U.S. Pilot Scarcity

2022 – What did not happen.

Presented & Researched By Allegiant Travel Company

May 2023

National Air Carrier Association

What didn't happen? – industry hitting hiring targets in 2022

2,500 – 4,500

6,500 – 8,500

11,000

What suffered?
Block hours, regional feed, capacity growth, network expansion

59% - 77%
of what airlines wanted

Industry Actual

Short

Industry Projection
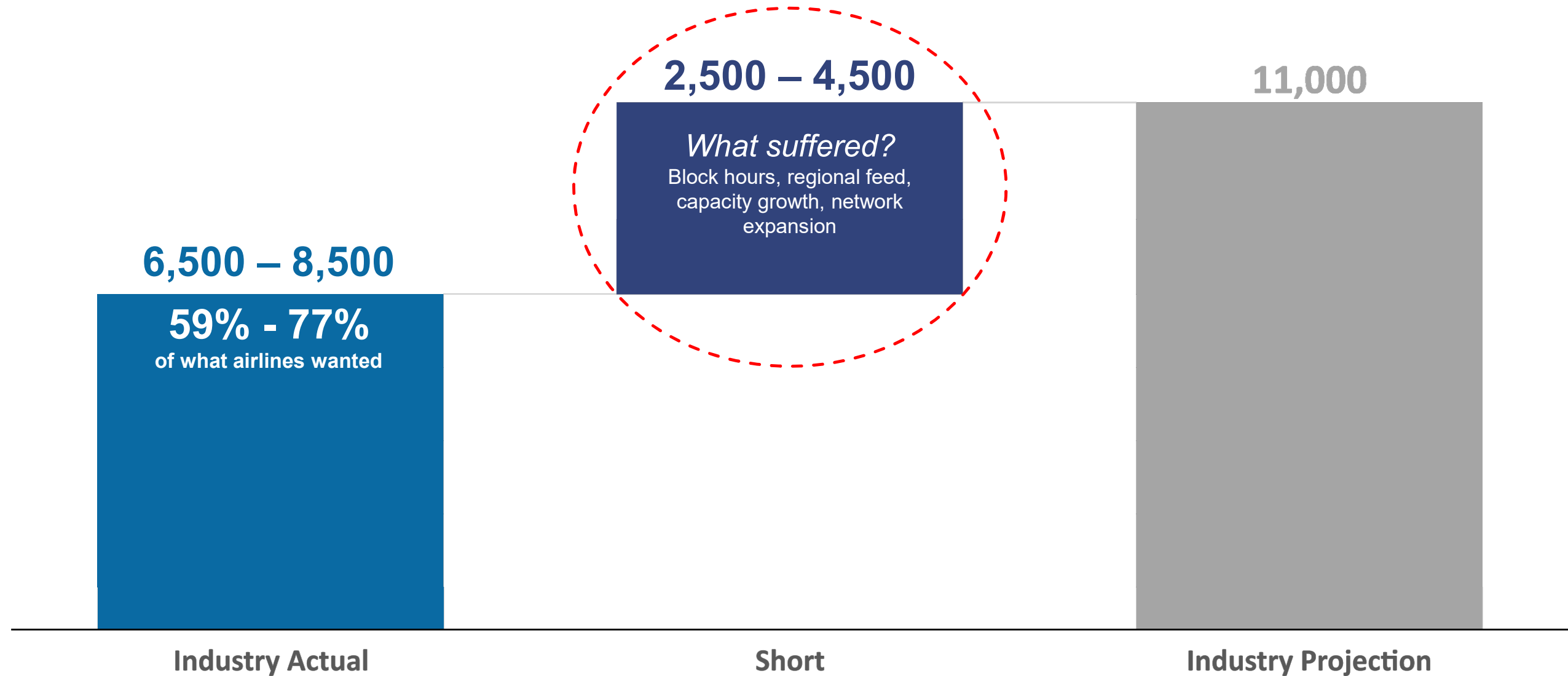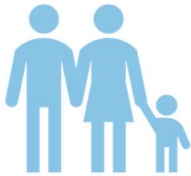
2022: A look back – what did not happen domestically

