

A Market Analyst Intrudes

Industry Conditions, and Thoughts

About The Future Of Flight

Presentation to National Academies Aero 2050

Washington, DC

Richard Aboulafia

Vice President, Analysis

Teal Group Corporation

www.tealgroup.com

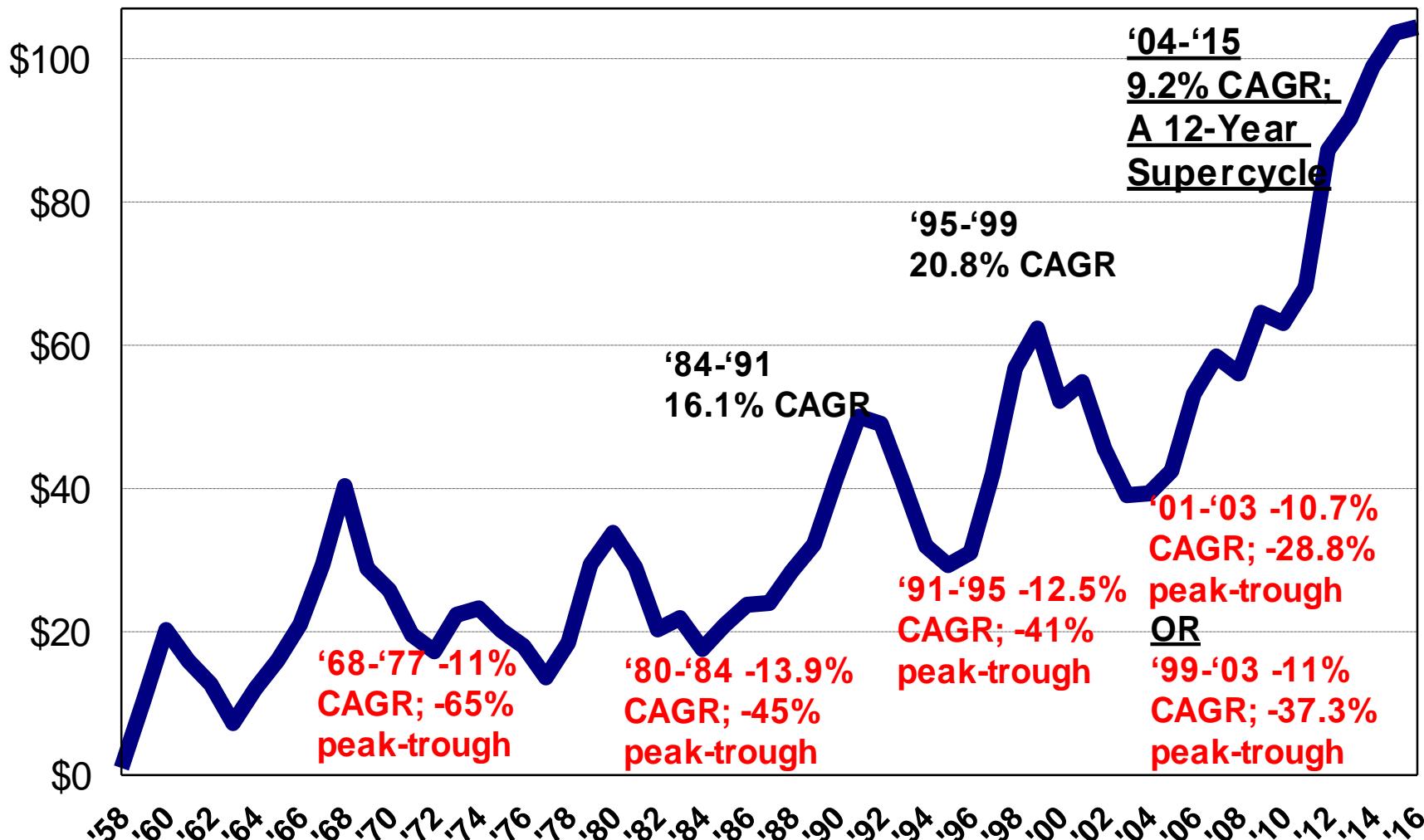
October 2017

1. Market Drivers And Conditions

Our Forgotten Nemesis...Cyclical

Large Jetliner Deliveries By Value

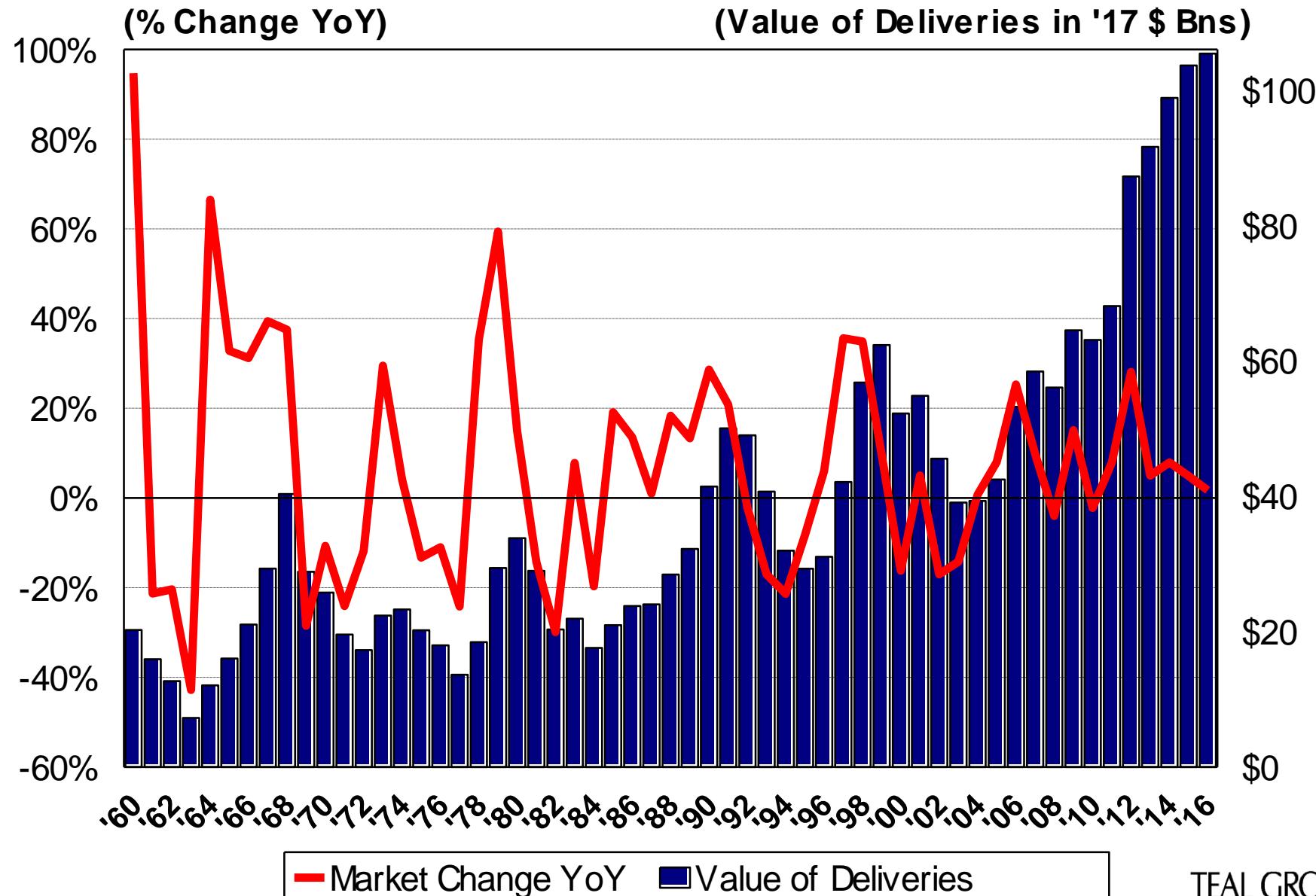
(Value in '17 \$Bns)



