A Market Analyst's Perspective On US Industry Leadership

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Irvine, CA
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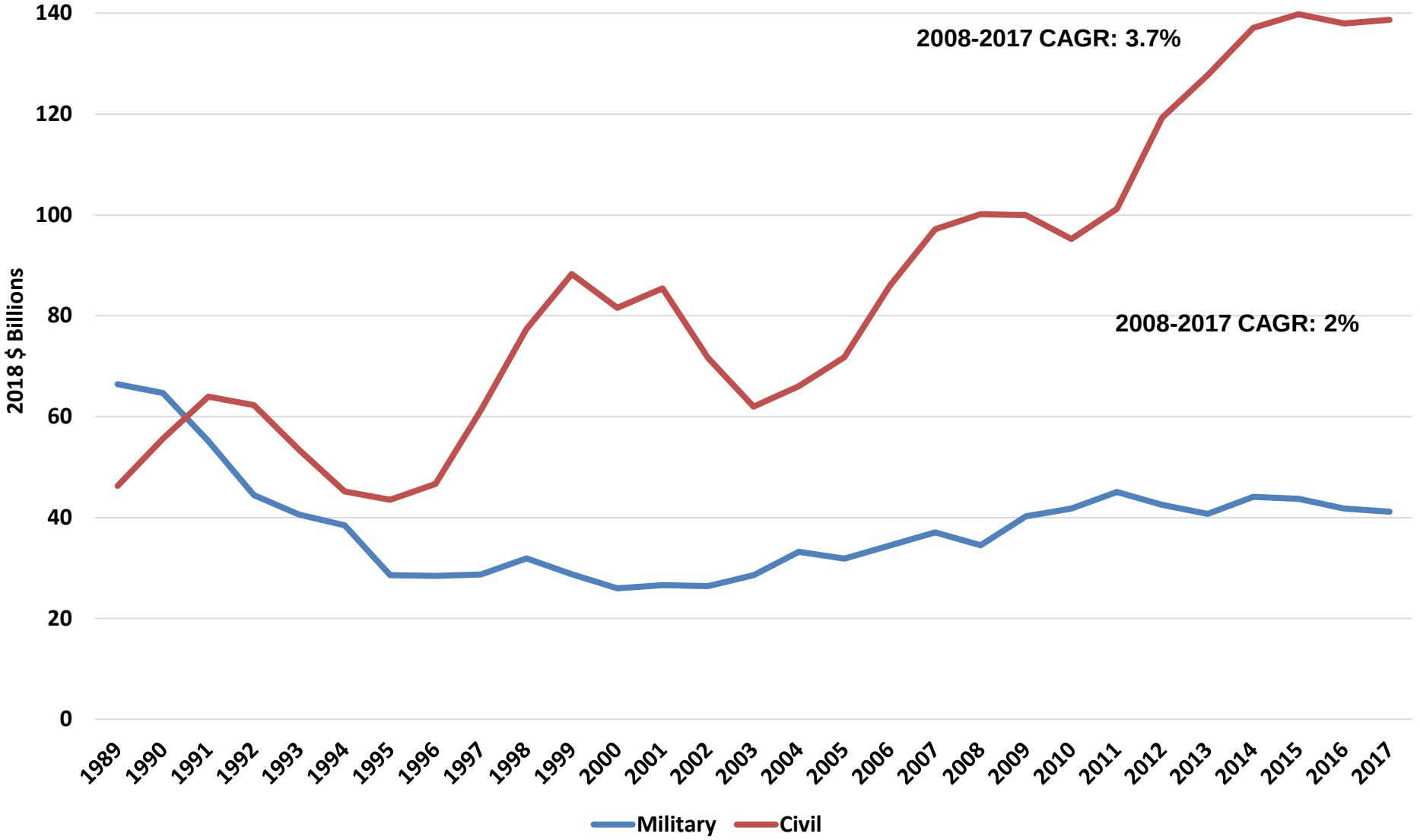
Our Friend, The Market

World Aircraft Deliveries By Value, 1989-2017



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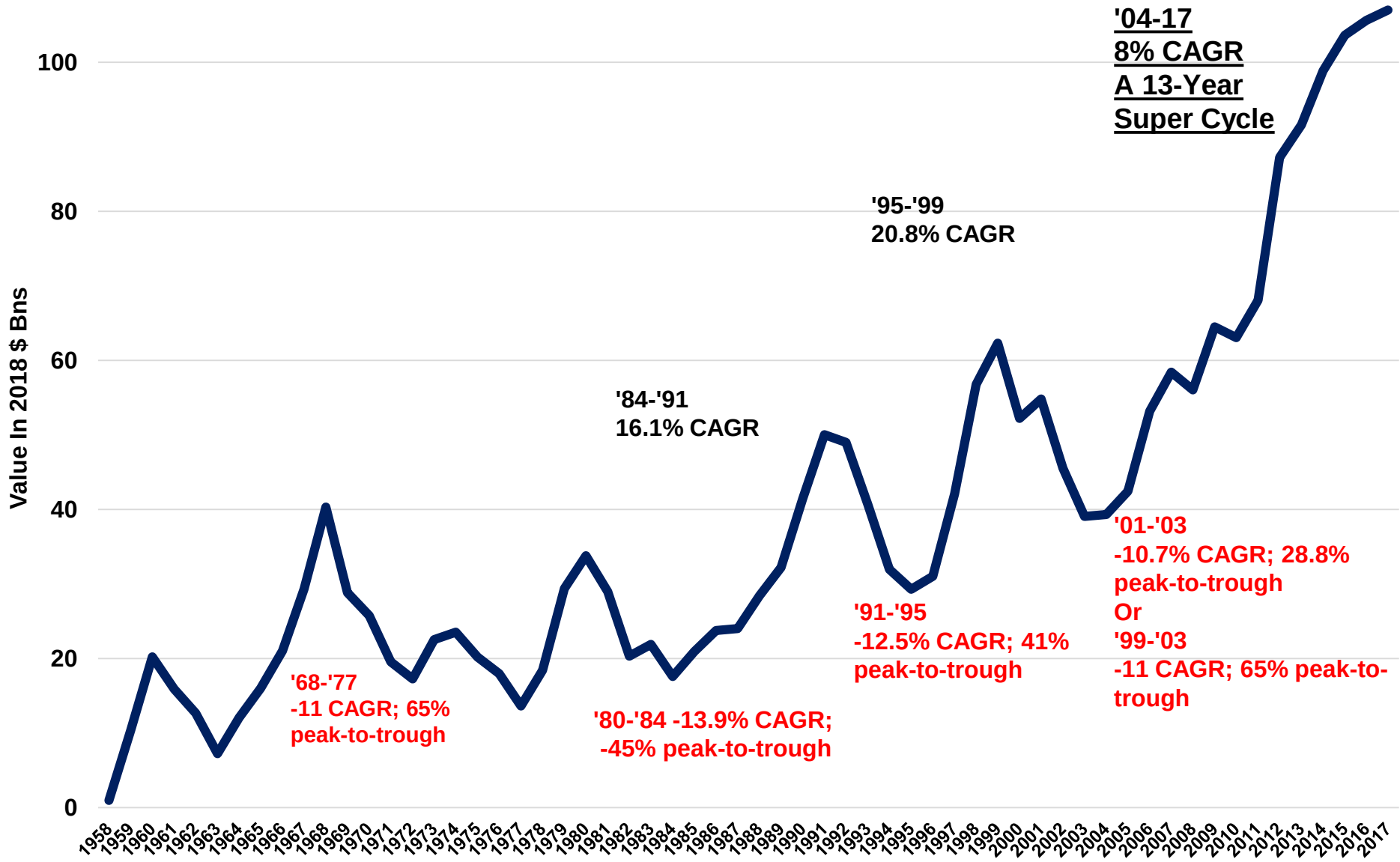
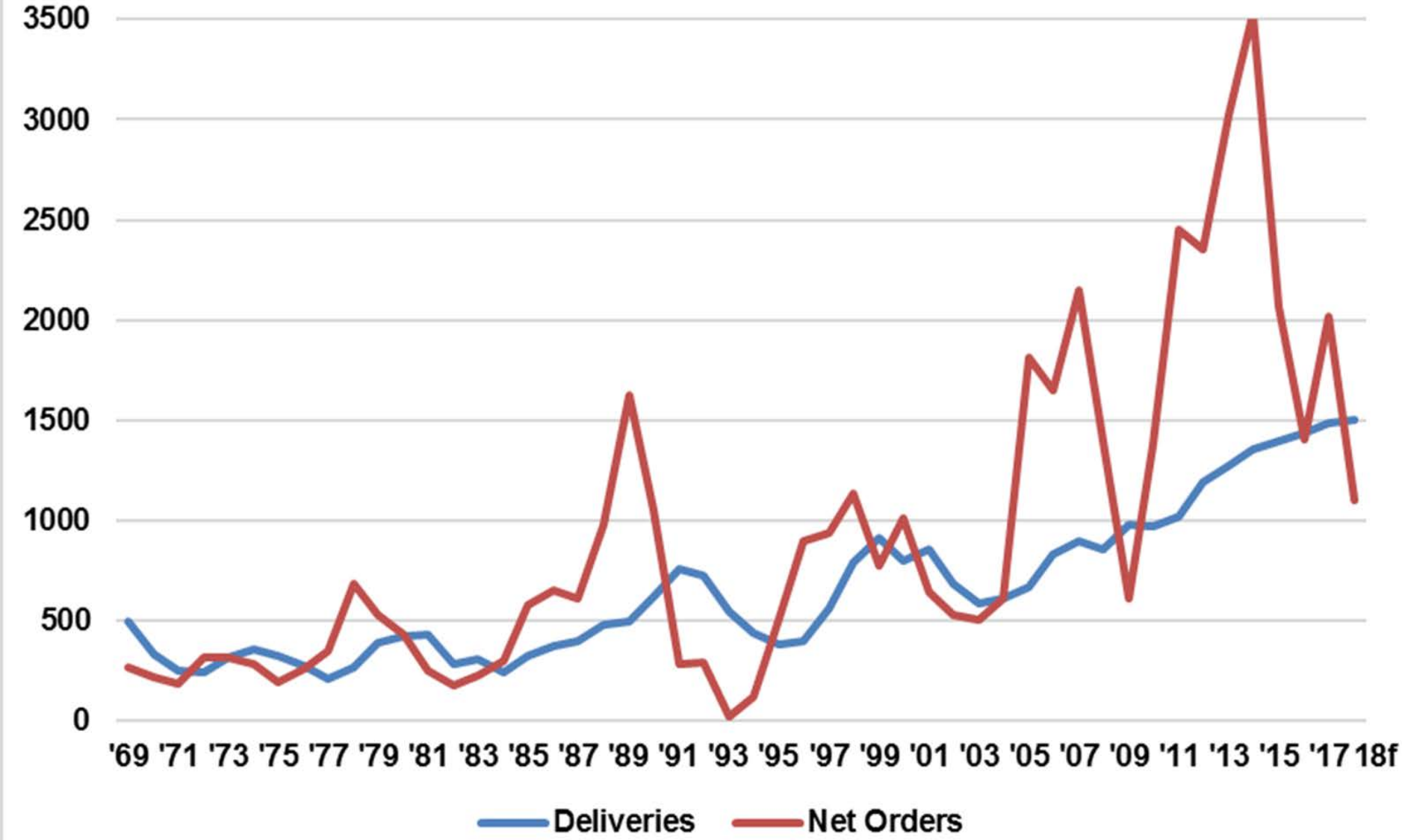
Aircraft Markets, Through Good And Bad Years

World New Deliveries In 2017 (2018 $)	CAGR '03-'08	CAGR '08-'14	Change '14-16	Change '16-'17
Large Jetliners ($102.2 b)	7.5%	9.9%	7.1%	1.1%
Business Aircraft ($20.3 b)	17.2%	-2.2%	-15.8%	-0.8%
Regionals ($7.1 b)	4.6%	-3.2%	0.4%	-8.3%
Civil Rotorcraft ($4.1 b)	19.8%	-1.3%	-30.1%	2.2%
Military Rotorcraft($12.9 b)	9.8%	8.9%	-20.2%	-7.0%
Military Transports ($6.1b)	3.2%	-0.7%	7.3%	0.6%
Fighters ($18.6 b)	1.9%	1.1%	-3.7%	9.1%
All Civil ($133.8 b)	10.1%	5.0%	1.0%	0.3%
All Military ($41.1 b)	3.9%	3.5%	-7.9%	0.6%
Total ($175 b)	8.3%	5.1%	-1.2%	0.4%