2022 Schedule Developments
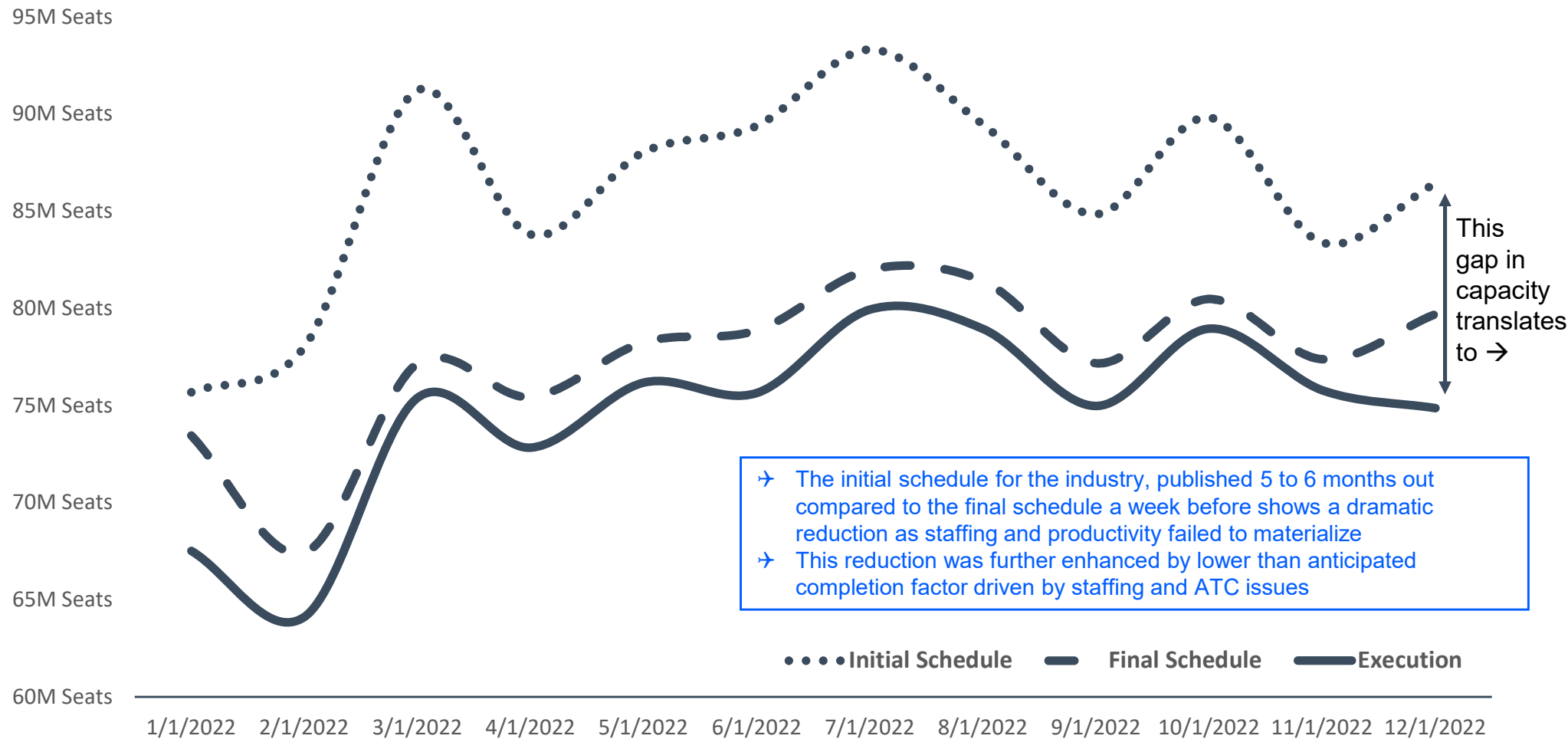
~18.6M Pax Unable to Travel

(2.1%) Lower Fare

$400M to $2.6B in Lost Revenue

This gap in capacity translates to →

→ The initial schedule for the industry, published 5 to 6 months out compared to the final schedule a week before shows a dramatic reduction as staffing and productivity failed to materialize
→ This reduction was further enhanced by lower than anticipated completion factor driven by staffing and ATC issues

• • • • Initial Schedule   ‒ ‒ Final Schedule   ⎯ Execution

Source: schedules for domestic brand airlines accessed through Sabre

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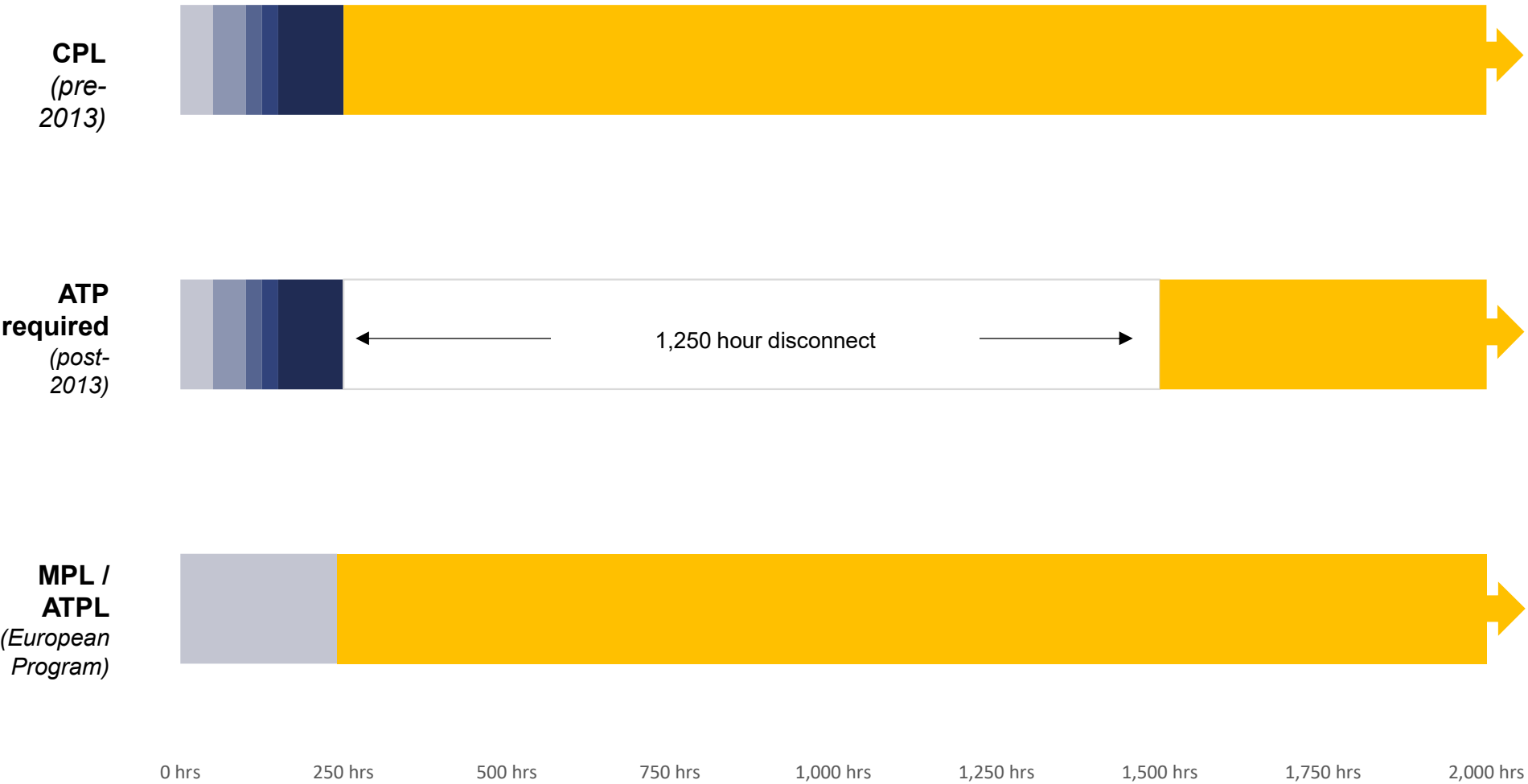# U.S Pilot Pipeline

