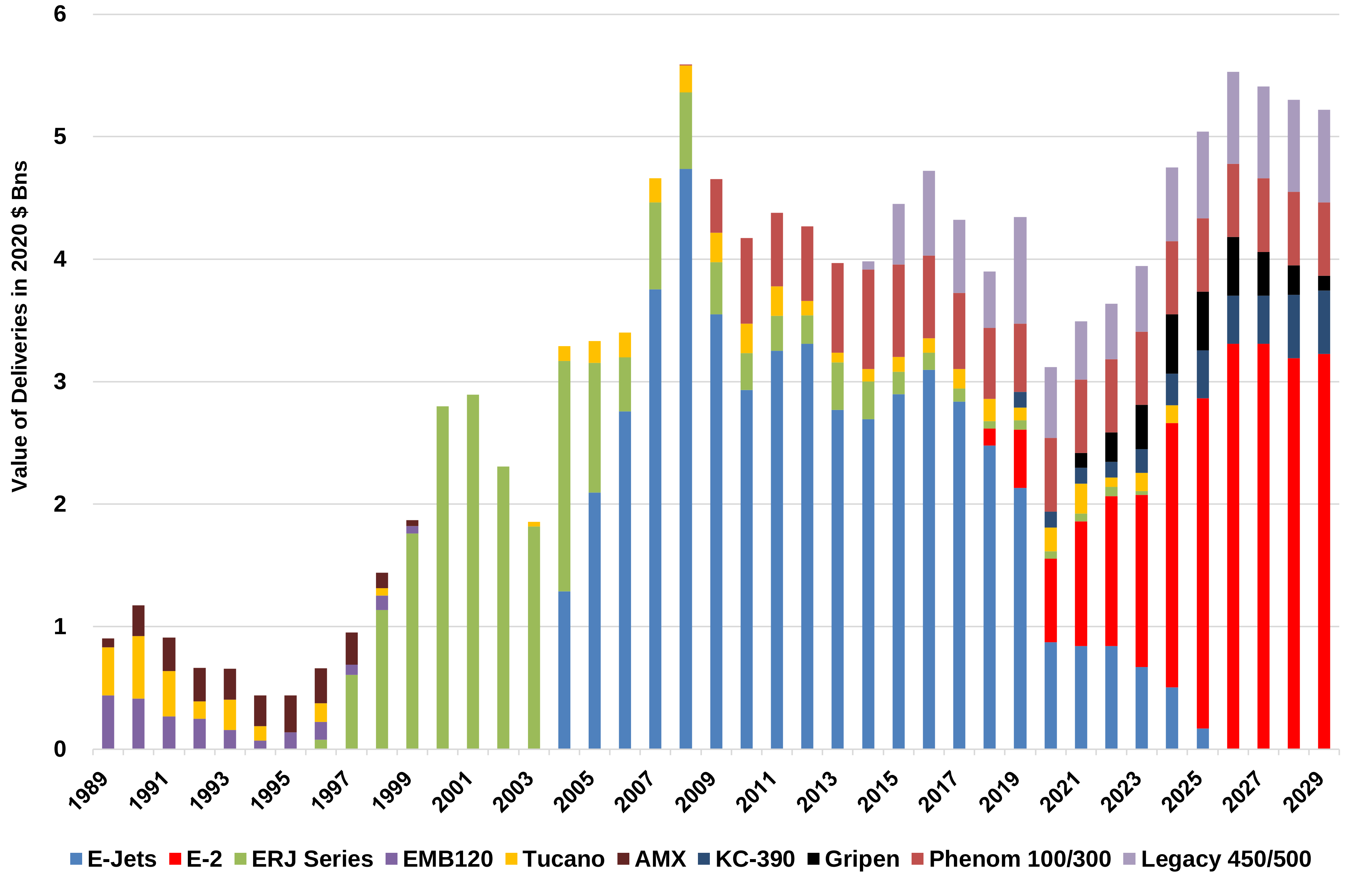
Embraer: Searching For Growth After The E-Jet Revolution



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Global Aircraft Market Outlook In One Page

(Deliveries, *not* Production)

Segment	2021	'21-'22	Risk	Elevator Comment
Jetliners-SA	67.5%	10.0%		Includes some already-built MAXs. Watch China, fuel, traffic.
Jetliners-TA	12.2%	-18.5%		Overcapacity, slow international recovery, secular shift to SAs; 787 inventory issue
Regionals	24.1%	5.6%		No Boeing supply chain effect on E-2; Scope clause de-risked, but little growth.
Business Aircraft	-3.0%	6.8%		Another hit after many false starts over a disappointing decade.
Civil Rotorcraft	0.0%	15.0%		Large civil hit again. Too many new models aimed at a weak segment (oil/gas).
Military Rotorcraft	19.2%	-9.3%		Programs end/slow; no risk of accelerated downturn; FVL beyond forecast, exc FARA.
Military Transports	4.8%	-4.8%		A seriously underperforming market.
Fighters	29.2%	18.6%		I like this market. F-35 (after COVID disruption), plus strong Gen 4.5
All Civil	**27.1%**	**0.7%**		SAJetliner snapback due to MAX, weakness in other segments; more overcapacity risk.
All Military	**20.3%**	**8.7%**		Global insecurity, Tension, Malice. Special mission (ISR, B-21) also boosts topline.
Total Industry	**25.0%**	**3.1%**		Back to peak in late 2024

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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.
- We're seeing a K-pattern everywhere.
  - Domestic/int'l traffic, single aisles/twins, bizav/scheduled, etc.

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?***