.58.60.62.64.66.68.70.72.74.76.78.80.82.84.86.88.90.92.94.96.98.00.02.04.06.08.10.12.14.16



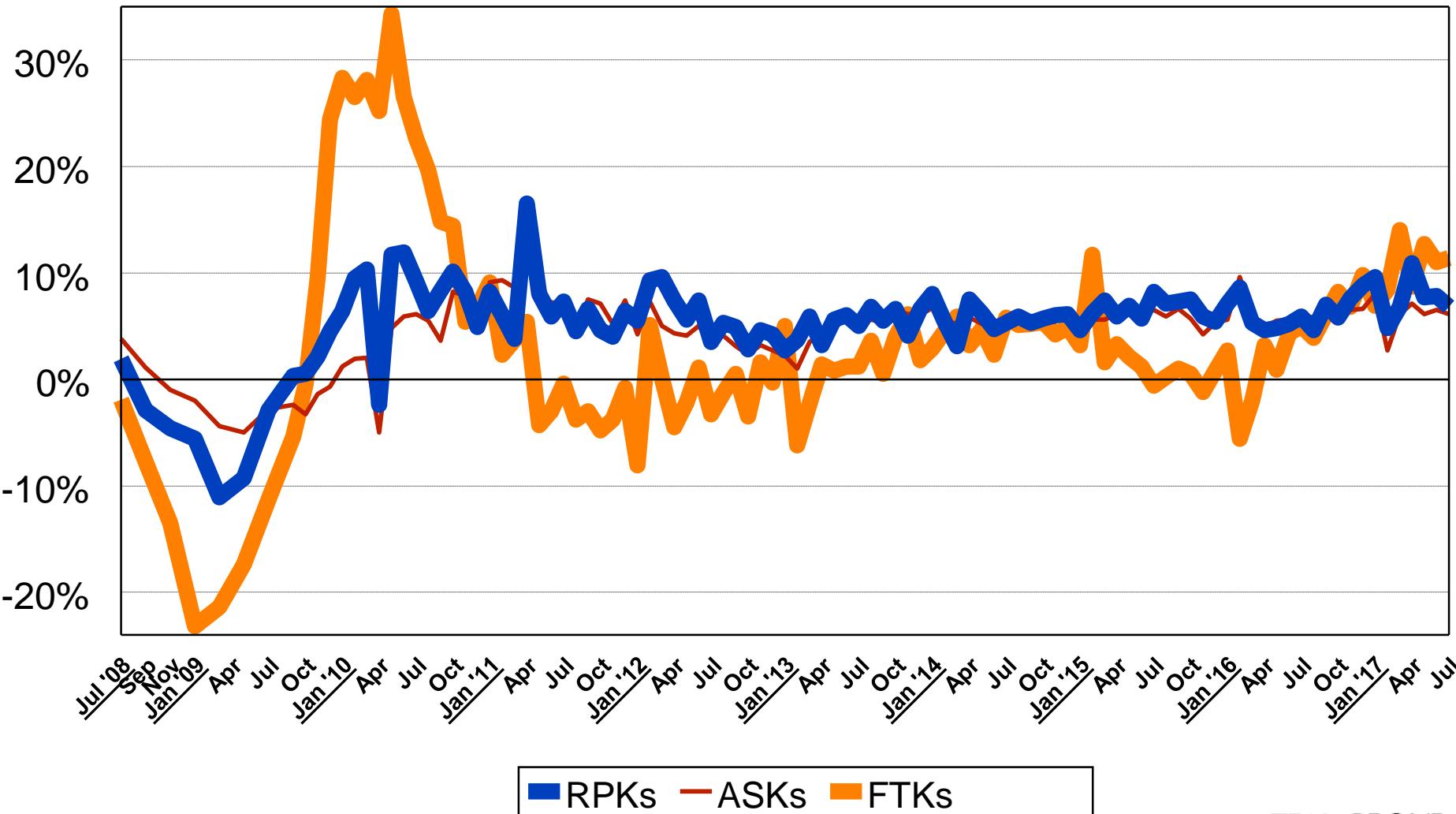
Jetliner Market Performance 1960-2016



Y/Y Traffic: Well Above Trend

2017 1H Totals: RPKs 7.9% (12-year high), FTKs 10.4% (3x 5-year average)