How the US trains pilots vs. the rest of the world

Before & After FAA Act of 2010 vs Rest of the World
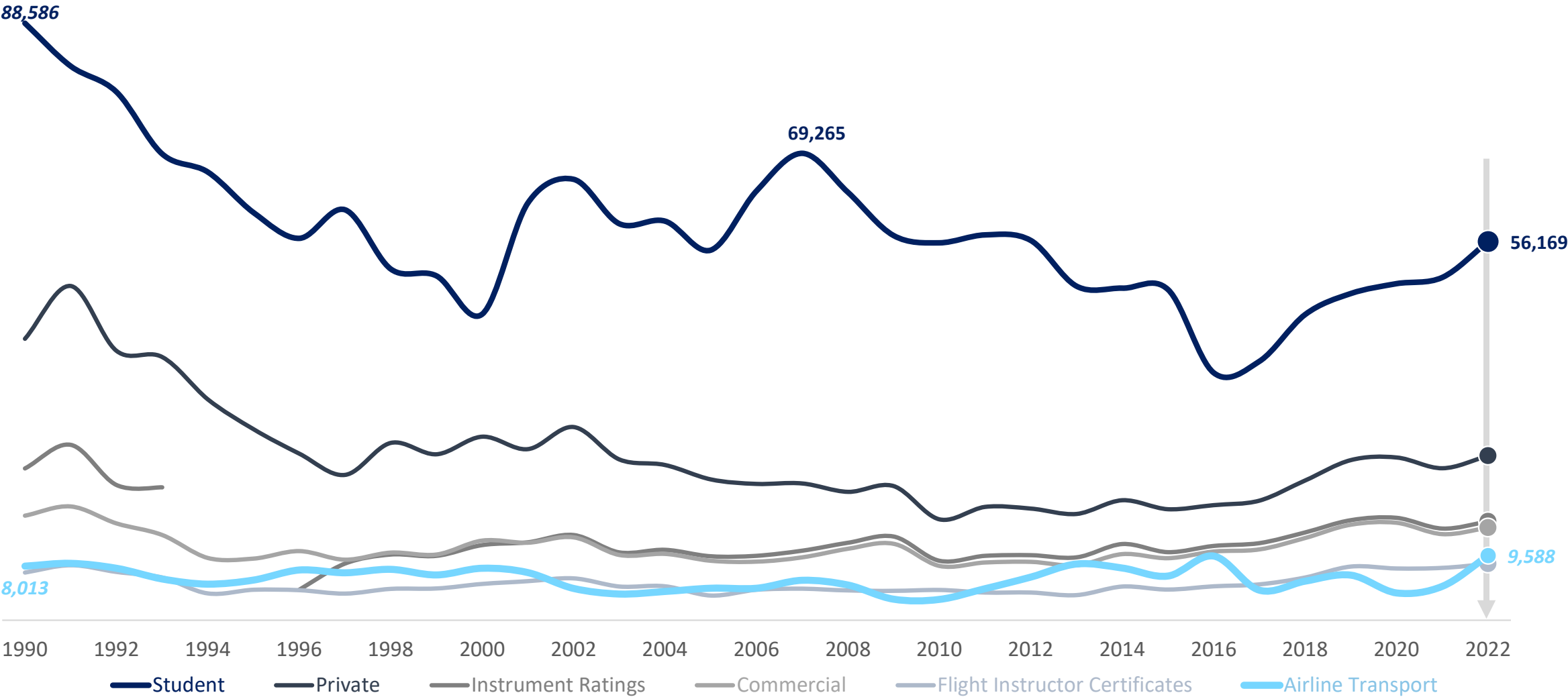*Airline Safety and Federal Aviation Administration Extension Act of 2010*

> → The US pilot training has historically been comparable to international - 250hrs for the right seat. This changed with tragic 2009 accident (Colgan Air)
> → The 1,500hr rule applies to both FO & CA, which has created a gap(disconnect) for students to fill this hour requirement

CPL *(pre-2013)*

ATP required *(post-2013)*

1,250 hour disconnect

MPL / ATPL *(European Program)*

Fly for Part 121 carrier

0 hrs   250 hrs   500 hrs   750 hrs   1,000 hrs   1,250 hrs   1,500 hrs   1,750 hrs   2,000 hrs   2,250 hrs

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Decades long decline in student starts

Original Airmen Certificates Issued
2010 - 2021

> ✈ Student **starts remain below historic levels** despite wide media coverage of pilot demand / new pay rates
> ✈ ATP generation is uneven compared to other ratings
> ✈ Precursors to ATP, private/commercial/flight instructor **flat with 2019 levels**