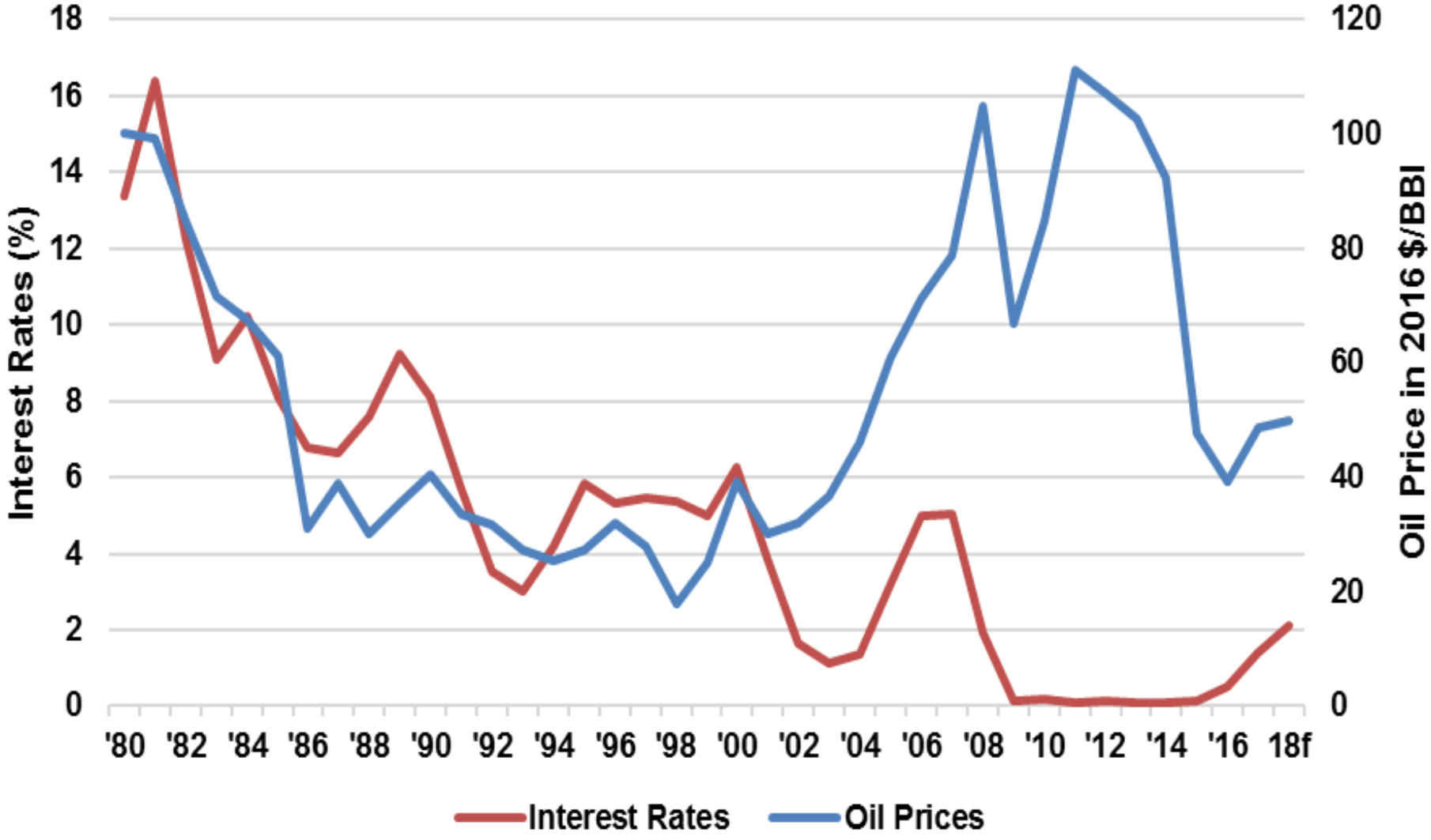
Cyclicality, Our Long-Forgotten Nemesis



Large Jetliner Orders And Deliveries



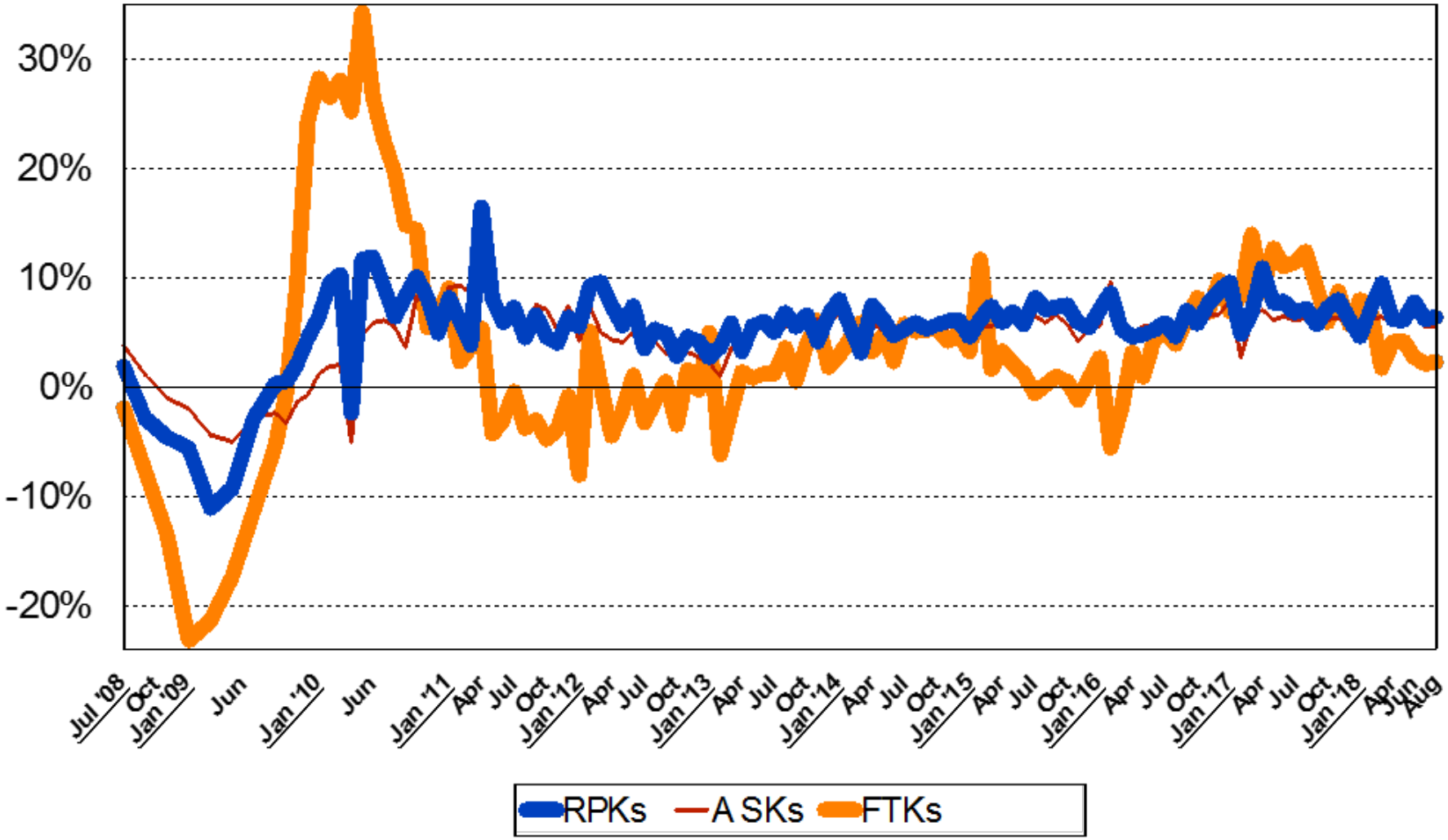
Oil Prices And Interest Rates: The End Of A Strange Moment



Y/Y Traffic: Well Above Trend

2017 Totals: RPKs 7.6% (10-year average: 5.5%), FTKs 9% (best since 2010 recovery)

2016: RPKs 6.3%, ASKs 6.2%, FTKs 3.8%; 2015: RPKs 6.5%, ASKs 5.6%, FTKs 2.2%



Source: IATA

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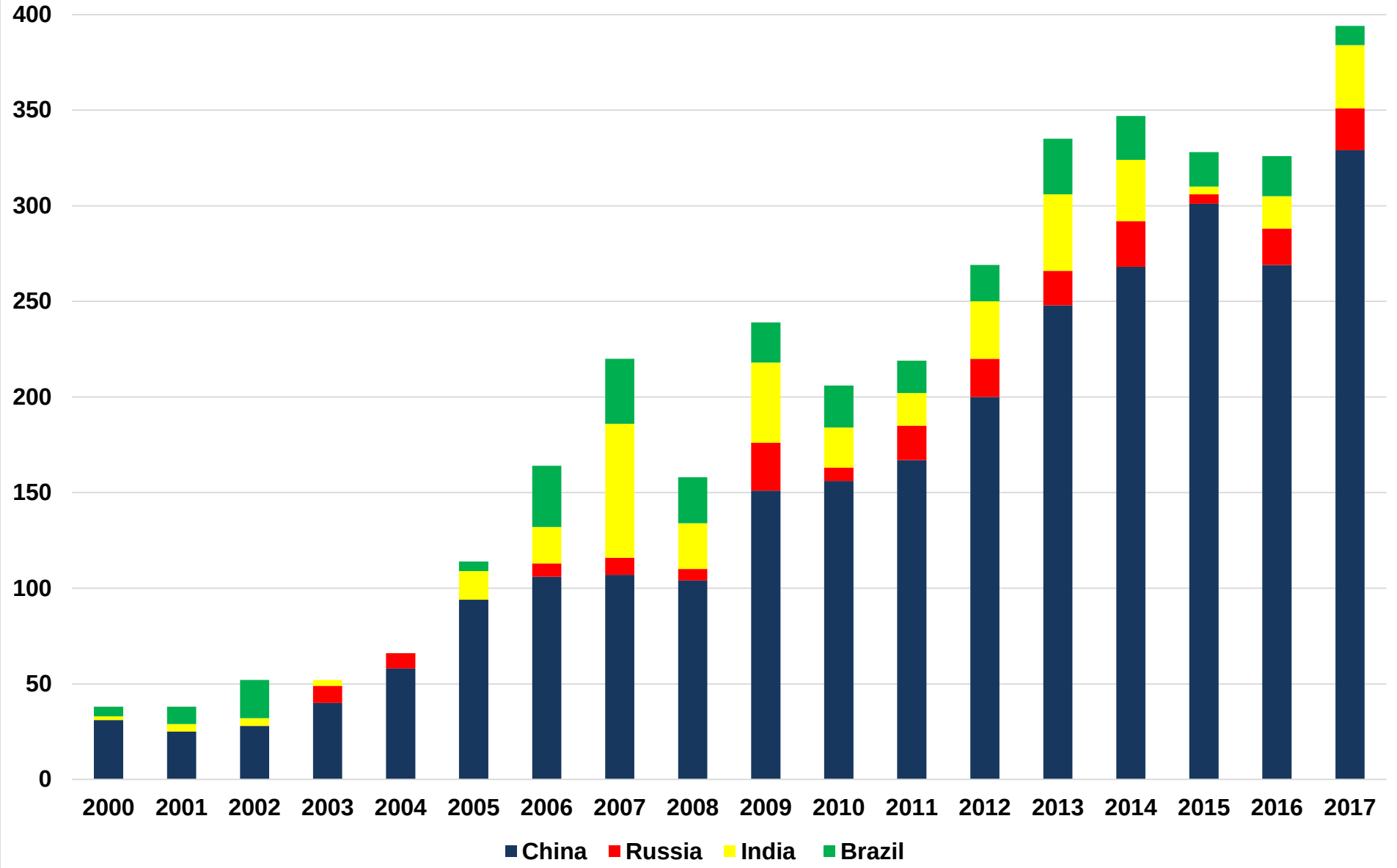
BRIC Deliveries: Peaked, Except For China