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

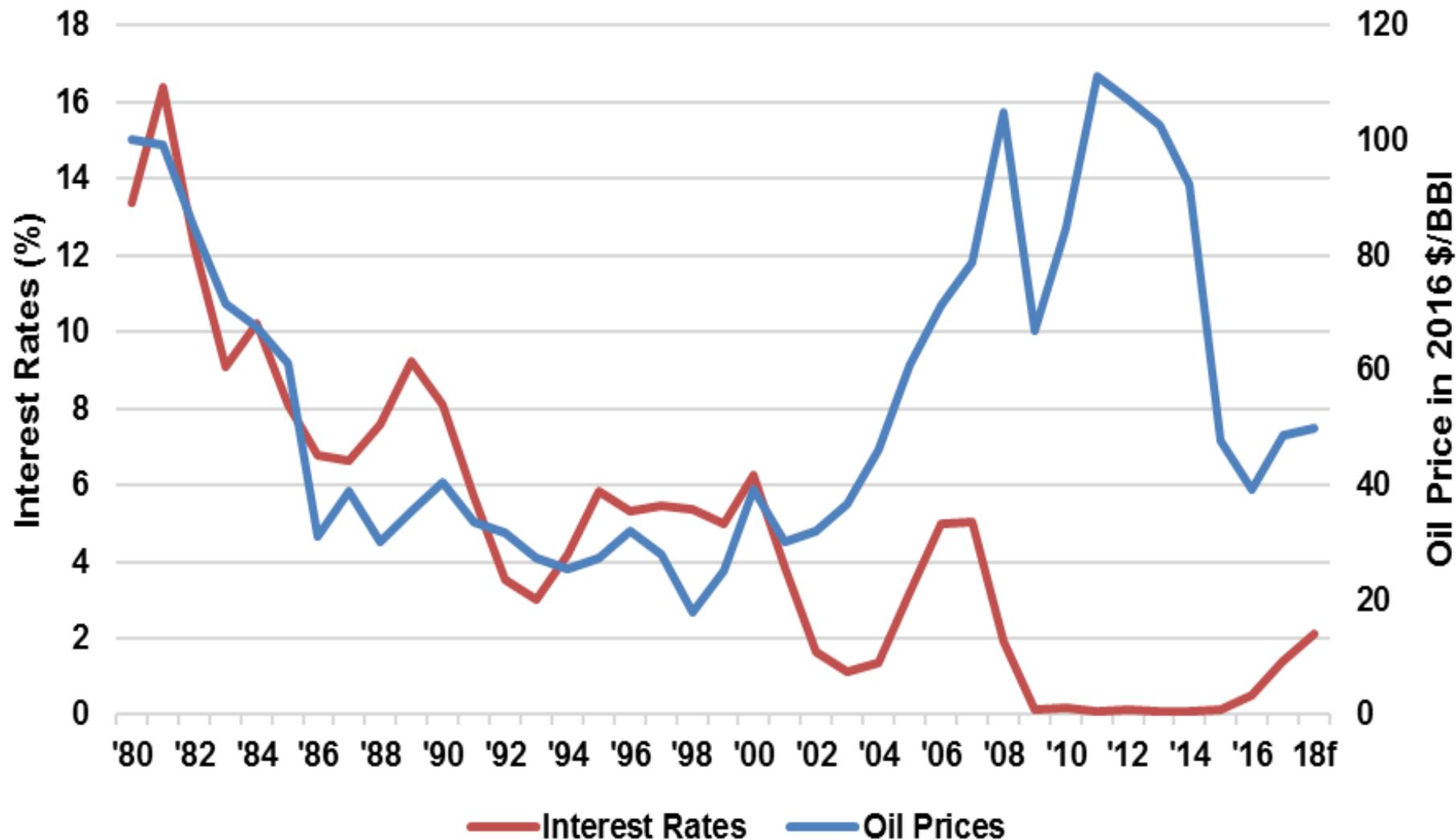


Source: IATA

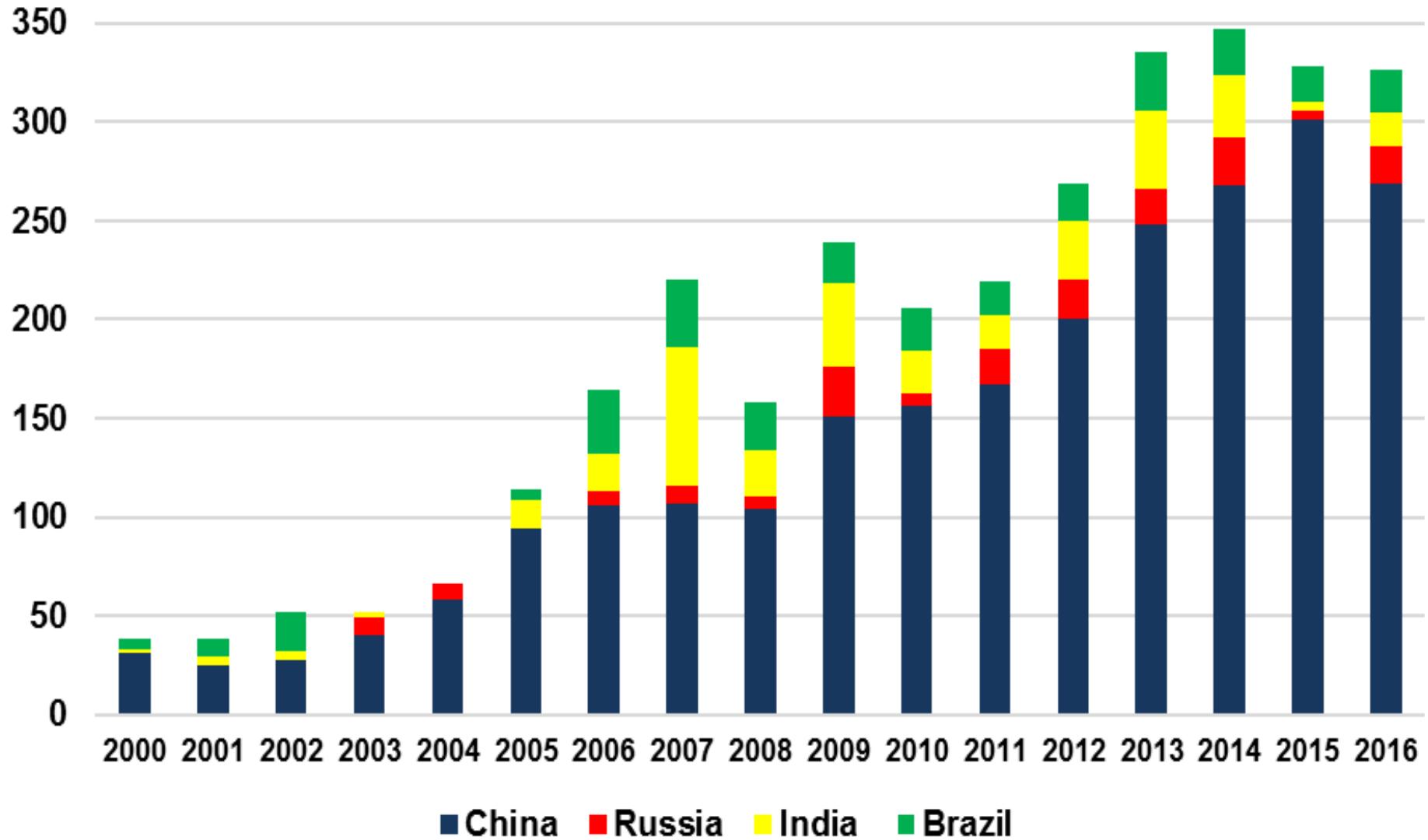
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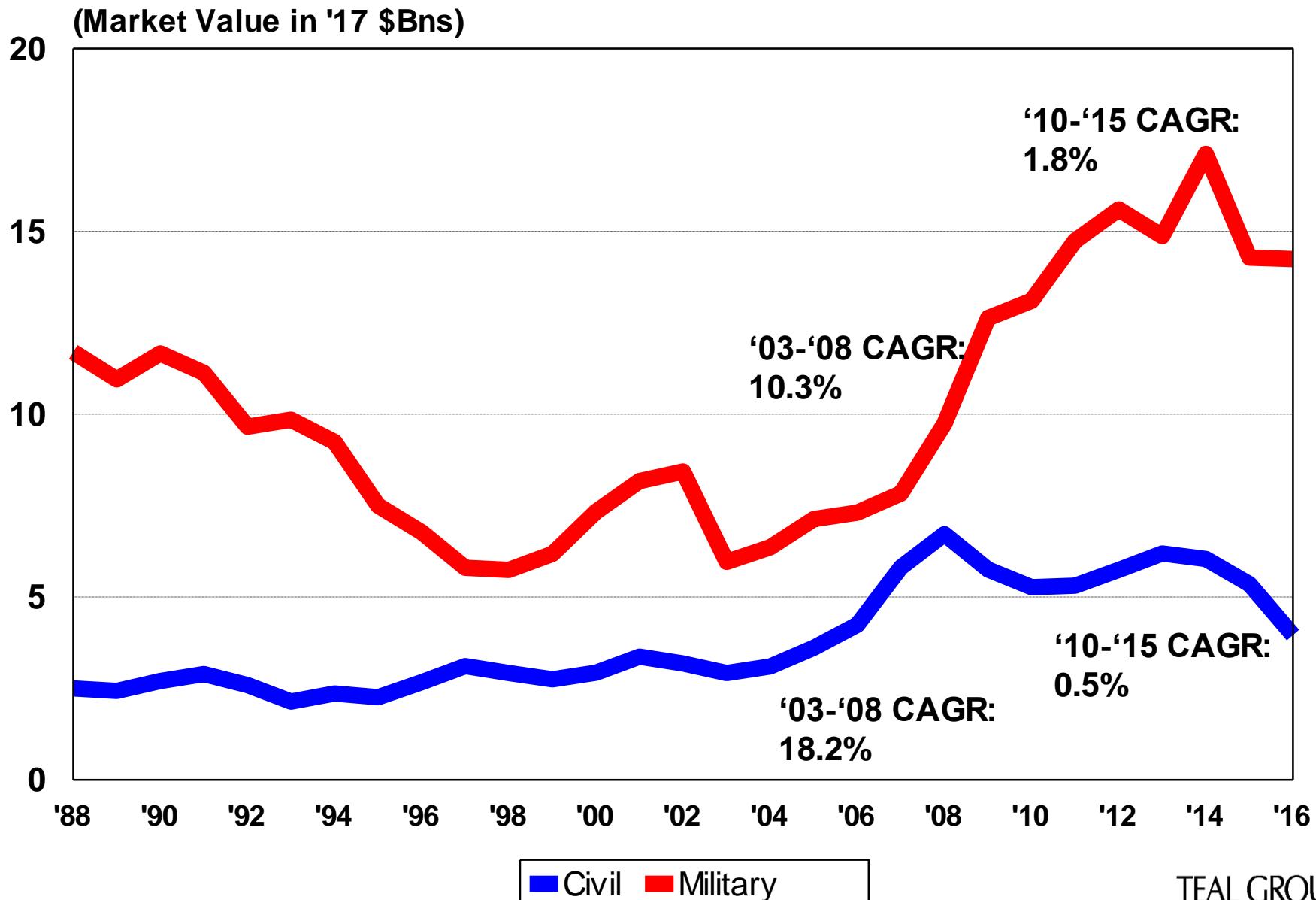
Oil Prices And Interest Rates: The End Of A Strange Moment