88,586

69,265

56,169

9,588

8,013

1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022

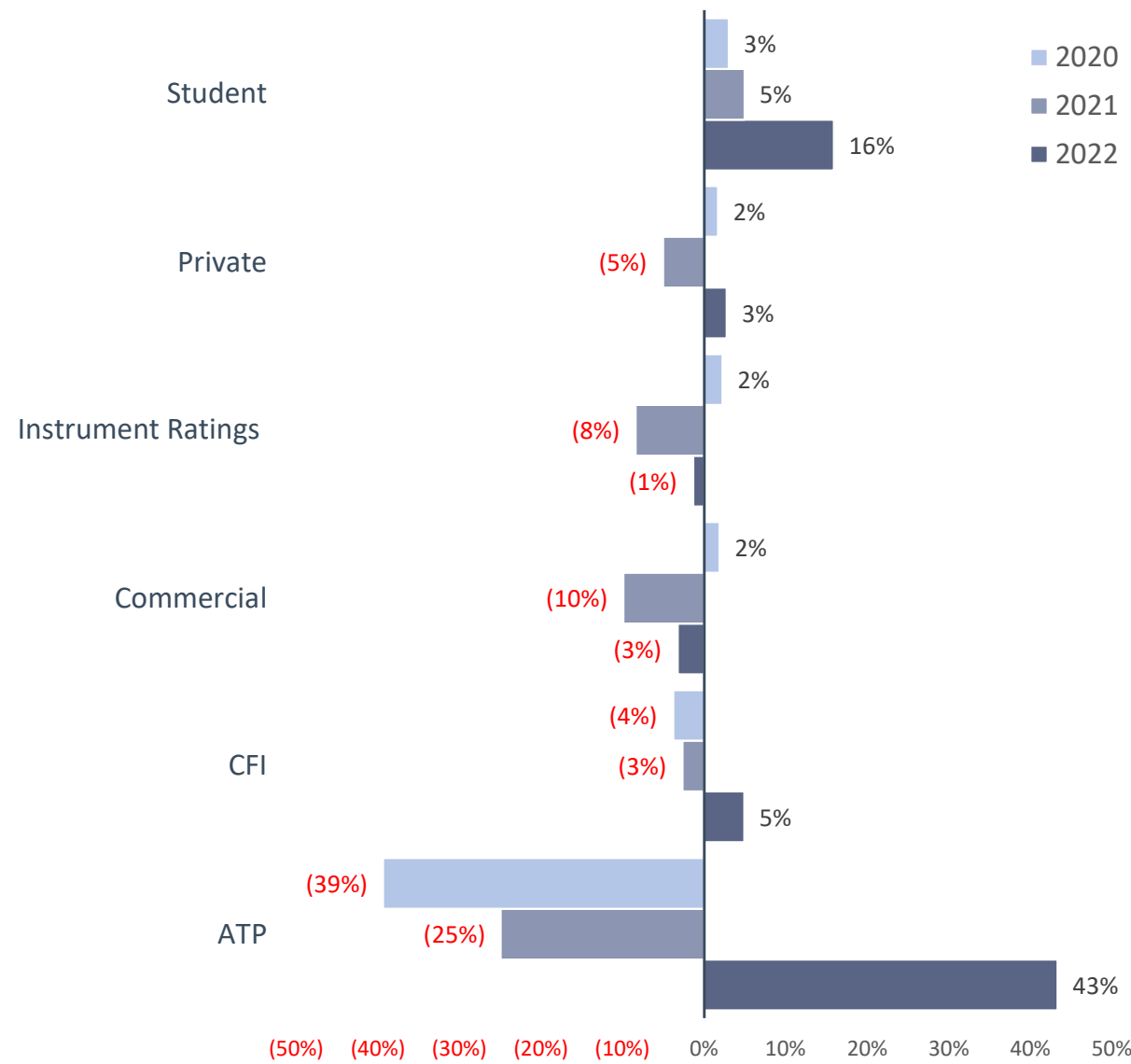━━ Student ━━ Private ━━ Instrument Ratings ━━ Commercial ━━ Flight Instructor Certificates ━━ Airline Transport

Source: FAA Civil Airman Statistics

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The journey from student to ATP

Original Airmen Certificates Issued
2019 vs 2020,2021 & 2022

Stages to Achieve ATP Certifications
Illustrative - based on estimates

> ✈ There are many different steps/certificates a student pilot needs to attain to become an ATP pilot. Its difficult to get the student all the way through the pipeline
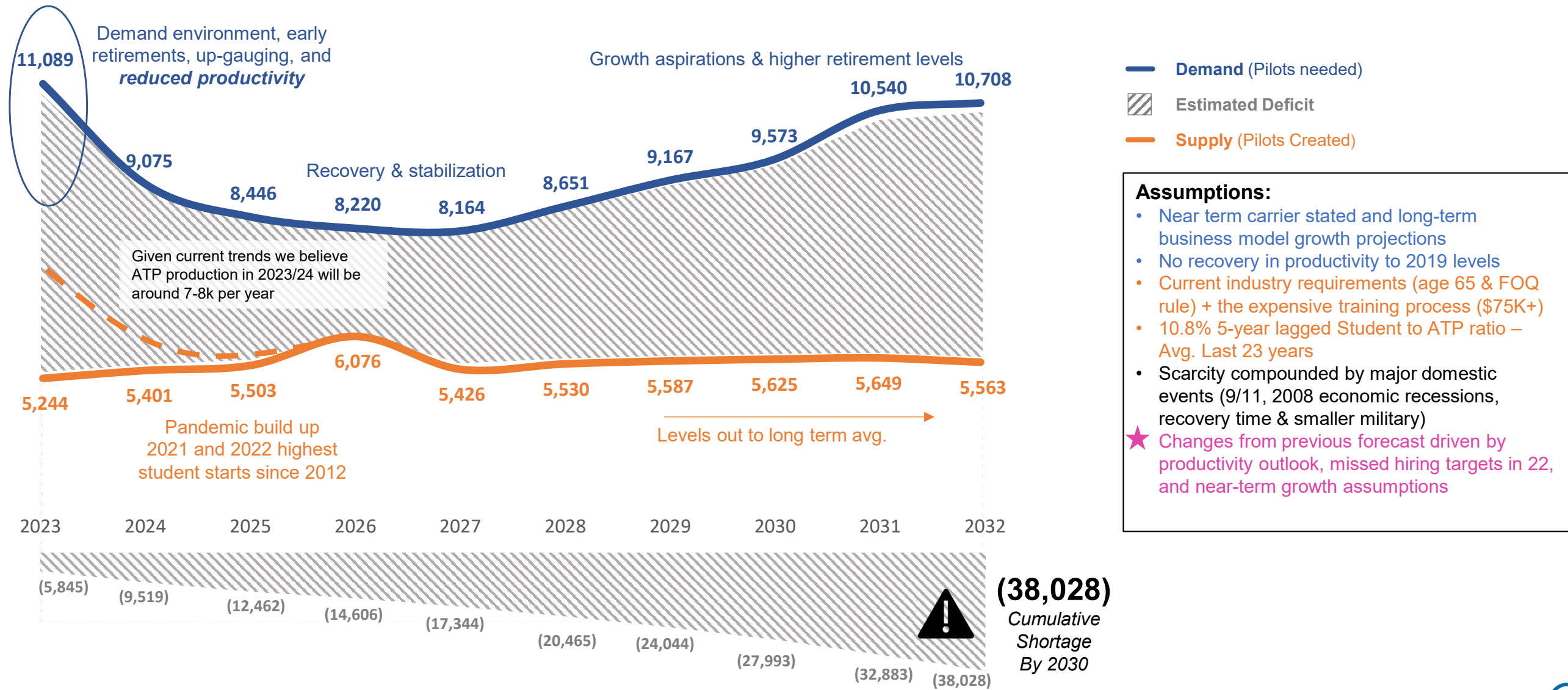
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The pilot scarcity will limit travel options over the next decade

Industry Pilot Outlook
With current industry environment

Demand environment, early retirements, up-gauging, and *reduced productivity*

Growth aspirations & higher retirement levels

11,089

9,075

8,446

Recovery & stabilization

8,220   **8,164**

8,651

9,167

9,573

10,540   **10,708**

Demand (Pilots needed)

Estimated Deficit

Supply (Pilots Created)

Given current trends we believe ATP production in 2023/24 will be around 7-8k per year

5,244   **5,401**   **5,503**   **6,076**   **5,426**   **5,530**   **5,587**   **5,625**   **5,649**   **5,563**

Pandemic build up 2021 and 2022 highest student starts since 2012

Levels out to long term avg.