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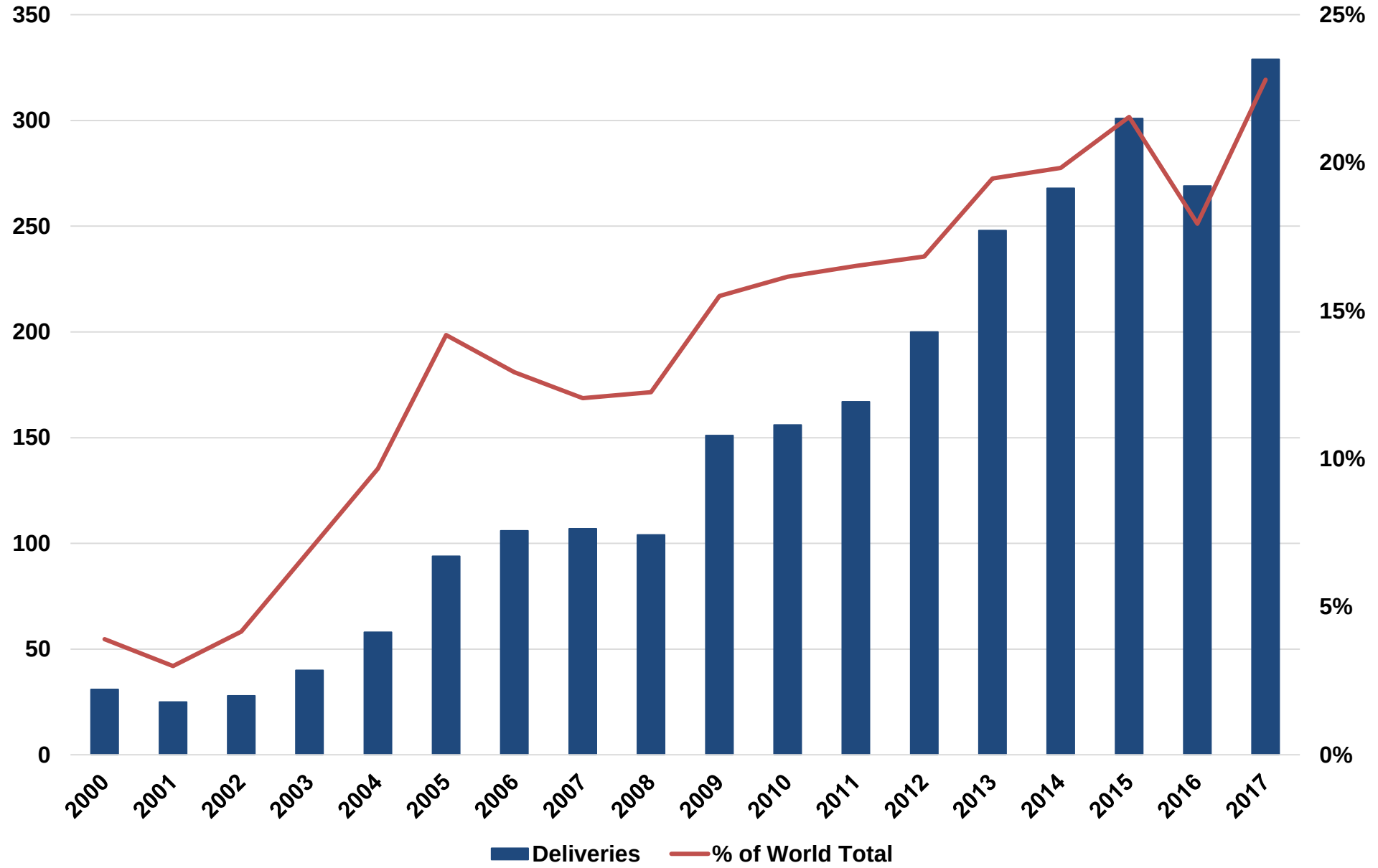
Large Jetliner Deliveries To China: Total And % Of World



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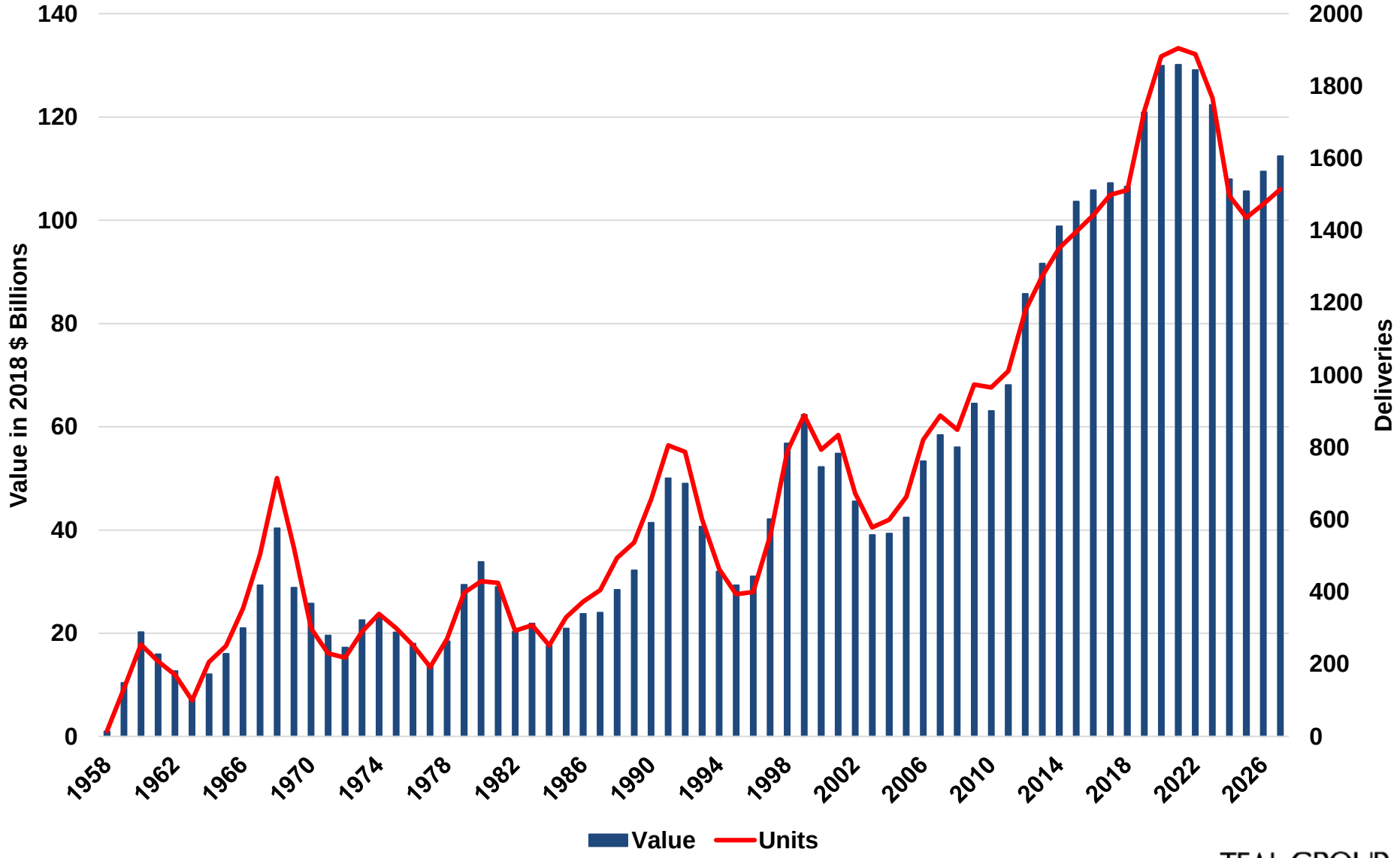
"It Was Different That Time," We Hope To One Day Say



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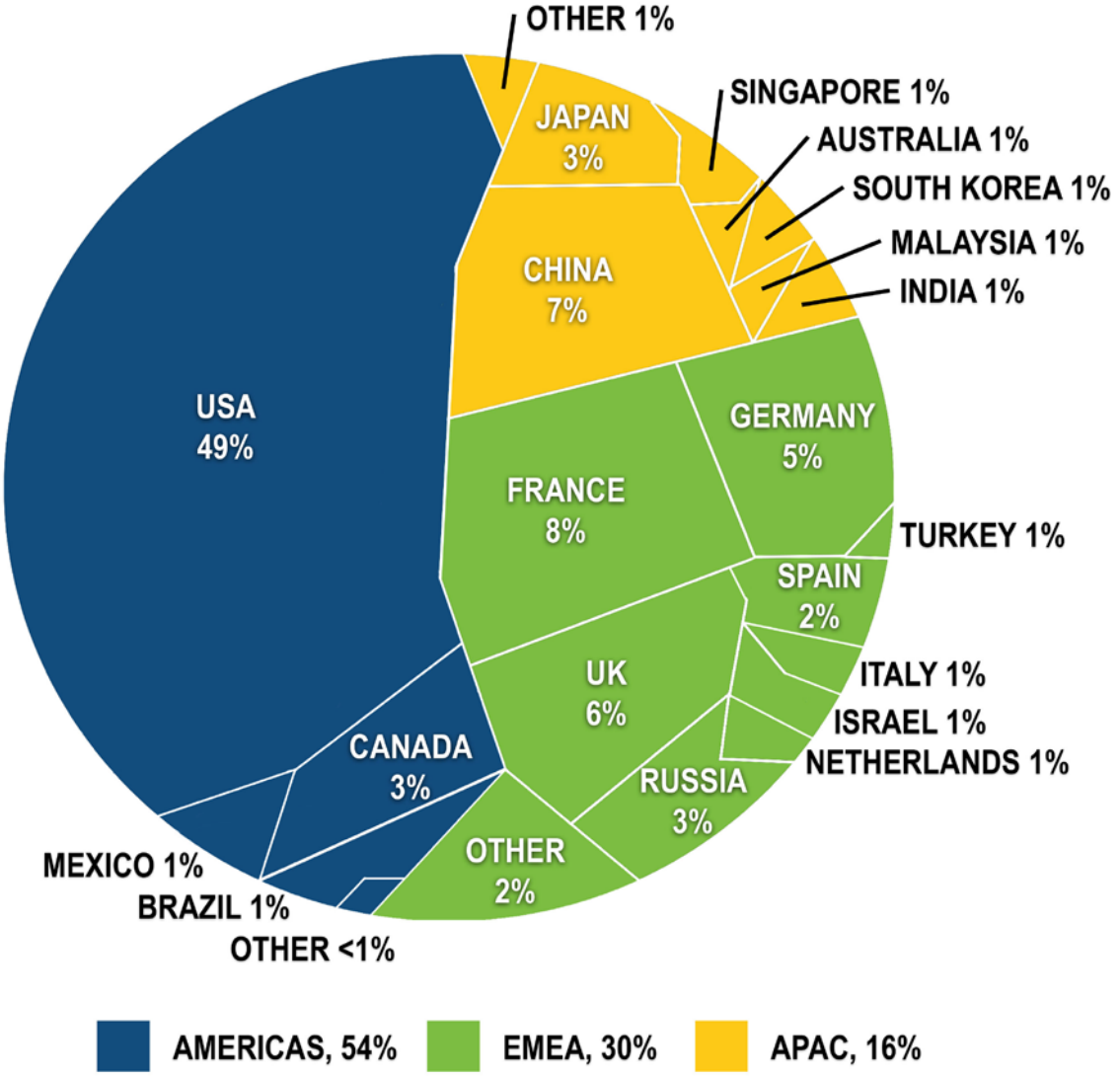
The US's Commanding Presence