BRIC Deliveries: Peaked



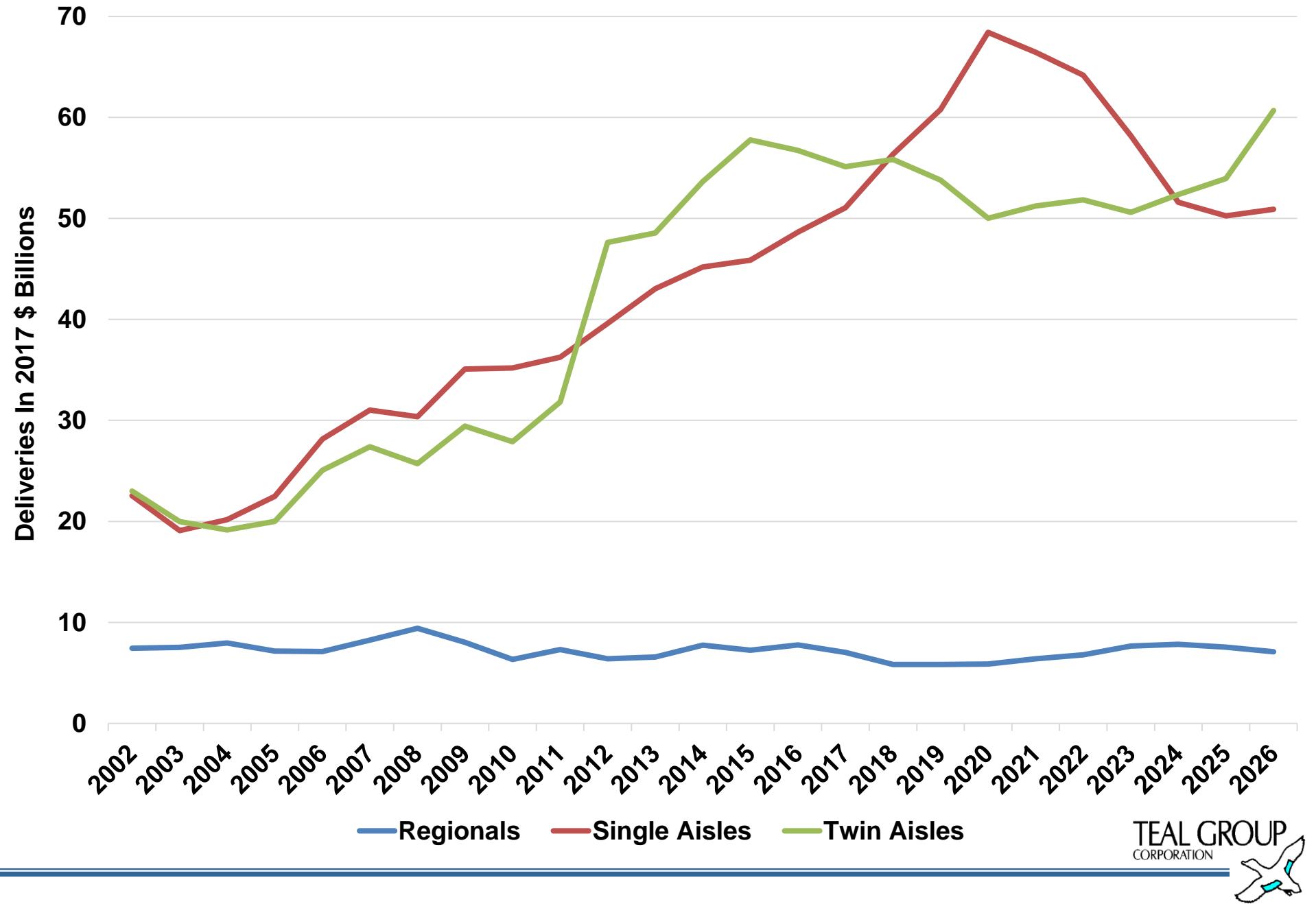
Civil/Military Rotorcraft Deliveries By Value