2023   2024   2025   2026   2027   2028   2029   2030   2031   2032

(5,845)   (9,519)   (12,462)   (14,606)   (17,344)   (20,465)   (24,044)   (27,993)   (32,883)   (38,028)

(38,028)
Cumulative Shortage By 2030

Assumptions:
- Near term carrier stated and long-term business model growth projections
- No recovery in productivity to 2019 levels
- Current industry requirements (age 65 & FOQ rule) + the expensive training process ($75K+)
- 10.8% 5-year lagged Student to ATP ratio – Avg. Last 23 years
- Scarcity compounded by major domestic events (9/11, 2008 economic recessions, recovery time & smaller military)
- ★ Changes from previous forecast driven by productivity outlook, missed hiring targets in 22, and near-term growth assumptions
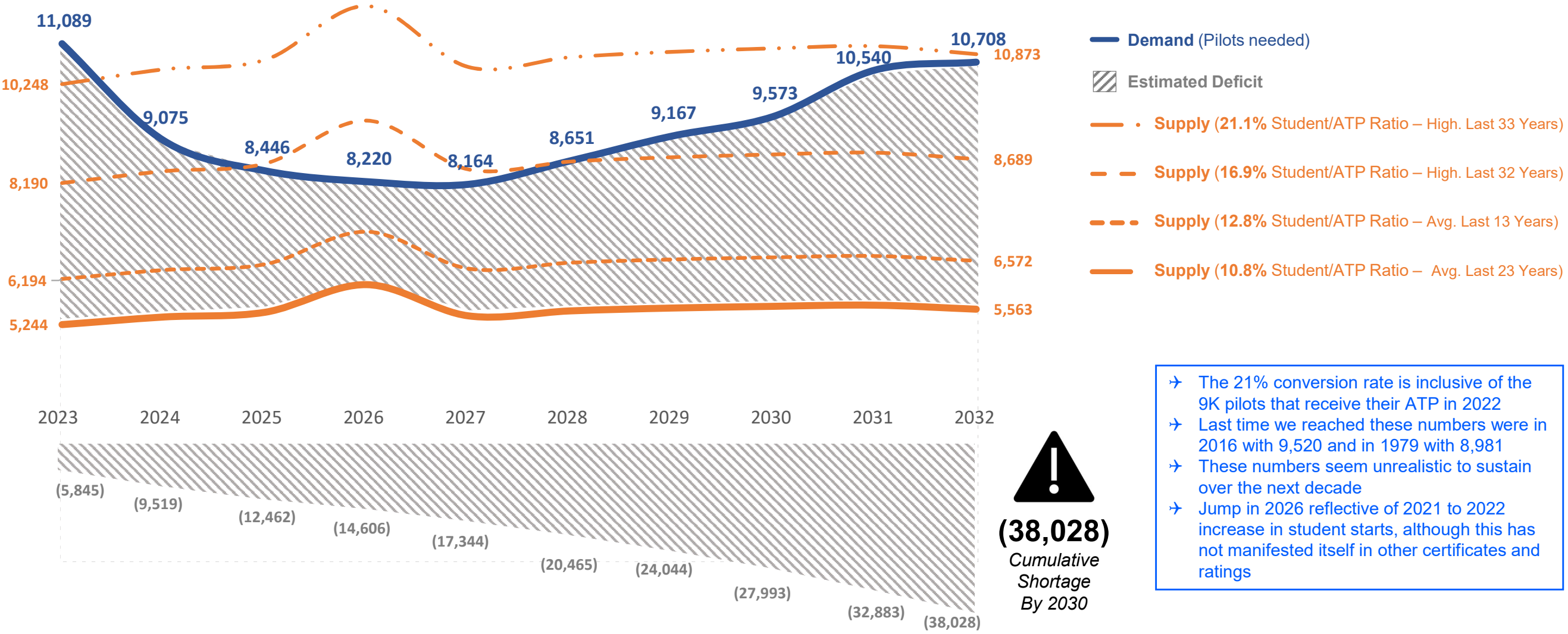
Source: Internal analysis

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The pilot scarcity will be largely dependent on students

**Industry Pilot Outlook**
With various student/ATP ratios

Demand (Pilots needed)

Estimated Deficit

Supply (21.1% Student/ATP Ratio – High. Last 33 Years)

Supply (16.9% Student/ATP Ratio – High. Last 32 Years)

Supply (12.8% Student/ATP Ratio – Avg. Last 13 Years)

Supply (10.8% Student/ATP Ratio – Avg. Last 23 Years)

Demand values: 11,089; 9,075; 8,446; 8,220; 8,164; 8,651; 9,167; 9,573; 10,540; 10,708

Supply 21.1% end value: 10,873
Supply 16.9% end value: 8,689
Supply 12.8% end value: 6,572
Supply 10.8% end value: 5,563

Left-axis start values: 10,248; 8,190; 6,194; 5,244

Years: 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032

Cumulative deficit values: (5,845); (9,519); (12,462); (14,606); (17,344); (20,465); (24,044); (27,993); (32,883); (38,028)

(38,028)
Cumulative Shortage By 2030

→ The 21% conversion rate is inclusive of the 9K pilots that receive their ATP in 2022
→ Last time we reached these numbers were in 2016 with 9,520 and in 1979 with 8,981
→ These numbers seem unrealistic to sustain over the next decade
→ Jump in 2026 reflective of 2021 to 2022 increase in student starts, although this has not manifested itself in other certificates and ratings