GLOBAL AEROSPACE INDUSTRY WORTH $838 BILLION; US> NEXT 25 BIGGEST COUNTRIES



Source: AeroDynamic Advisory & Teal Group

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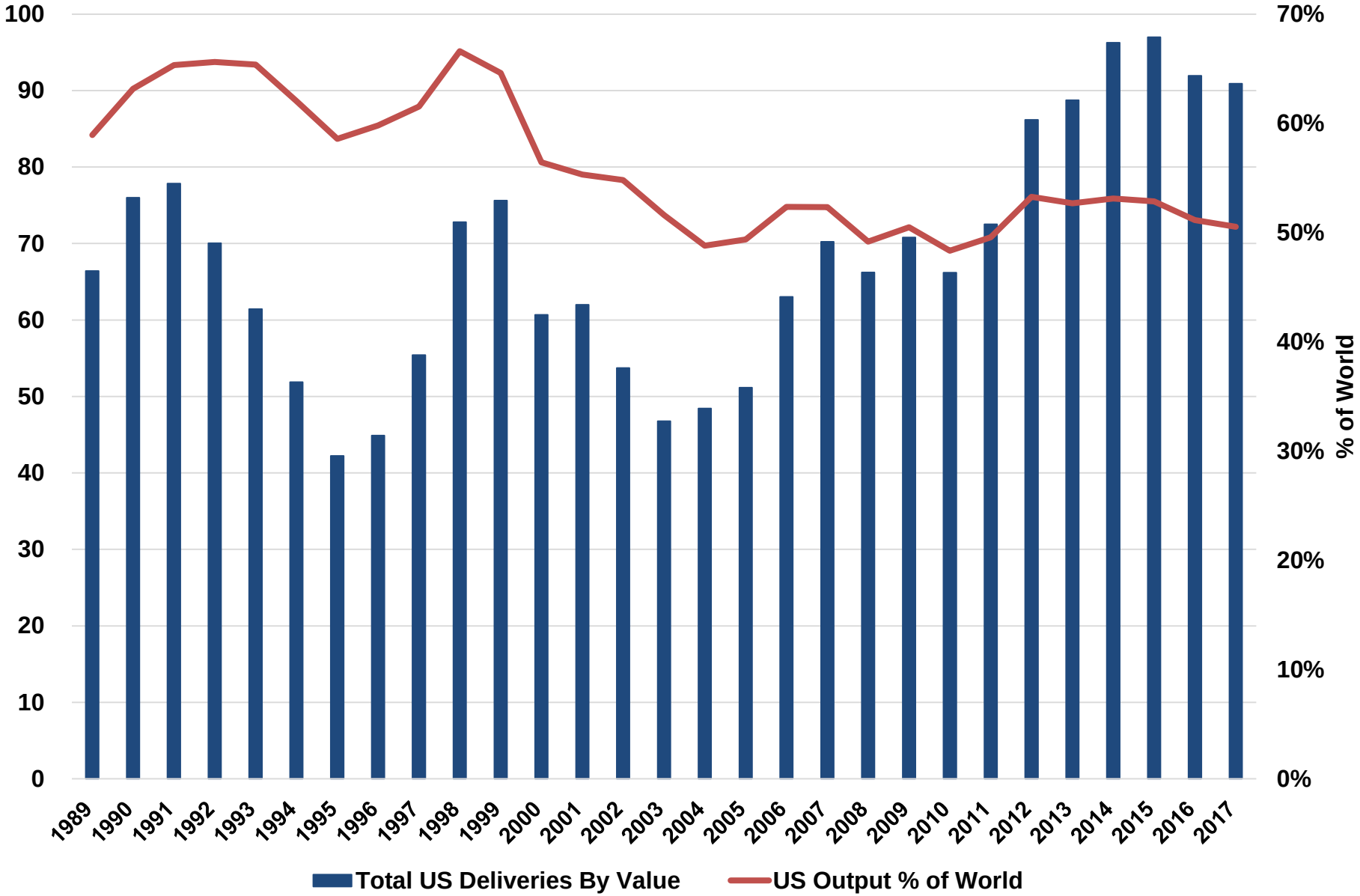
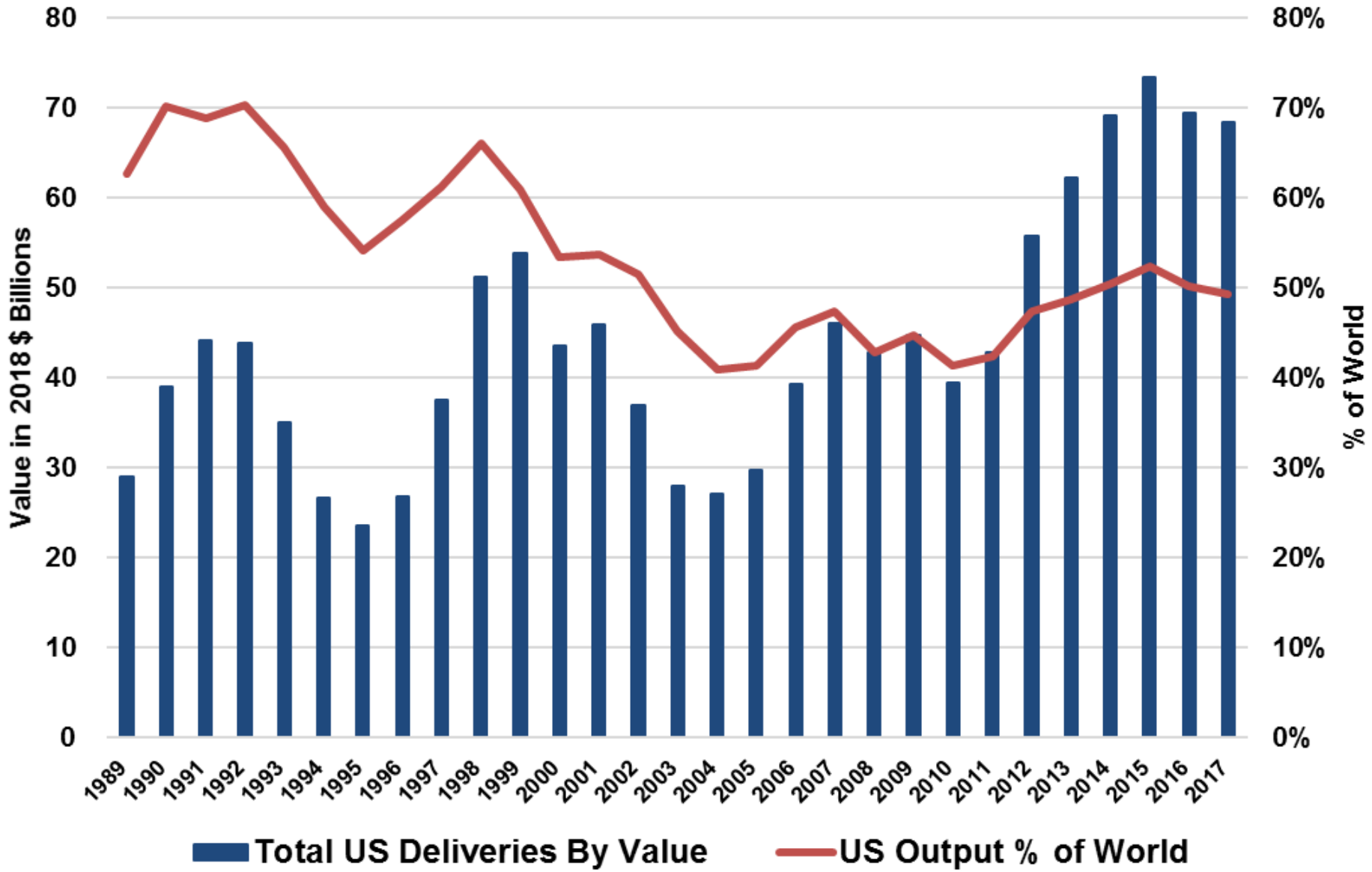
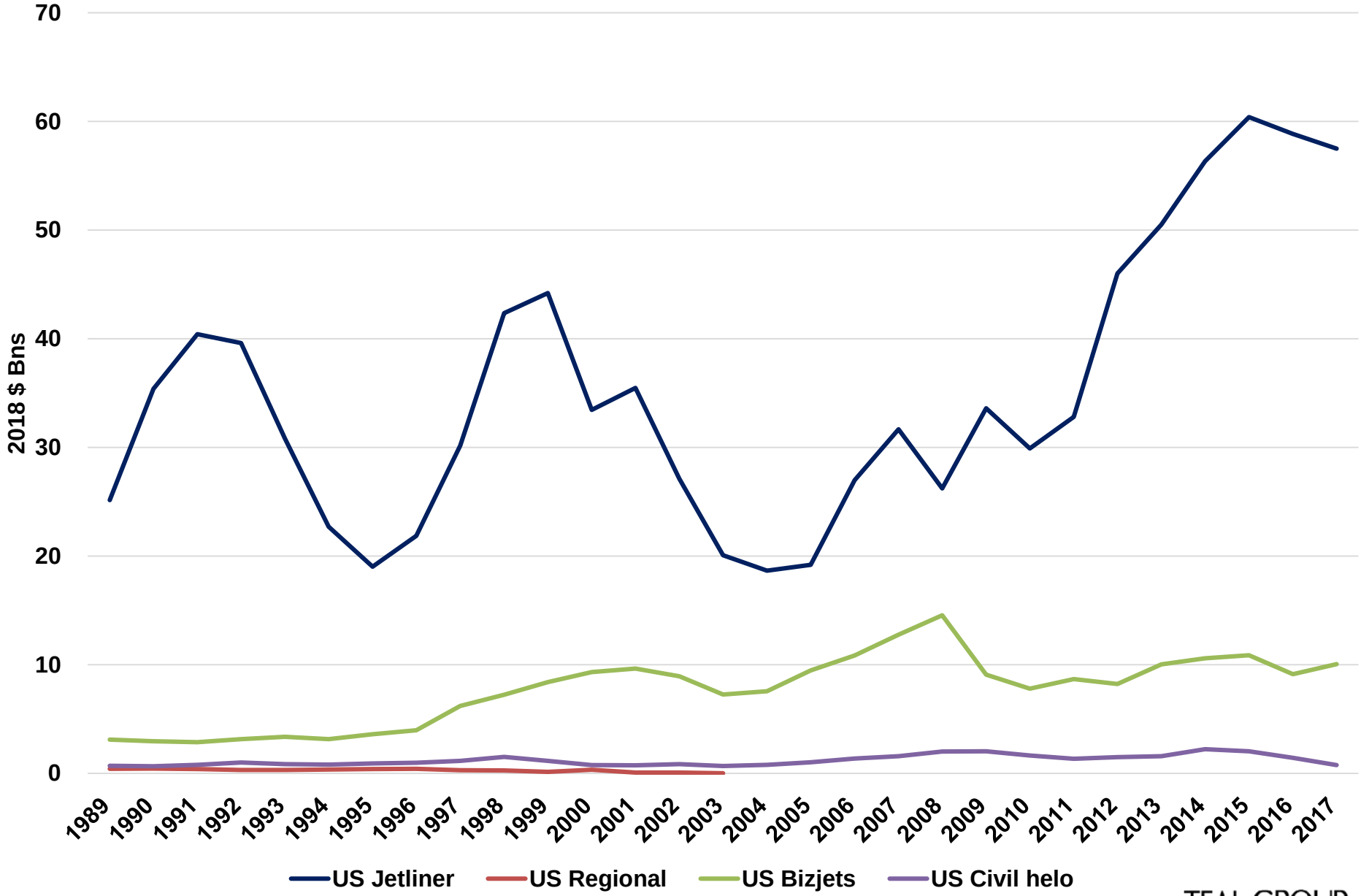
US Aircraft Industry Output



US Civil Aircraft Industry Output



US Civil Deliveries By Market



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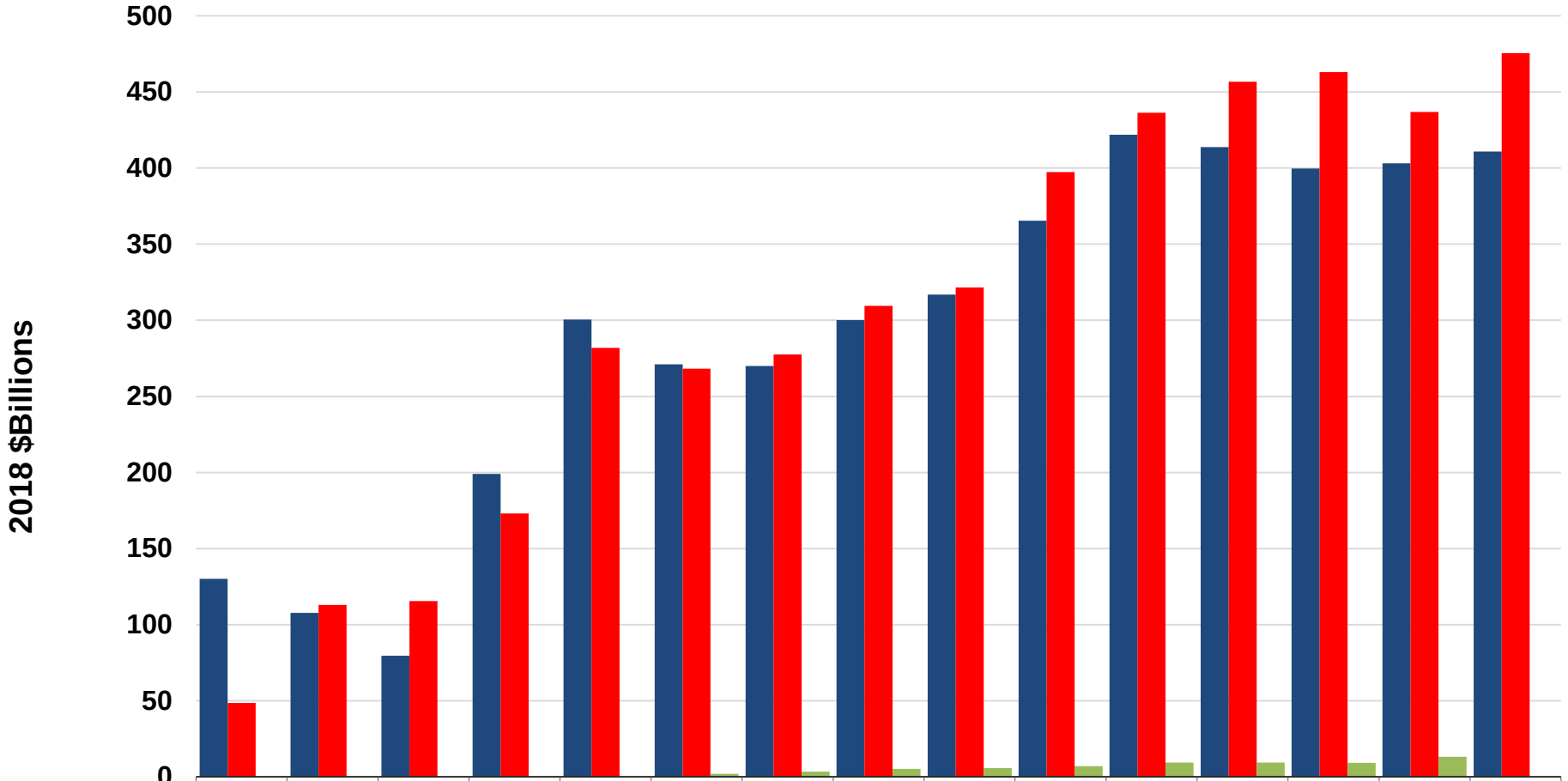
Firm Order Backlog Values