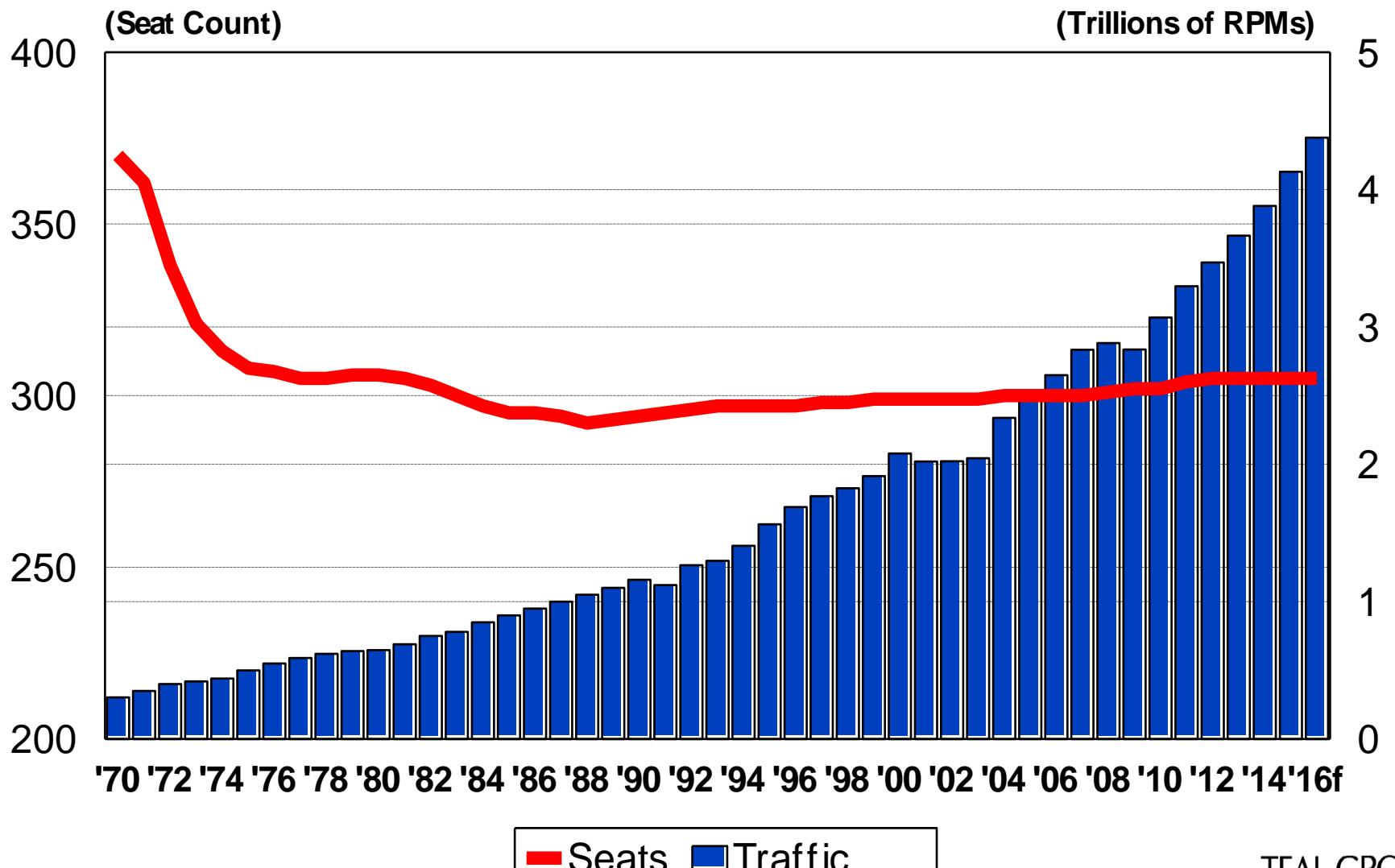
2. Market Characteristics



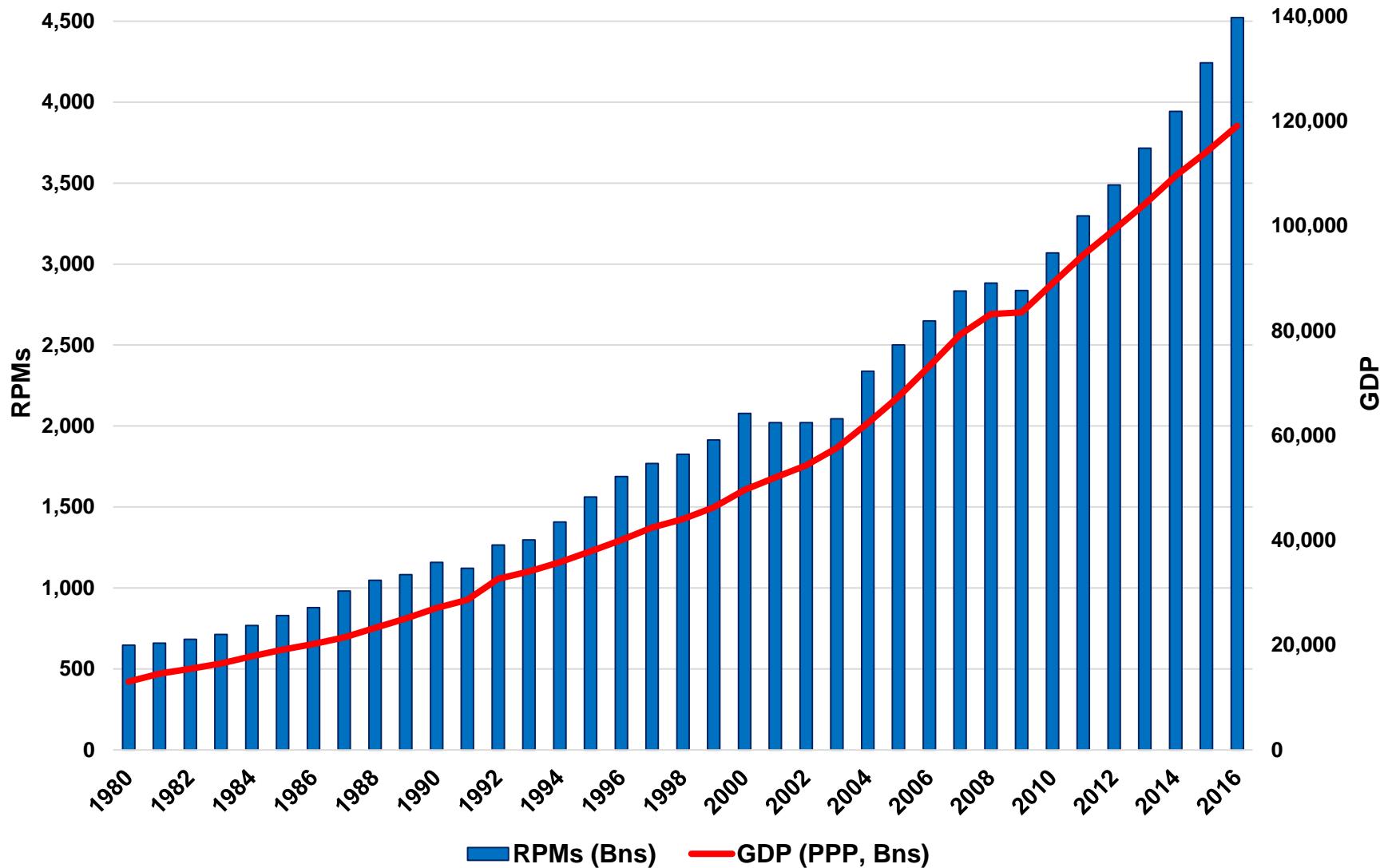
The Air Transport Market By Class



Twin Aisle Average Seat Count (Fleetwide) V. World Airline Traffic

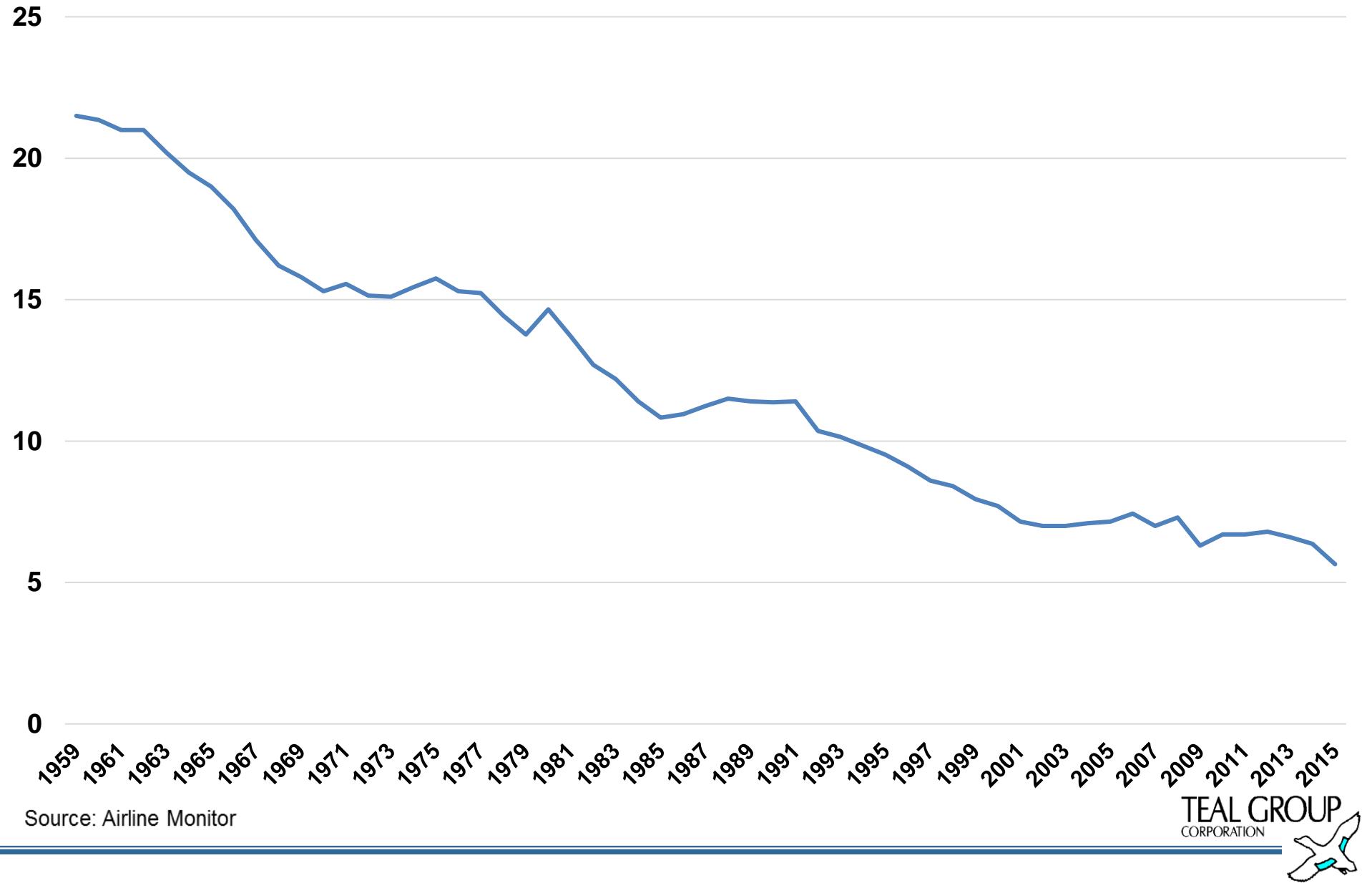


Global Economy Outpaced By Travel Demand Growth

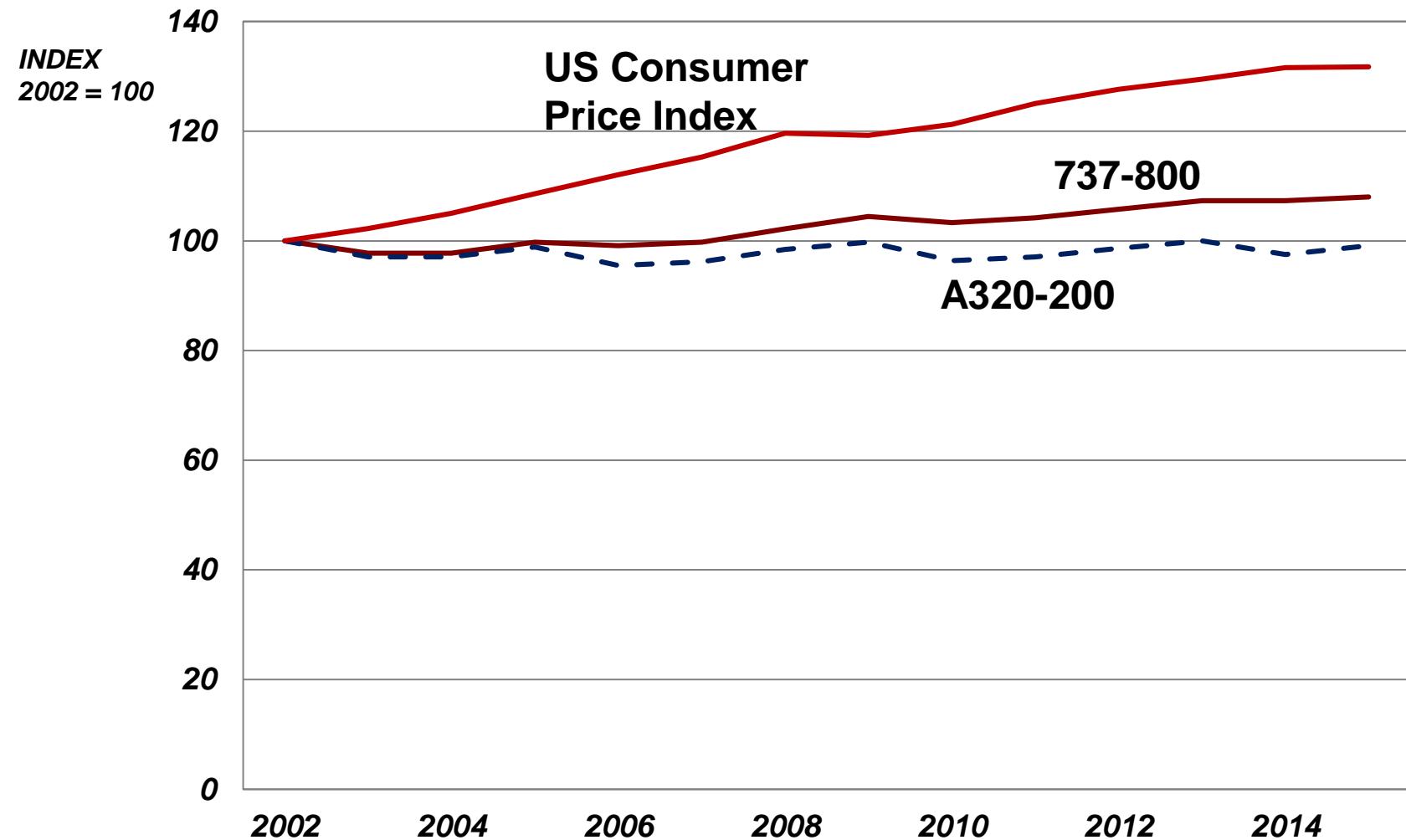


Getting Bigger By Getting Cheaper

Yield per RPM (cents) in 1983 \$