Source: Internal analysis

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Especially …. given projected demand scenarios

Industry Demand Outlook
With 10.8% student/ATP ratio
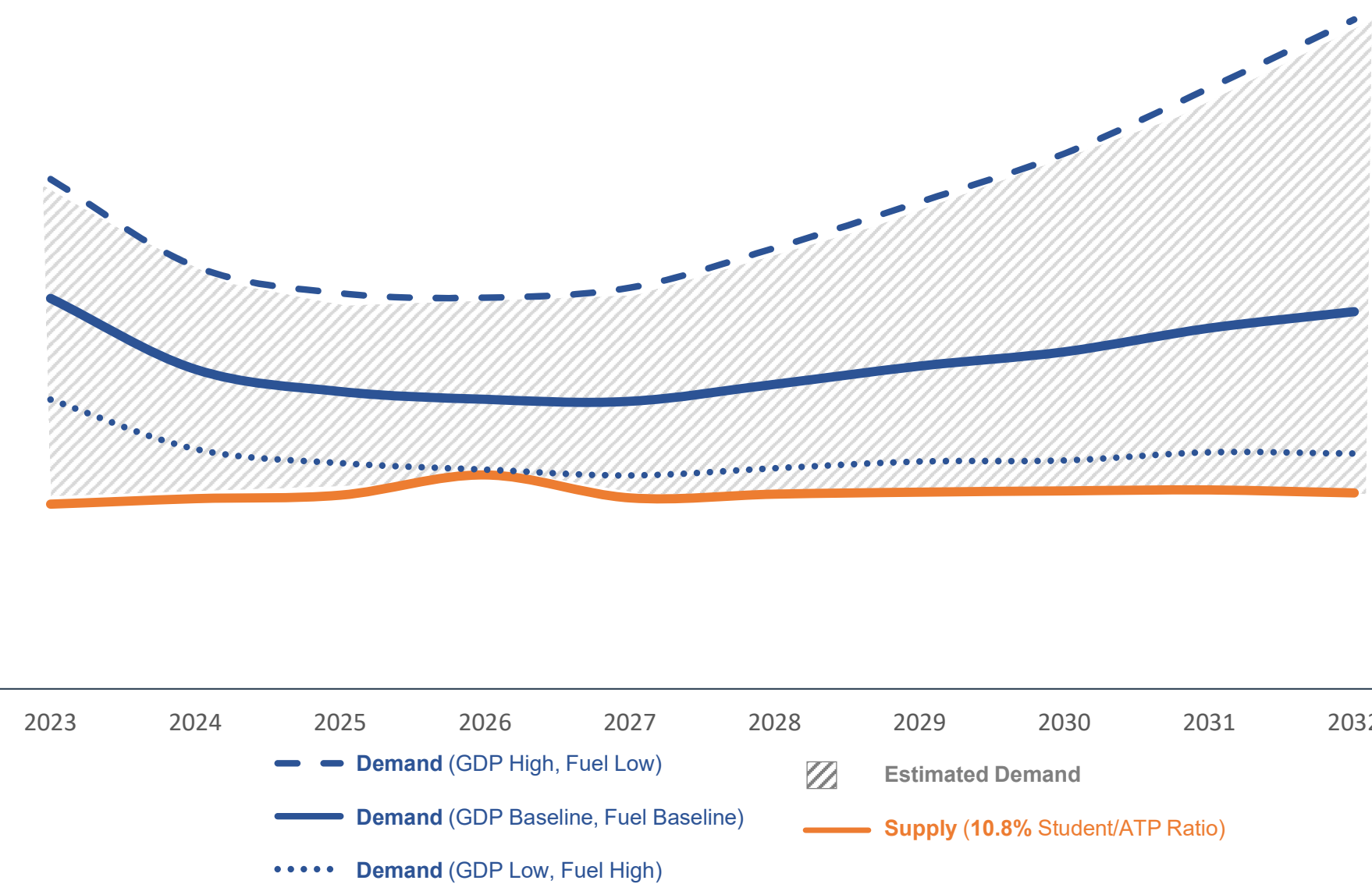
(82K)
Cumulative Pilots Needed By 2032

Demand
(GDP High, Fuel Low)

Strong Economy

(38K)
Cumulative Pilots Needed By 2032

Demand
 (GDP Baseline, Fuel Baseline)

Baseline Economy

(10K)
Cumulative Pilots Needed By 2032

Demand
(GDP Low, Fuel High)

Weak Economy

✈ The severity of the scarcity through the end of the decade is modeled in a variety of decade averaged scenarios
✈ To meet the strongest demand up to 72K pilots would be needed

2023 2024 2025 2026 2027 2028 2029 2030 2031 2032

– – **Demand** (GDP High, Fuel Low)

—— **Demand** (GDP Baseline, Fuel Baseline)

····· **Demand** (GDP Low, Fuel High)

▨ **Estimated Demand**

—— **Supply** (**10.8%** Student/ATP Ratio)

Source: Internal analysis

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2022 – jump in student pilots and ATPs, how does that effect the forecast

Original Airmen Certificates Issued
2010 – 2022Actual; 2023 – 2032Forecast

1 Increase student starts with current conversion rate

2 Constant student starts with higher conversion rate

1990, 88,586

2007, 69,265

2022, 56,169

2021, 50,874

2016, 9,520

2021, 5,020

2022, 9,588

1990, 8,013

How many students can the industry convert?

