A Market Analyst Intrudes

Industry Conditions, and Thoughts About The Future Of Flight

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Washington, DC
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1. Market Drivers And Conditions
Our Forgotten Nemesis...Cyclicality

Large Jetliner Deliveries By Value

(Value in '17 $Bns)

- '04-'15
  - 9.2% CAGR;
  - A 12-Year Supercycle

- '95-'99
  - 20.8% CAGR

- '84-'91
  - 16.1% CAGR

- '80-'84
  - -13.9% CAGR; -41% peak-trough

- '68-'77
  - -11% CAGR; -65% peak-trough

- '91-'95
  - -12.5% CAGR; -41% peak-trough

- '99-'03
  - -11% CAGR; -37.3% peak-trough

- '01-'03
  - -10.7% CAGR; -28.8% peak-trough
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
Oil Prices And Interest Rates: The End Of A Strange Moment

- Interest Rates (%)
- Oil Price in 2016$/BBL

- '80 '82 '84 '86 '88 '90 '92 '94 '96 '98 '00 '02 '04 '06 '08 '10 '12 '14 '16 '18f

- Interest Rates (red)
- Oil Prices (blue)
Civil/Military Rotorcraft Deliveries By Value

(Market Value in '17 $Bns)

'03-'08 CAGR: 10.3%

'M03-'08 CAGR: 18.2%

'10-'15 CAGR: 1.8%

'10-'15 CAGR: 0.5%
2. Market Characteristics
The Air Transport Market By Class

Deliveries In 2017 $ Billions

- Regionals
- Single Aisles
- Twin Aisles
Twin Aisle Average Seat Count (Fleetwide) V. World Airline Traffic

(Seat Count) (Trillions of RPMs)

'70 '72 '74 '76 '78 '80 '82 '84 '86 '88 '90 '92 '94 '96 '98 '00 '02 '04 '06 '08 '10 '12 '14 '16f

0 1 2 3 4 5

200 250 300 350 400

Seats Traffic

Teal Group Corporation
Global Economy Outpaced By Travel Demand Growth

![Graph showing the relationship between GDP and RPMs over time.](image-url)
Jets Are Getting Cheaper (In Real Terms), Too

Sources: US Bureau of Labor Statistics, ICF
An Obvious But Tough Reality

New technologies need to either:

Raise RASM

OR:

Lower CASM

Source: Airline Monitor
"When your only tool is a trebuchet, every problem looks like a siege."
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!

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

• **Point:** “Simply put, I believe the United States is on the verge of a hypersonics revolution.” Orlando Carvalho, Lockheed Martin, September 2017.

• **Counterpoint:**

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**THE HYPERSONIC REVOLUTION**

*Case Studies in the History of Hypersonic Technology*

*Volume I*

*From Max Valier to Project PRIME (1924-1967)*

Edited by

Dr. Richard P. Hallion
Technological Dead Ends Happen
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 (Avast July 7, 1986, p. 26).
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.

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.