	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	Mid 2018
Boeing	130.0	107.8	79.5	199.1	300.4	271.1	270.0	300.1	316.8	365.3	421.9	413.8	399.7	403.1	410.9
Airbus	48.6	112.9	115.5	173.0	281.8	268.2	277.6	309.5	321.6	397.4	436.3	456.7	463.0	436.8	475.5
Bombardier	—	—	—	—	—	2.0	3.5	5.2	5.8	7.1	9.5	9.5	9.2	13.1	—

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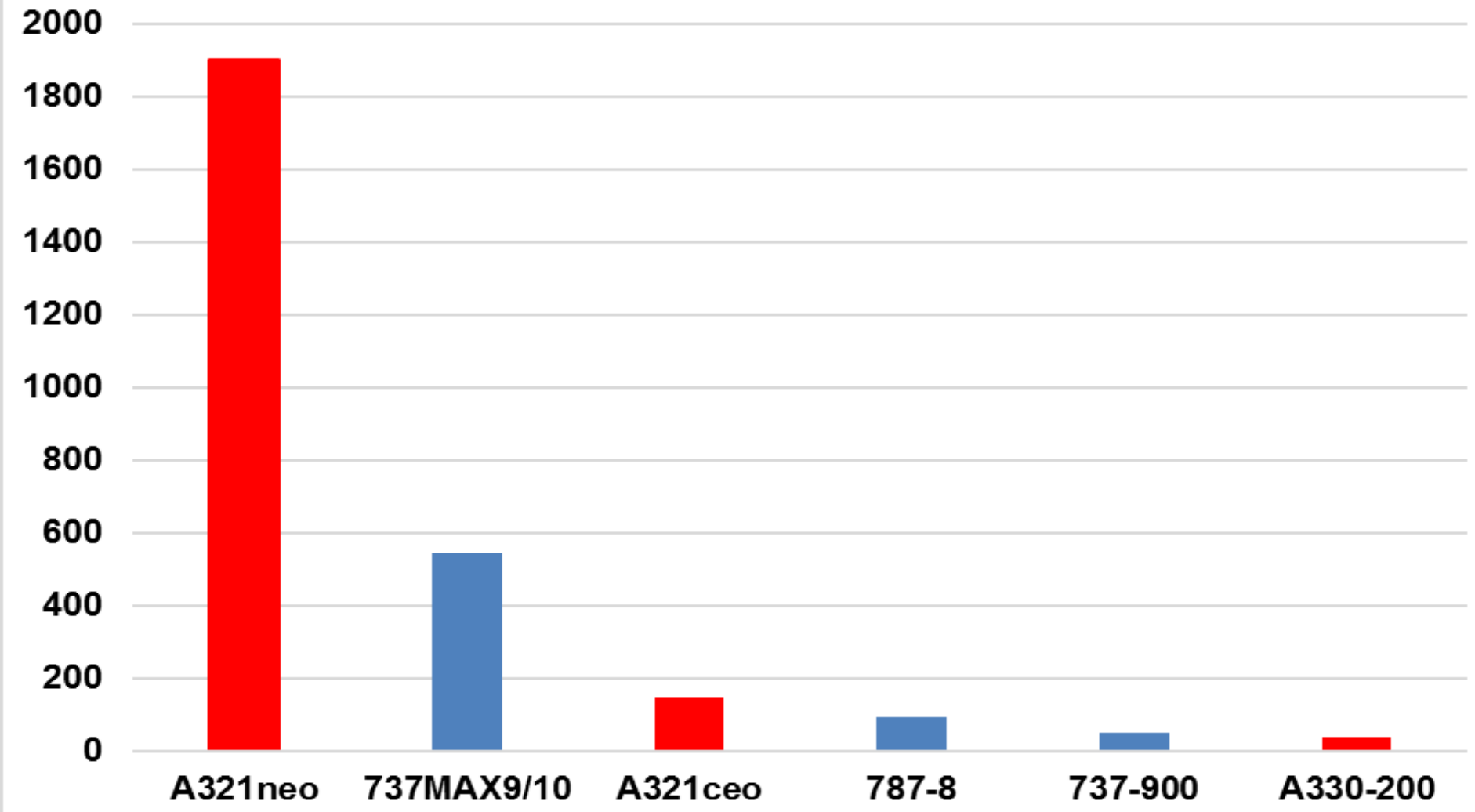
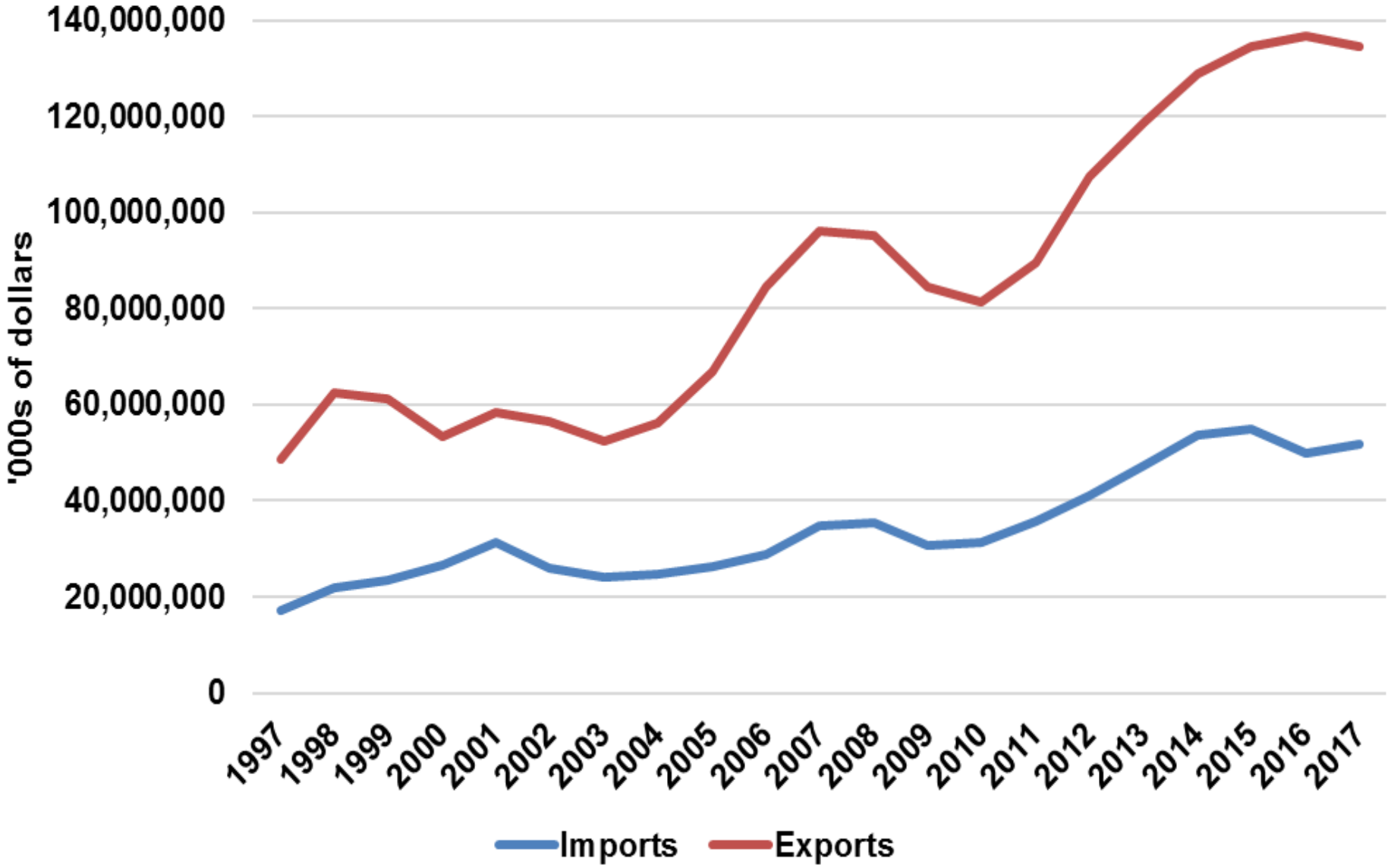
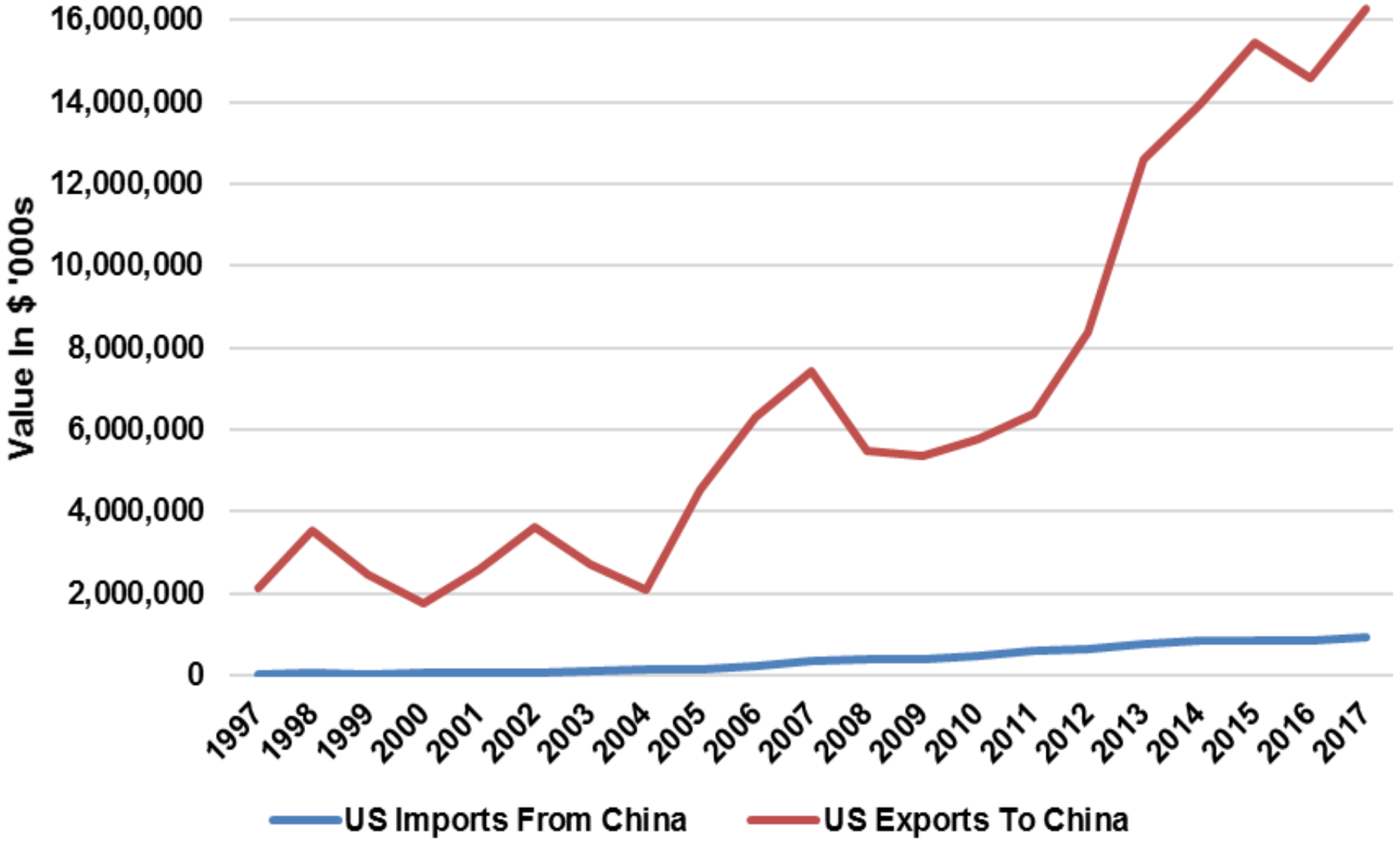
Mid-Market Backlogs: Airbus's Strong Position