Student   **Airline Transport**   **High 3 Year Lagged - 1990 on**   **Last 10 Year Compound Annual Growth Rate**
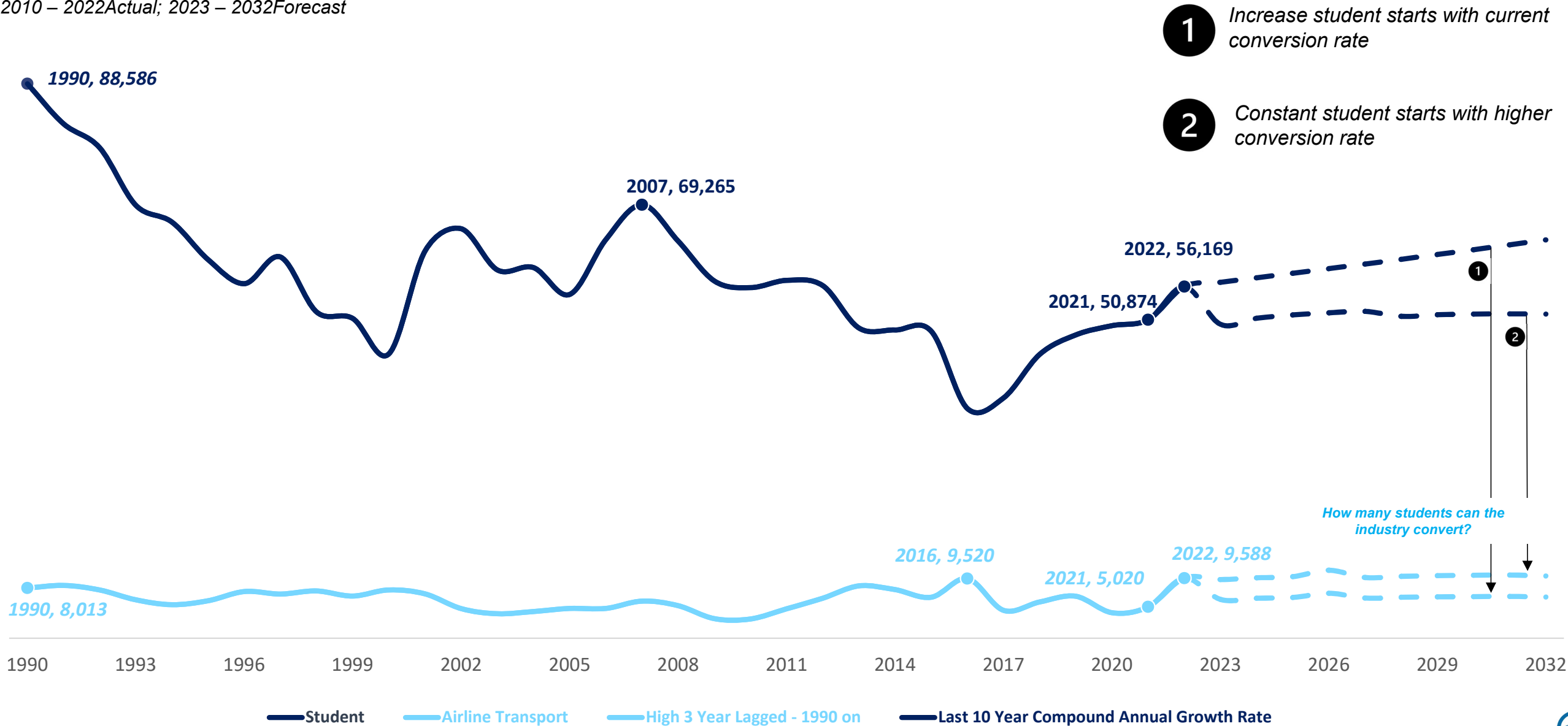
Source: FAA Civil Airman Statistics, Forecast using avg. 3-year lag/ conversion based on 2010 data onwards (ignores 1990-2009)

Industry growth would need to be significantly reduced to avoid scarcity

Block Hour Forecast With & Without Scarcity

Forecasted as of April 2023 using investor projections & carrier type growth profiles after 2024
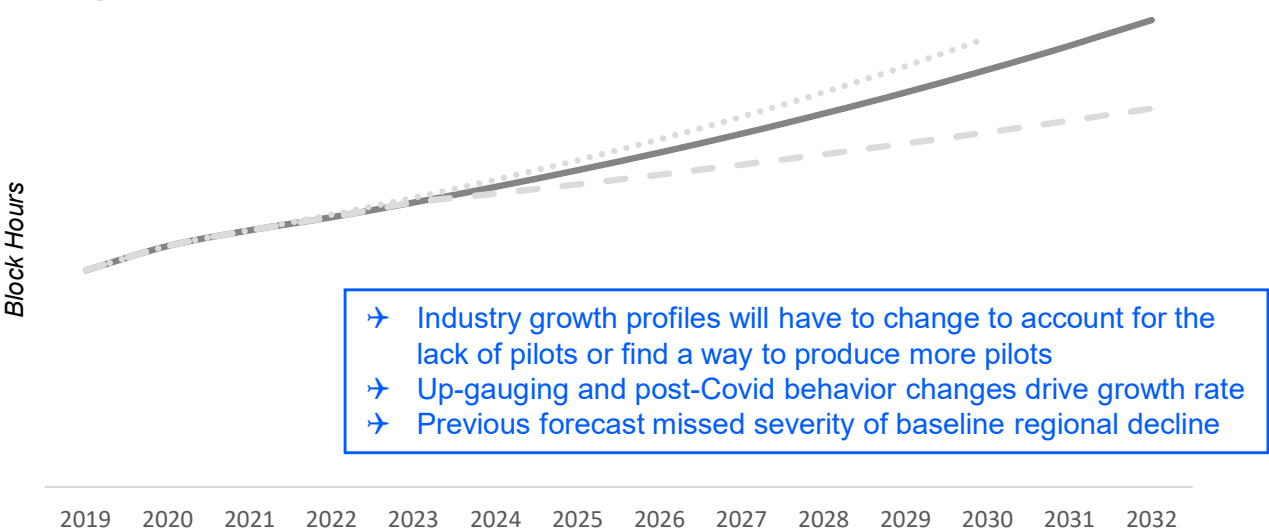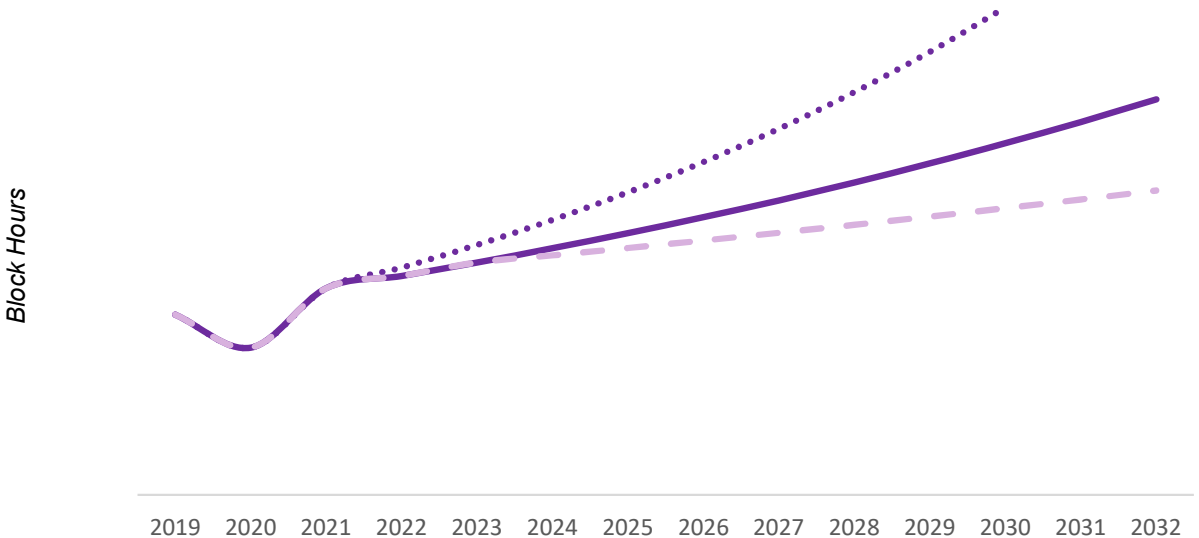
Scheduled Majors