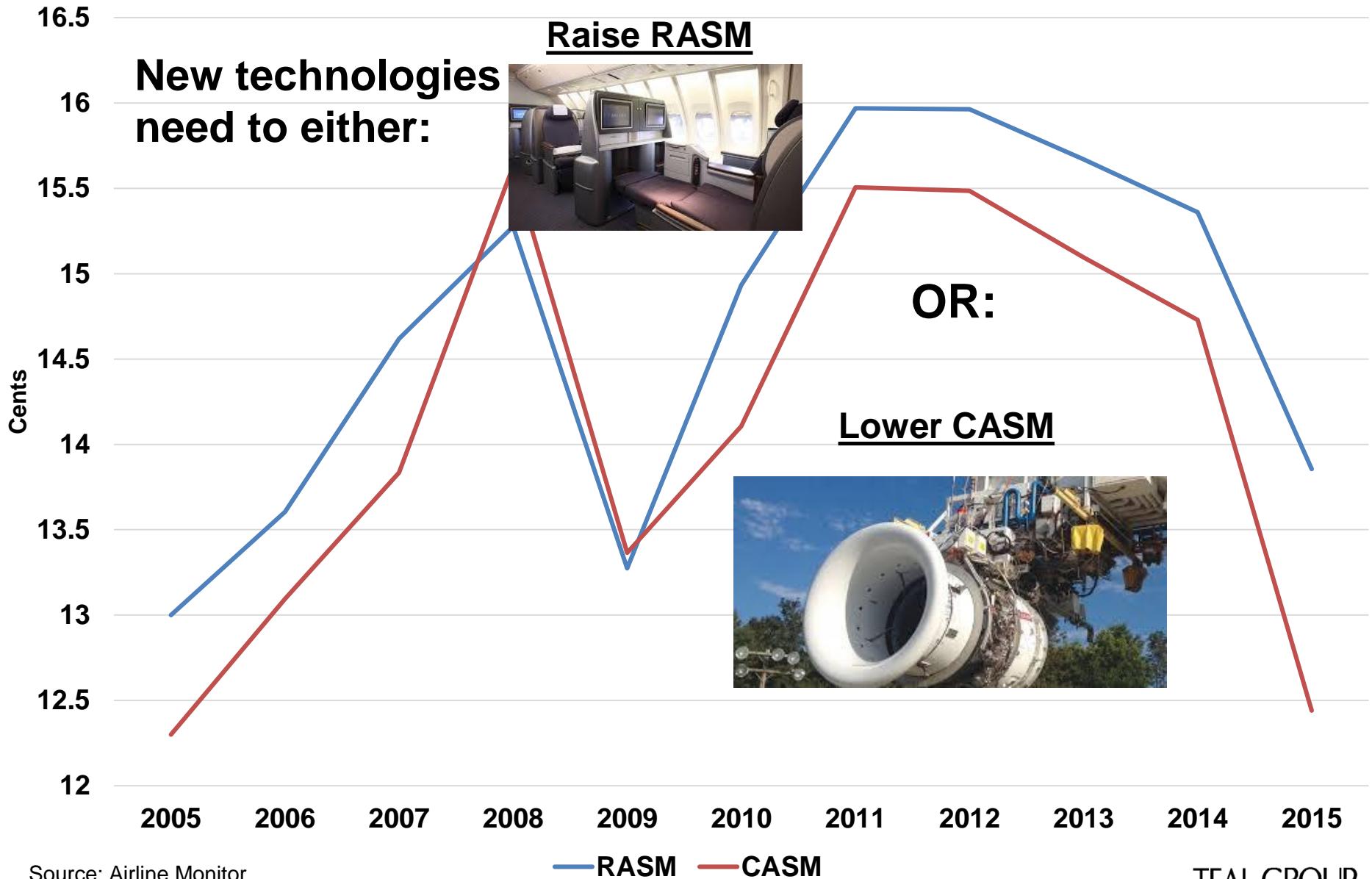


Jets Are Getting Cheaper (In Real Terms), Too

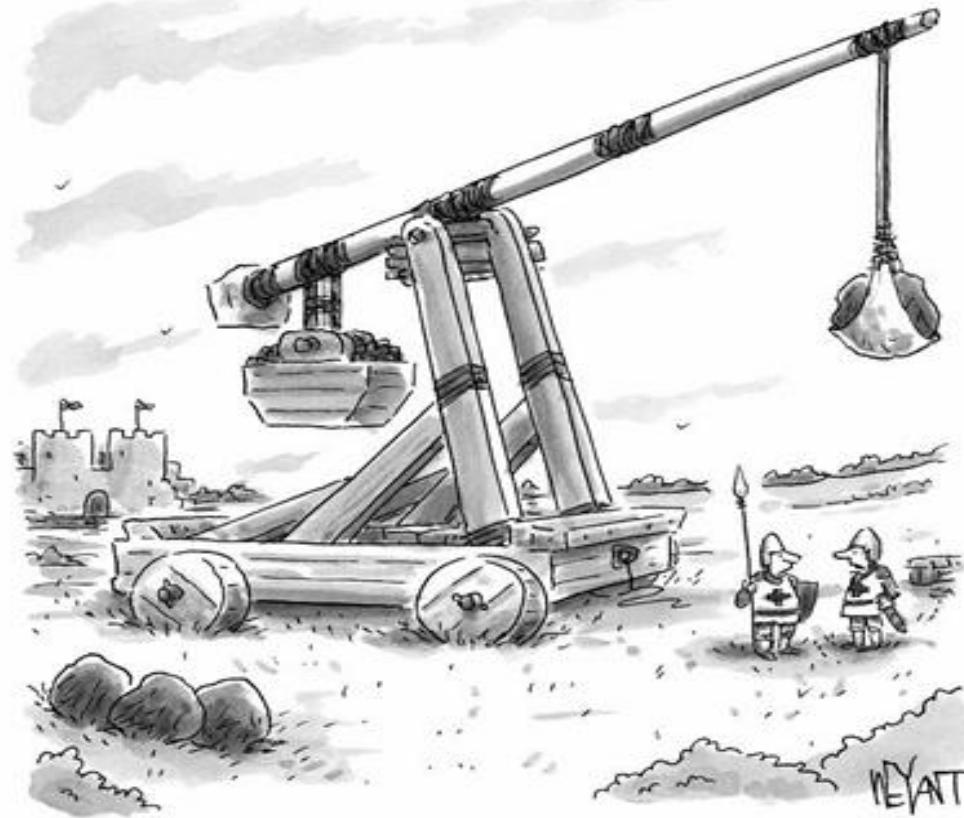


Sources: US Bureau of Labor Statistics, ICF

An Obvious But Tough Reality



3. Technology And The Market



"When your only tool is a trebuchet, every problem looks like a siege."

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First, A Look Back At Some Surprisingly Popular Ideas Of The Past

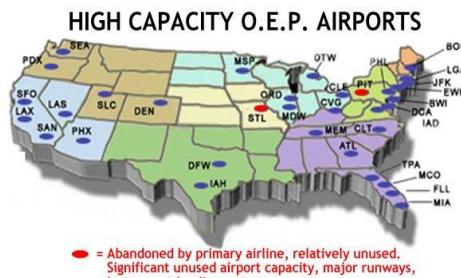
- **Aircraft:**

- Small!
- Smaller!
- Big!
- Speed!
- Water!
- Vertical!
- Space!



- **Air Transport:**

- Luxury/Retail!
- Wayports!



http://www.faa.gov/about/office_org/headquarters_offices/ato/publications/oep/qa/airports/images/BenchmarkAirports.jpg



- <http://www.nytimes.com/1989/03/24/us/is-relief-for-airport-crowds-in-middle-of-nowhere.html?pagewanted=all>