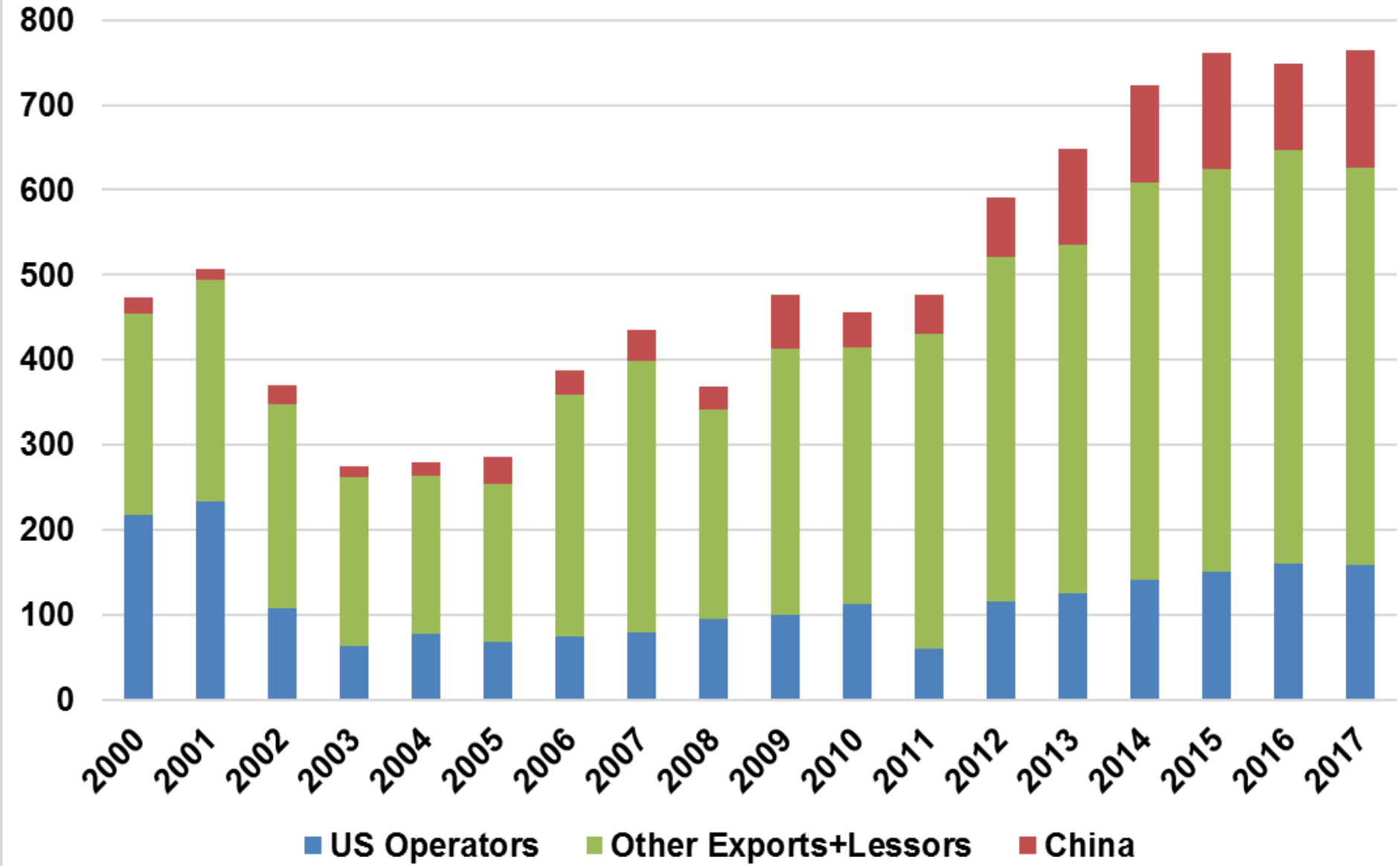
US Aerospace Trade: A Consistent Surplus



China-US Aerospace Trade



Boeing Deliveries (By Unit) 2000-2017



A Brief History of Failure, And What Could Bring It

Illustrated Thoughts On Failure

- **Tactical Failure:**
  - Magical Thinking.




  - Failure to Think Globally with new products.


- **Strategic Failure:**
  - Government ownership.
  - Failure to reach across borders.

  - Autarky, government ownership, national vertical integration.



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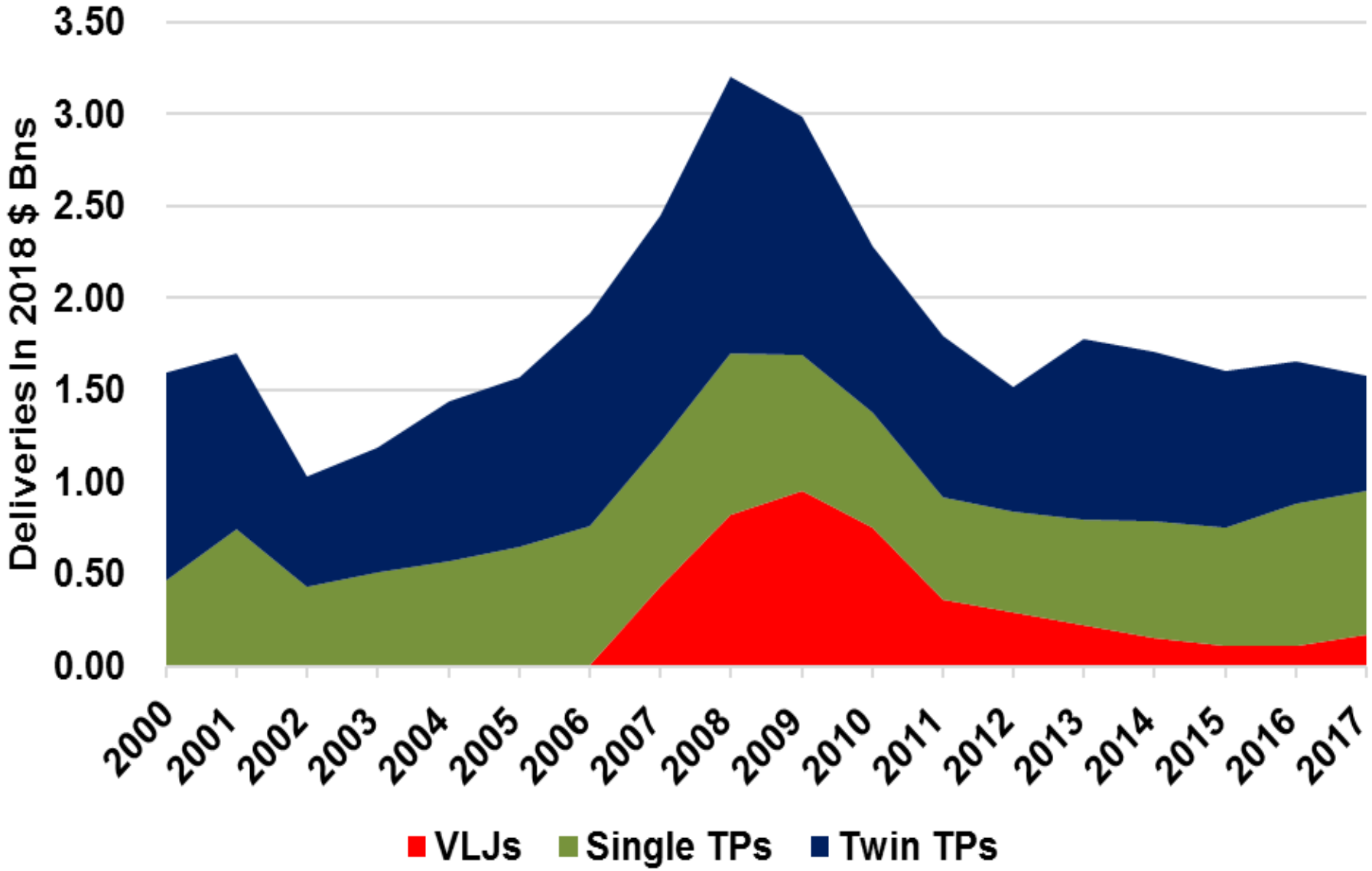
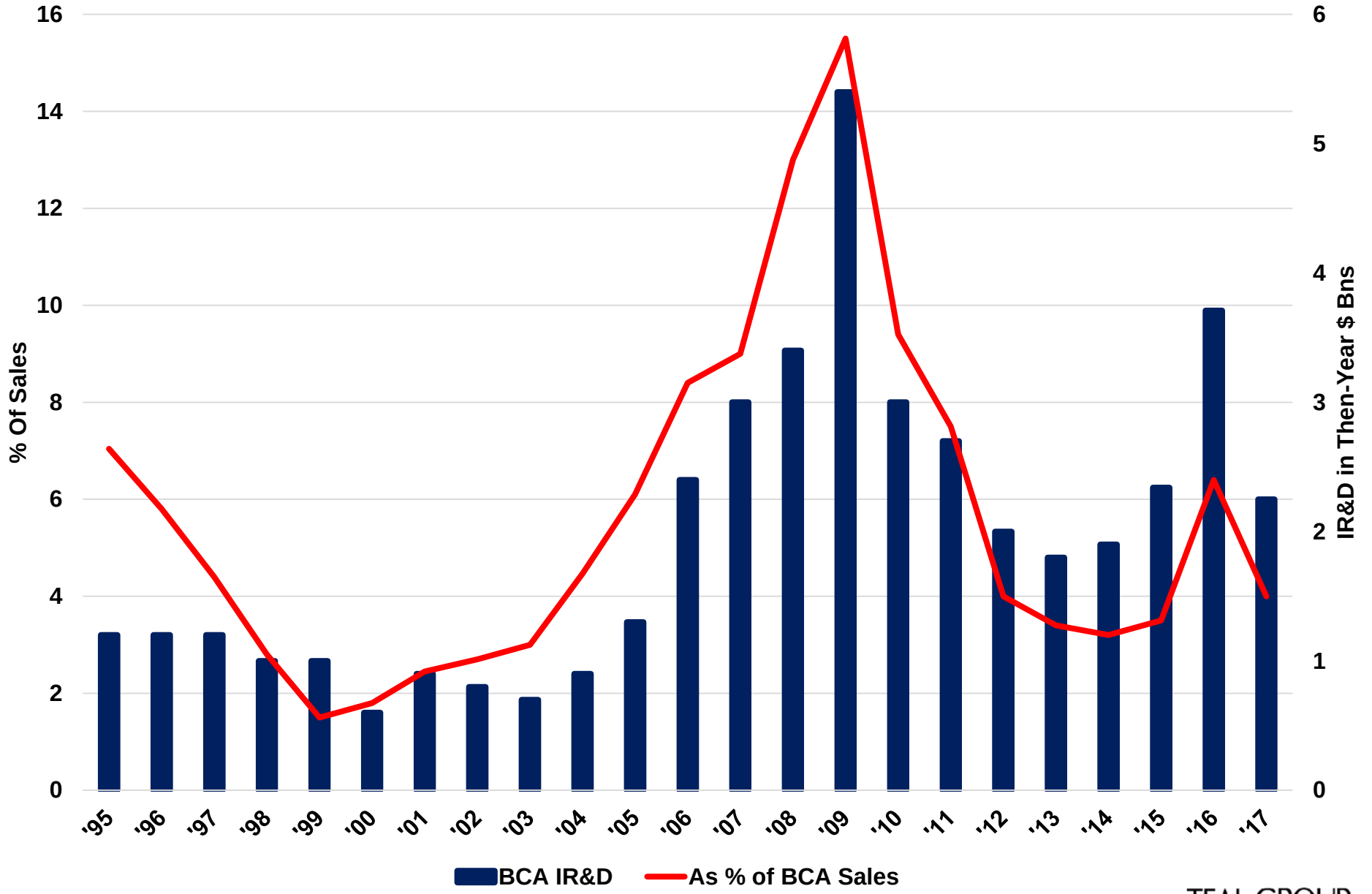
The Brief, Terrifying Reign Of The VLJ/Air Taxi



Boeing Commercial IR&D: More With Market Growth



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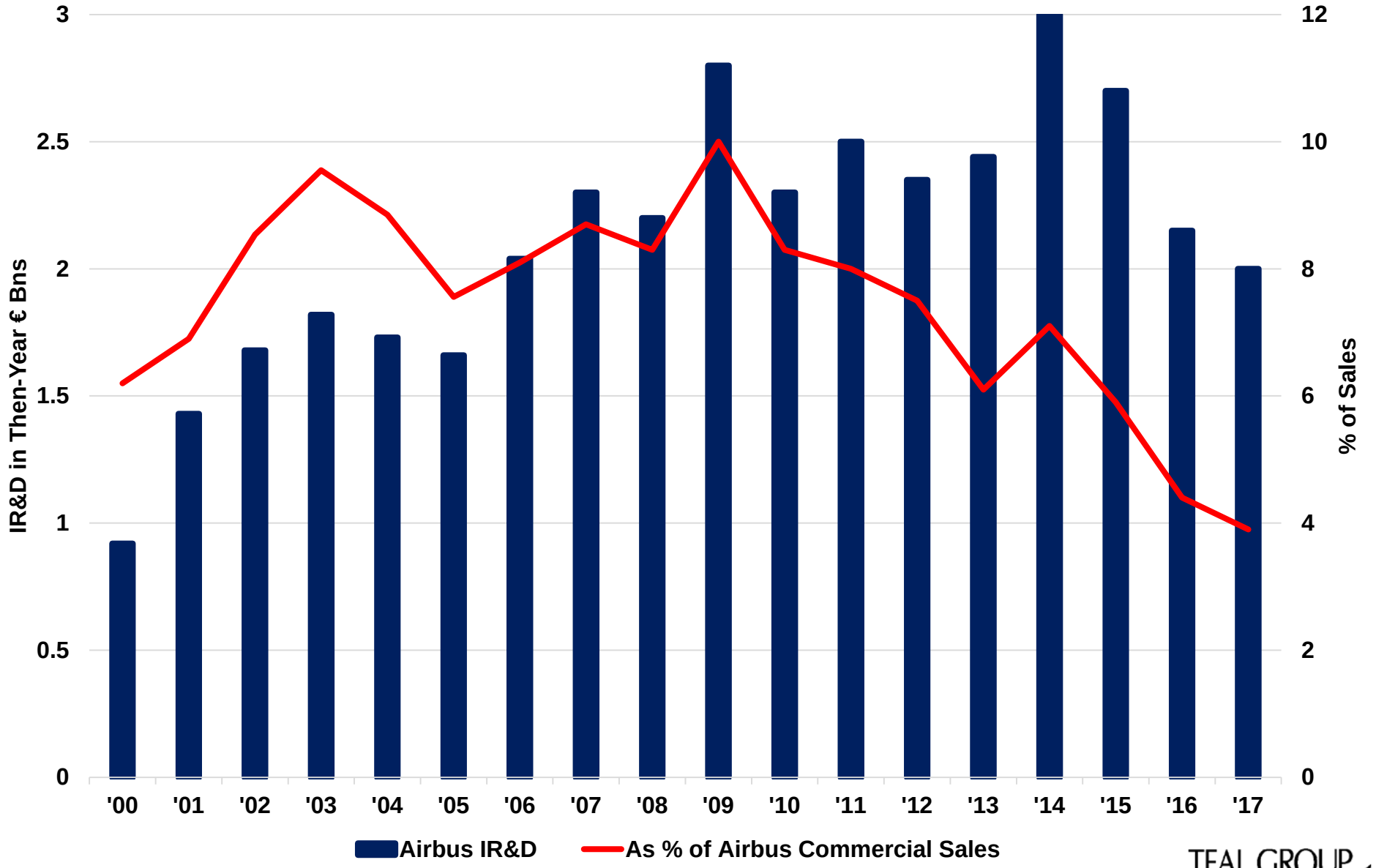
Airbus Commercial IR&D: More Spend, Less Discipline…Until Now



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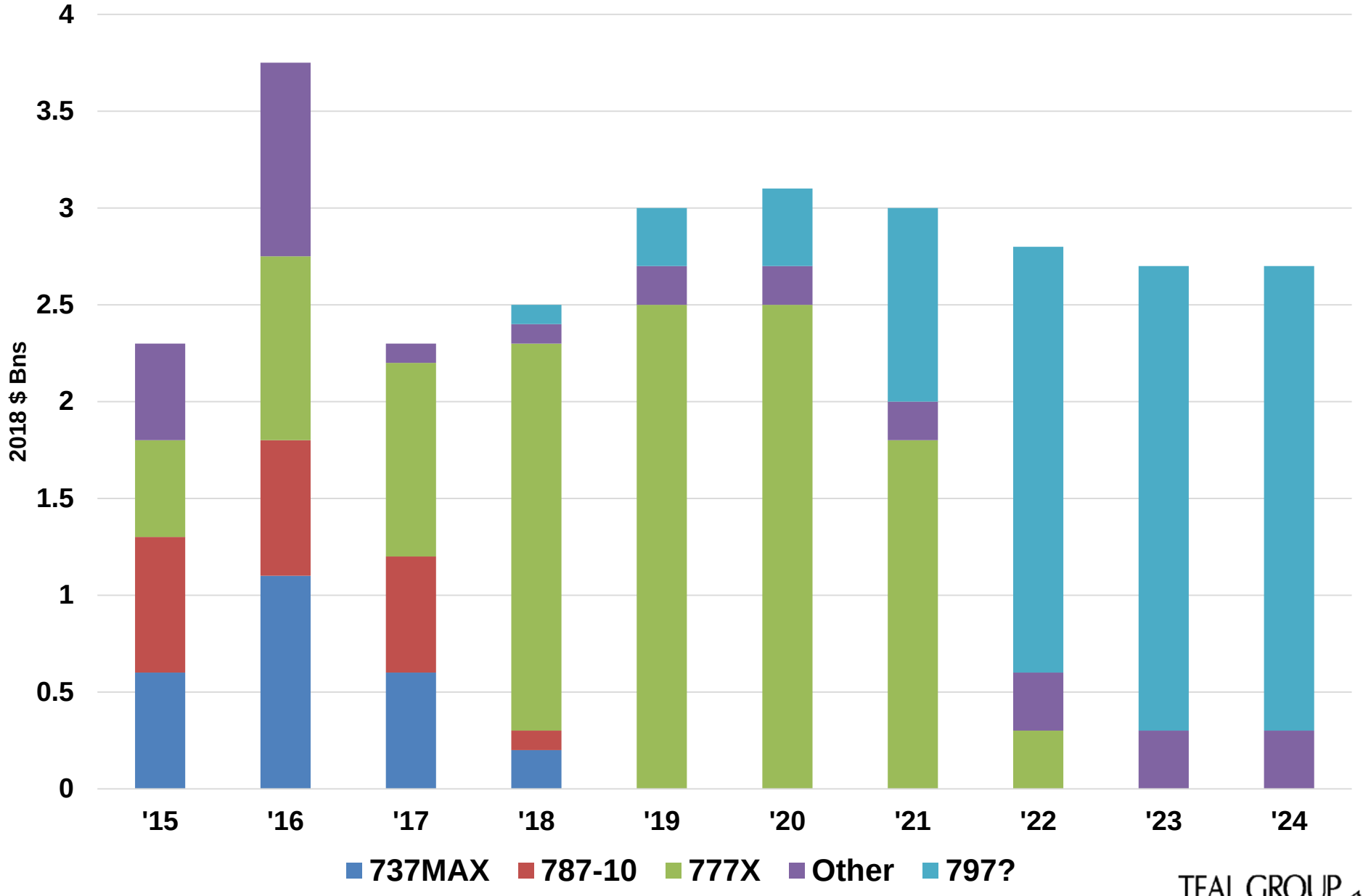
Boeing IR&D Spend: Forecast Breakdown



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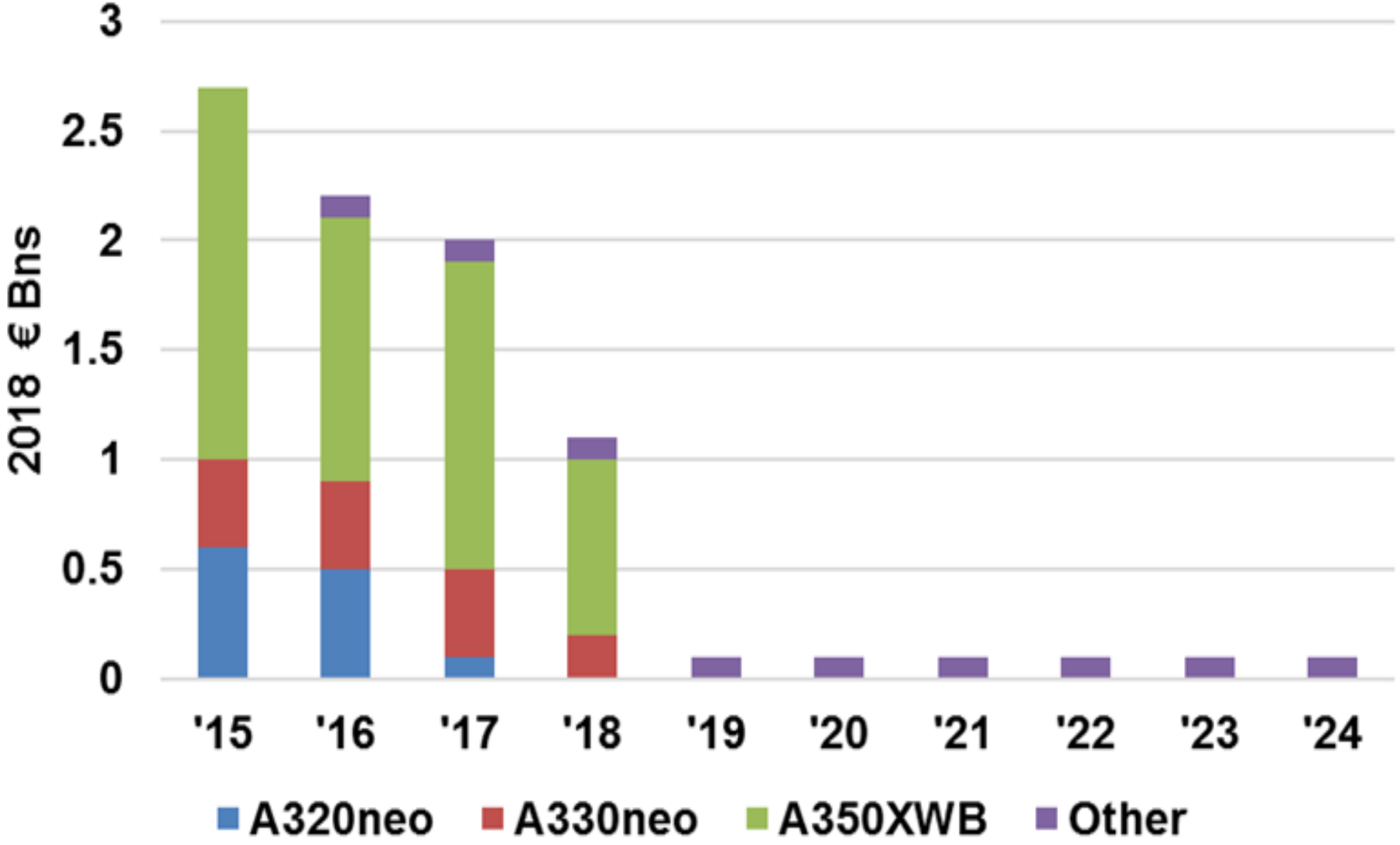
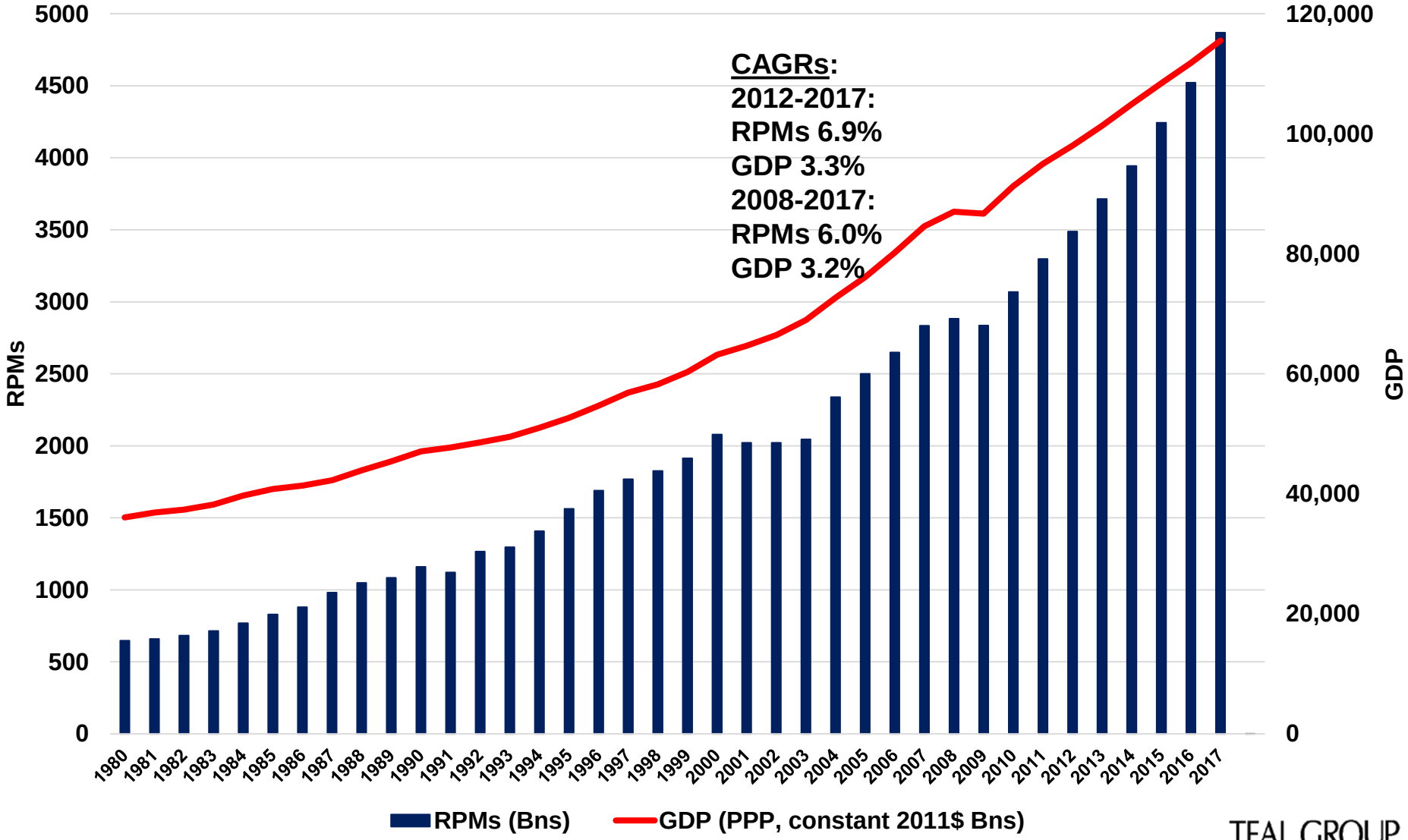
Airbus IR&D Spend Breakdown