We're On An Aeronautical Plateau; We May Be On It For Some Time



1965



2017



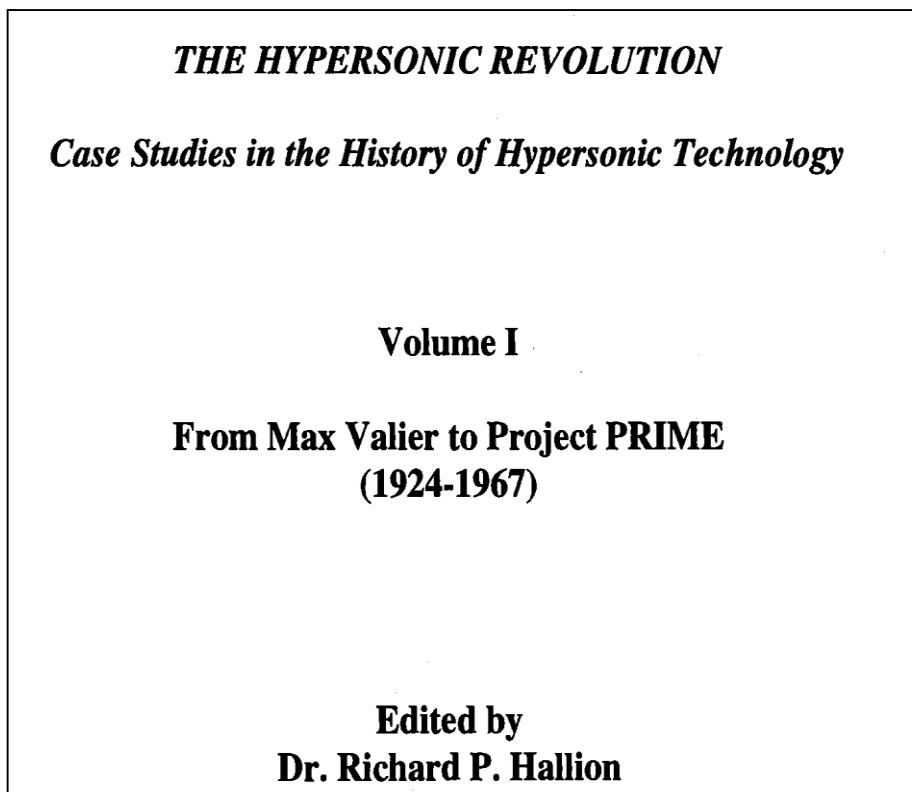
20??

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Objects In Future May Be Further Away Than They Appear

- [www.slate.com/articles/technology/future tense/2017/09/in technology everything is always five to 10 years away.html](http://www.slate.com/articles/technology/future_tense/2017/09/in_technology_everything_is_always_five_to_10_years_away.html)
- **Point:** “Simply put, I believe the United States is on the verge of a hypersonics revolution.” Orlando Carvalho, Lockheed Martin, September 2017.
- **Counterpoint:**



Technological Dead Ends Happen



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New Ideas Can Go Away And Come Back...And Then Perhaps Go Away Again



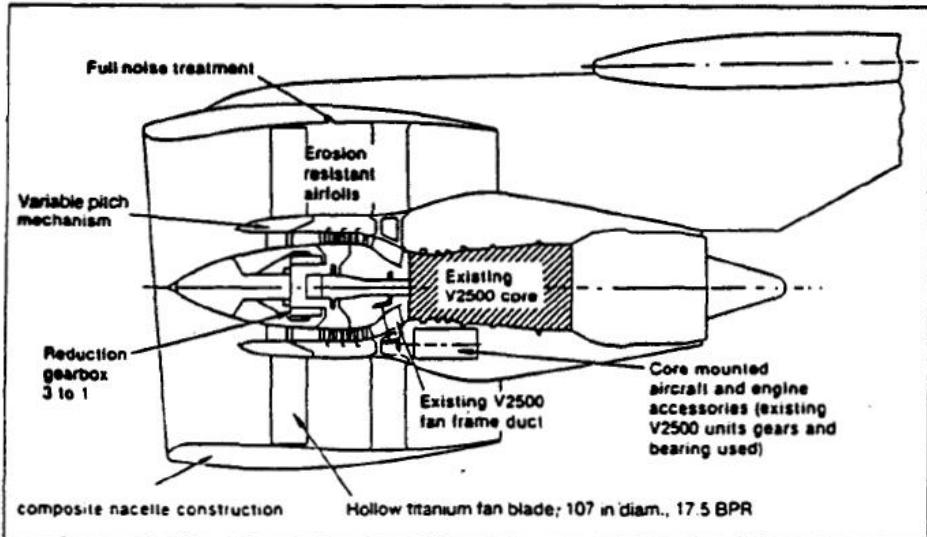
1942



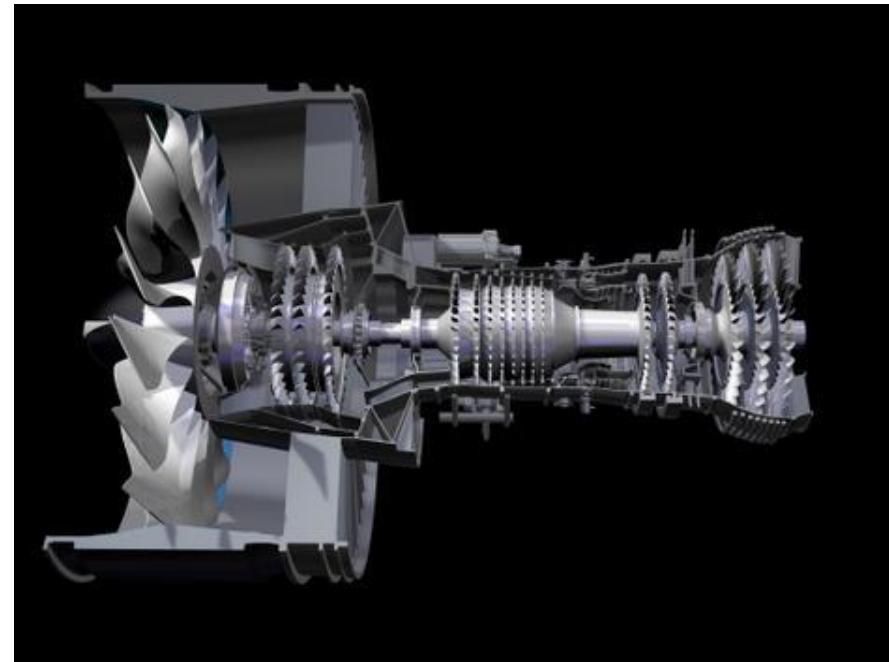
2009



Even Incremental New Ideas Can Take A Lot Longer Than Expected



International Aero Engines' V2500 SuperFan ultrahigh bypass ratio engine rated at 30,000 lb. thrust has been selected to power the A340. Cutaway drawing shows the engine's latest configuration. CFM International also is considering offering a 30,000-lb.-thrust version of its CFM56 engine for the A340. Range of the A340-300 with V2500 Superfans is estimated at 7,000 naut. mi. with a payload of 295 passengers and luggage (AW&ST July 7, 1986, p. 26).



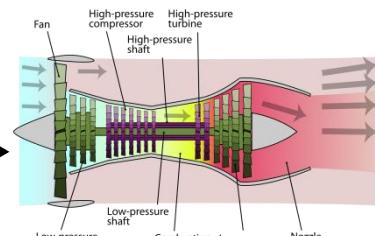
1986

2016

Development ≠ Commercialization; Commercialization ≠ Mass Utilization



Military Developments Are Much Less Of A Source Of Civil Technology



Things People Like

- **New Technology.**
- **Growth, realistic or not**
 - Justify budget requests, revenue projections, etc.
- **Stories to tell each other.**
- **Exciting new investment opportunities.**
 - Defining reality of our time: too much money chasing too few good ideas.



SEARCH

TOP HEADLINES

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Recession-Plagued Nation Demands New Bubble To Invest In

WASHINGTON—A panel of top business leaders testified before Congress about the worsening recession Monday, demanding the government provide Americans with a new irresponsible and largely illusory economic bubble in which to invest.