Things To Worry About

Global Economic Growth Outpaced By Travel Demand

Will Anything Change This…Like Millennials? Or The Environment?



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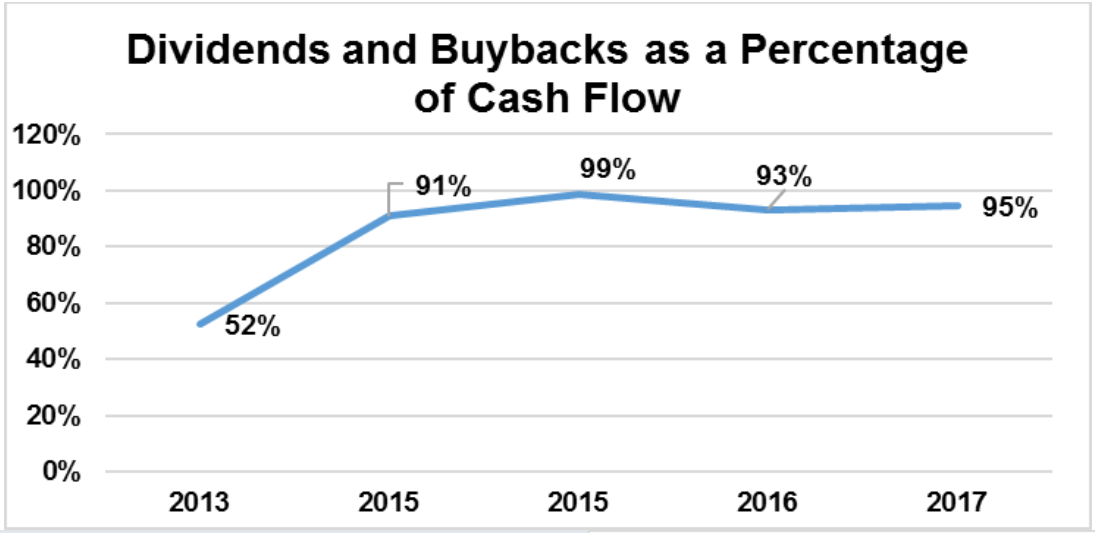
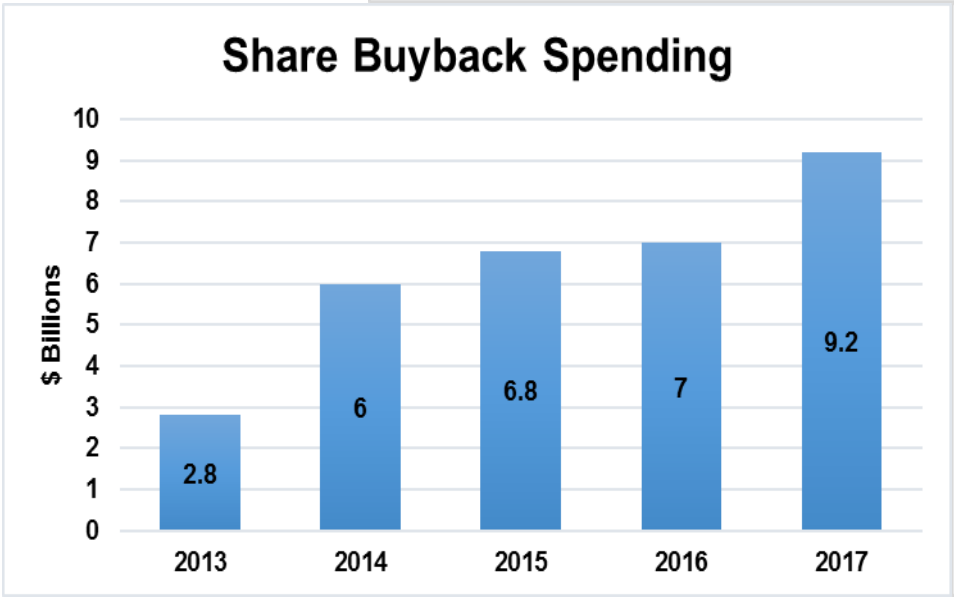
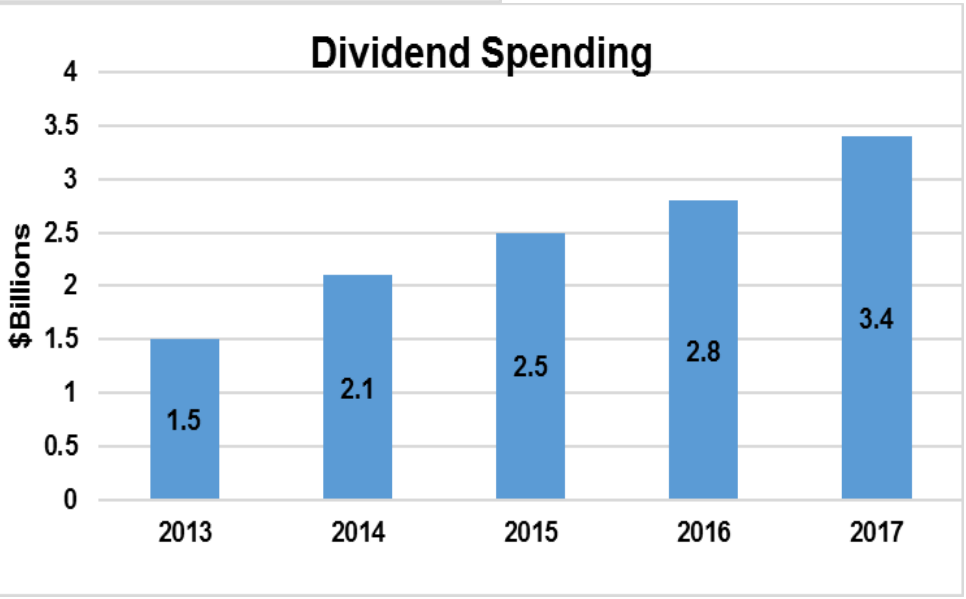
This May (Or May Not) Be An Issue

Boeing Emphasizing Returns (And Cash Flow)







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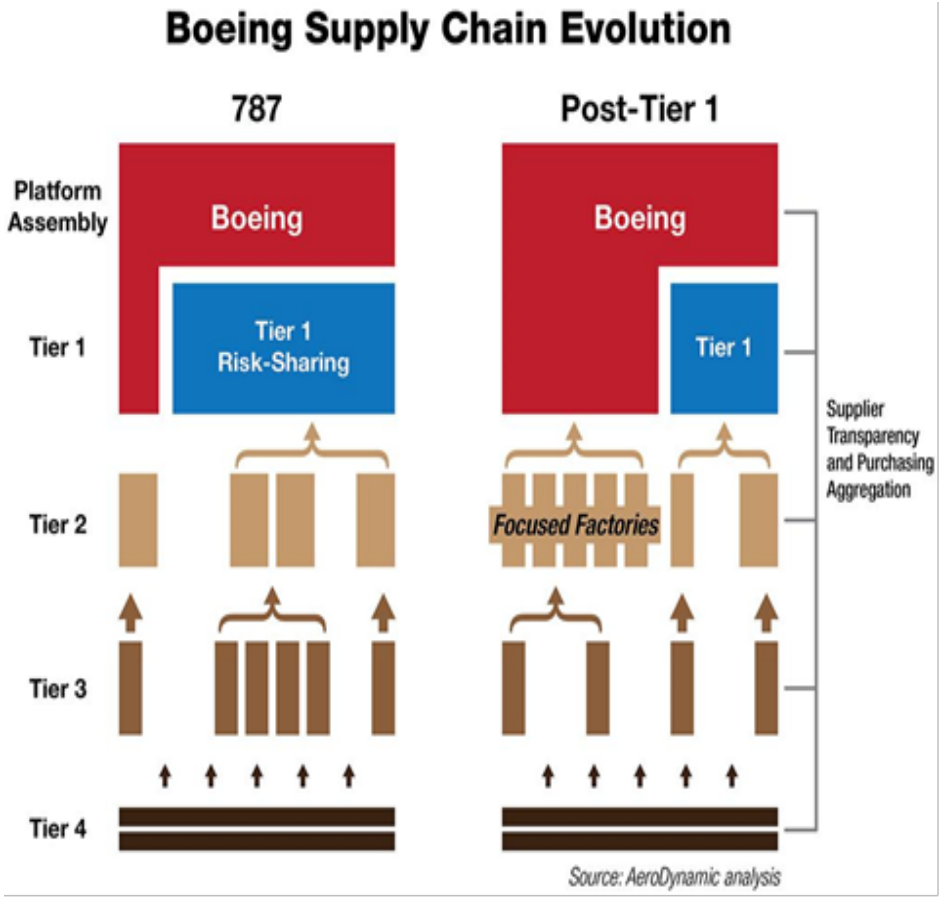
Another Possible Issue: Boeing, And The Supply Chain

- Vertical integration reduces risk, retains secrets, and helps grow revenue/profits, but in a downturn they mean risk and overhead.
- New business initiatives (APUs, avionics, actuators, propulsion buildup, etc.) sounds great, but these turn into expensive cost centers in a downturn.
- All of the above can tie engineers' hands, keeping them from buying best-in-class equipment.
- PFS may have a serious impact on suppliers' ability to raise cash for new technology and capacity.



Potentially Disruptive Ideas/Opportunities For The Future

And What Could Promote Or Quash Them

Ideas

- **Likely (next 25 years):**
  - Biofuels
  - Electric systems power
  - Hybrid power
- **Possible:**
  - Radical new shapes
  - SSBJ
  - Ultra-High Bypass engines
- **Conceivable, at best:**
  - Airliner SST
  - Hydrogen fuel cells
- **Probably Not:**
  - Solar
  - Commercial scramjets
  - Electric/battery power for primary propulsion
  - Mass adaptation of UAM

Variables

- Fuel prices
- Air Travel Demand
- Technology Maturation
- Public funding initiatives
- Environmental issues
- Consumer acceptance
- Investor sentiment (and occasional irrationality)

What Could Possibly Go Horribly Wrong?

- **Starving the supply chain turns out to have unintended consequences.**
  - **Already there.**
- **Further production snafus.**
  - **Sure.**
- **Trade wars, tariffs, retaliatory tariffs, Brexit, general chaos, and the new in-vogue US Sinophobia, or China's self-imposed isolation/Russia alliance.**
  - **Be afraid.**
- **General economic downturn.**
  - **Always possible, but traffic seems to have a mind of its own.**
- **Interest rates.**
  - **Medium risk, but long term trend looks good.**
- **Oil.**
  - **No longer as big a problem as it once was.**