Growth projections with scarcity

Growth pull back needed to avoid scarcity

Previous forecast

Block Hours

2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032

Scheduled Regionals

Block Hours

2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032

Cargo & Charters

Block Hours

- ✈ Industry growth profiles will have to change to account for the lack of pilots or find a way to produce more pilots
- ✈ Up-gauging and post-Covid behavior changes drive growth rate
- ✈ Previous forecast missed severity of baseline regional decline

2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032

Fractional

Block Hours

2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032

Source: internal analysis, stated carrier projections, annual growth rates over last cycle: scheduled majors - 2.4%, regionals - (0.9%)
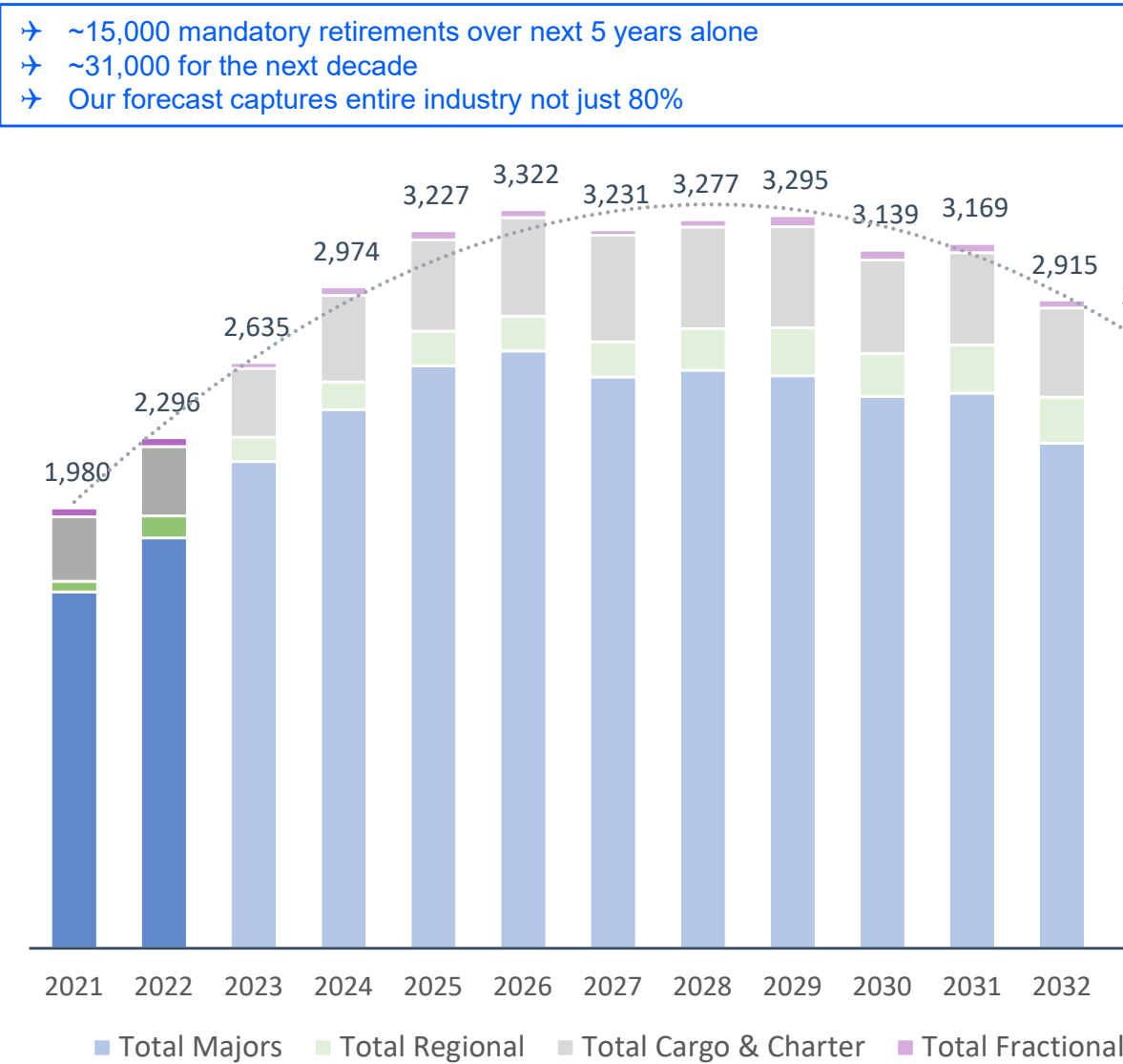
Industry Environment

U.S Pilot Pipeline   **Forecast**   **Industry Environment**   **Industry Options**

Pilot supply impacted by increased retirements
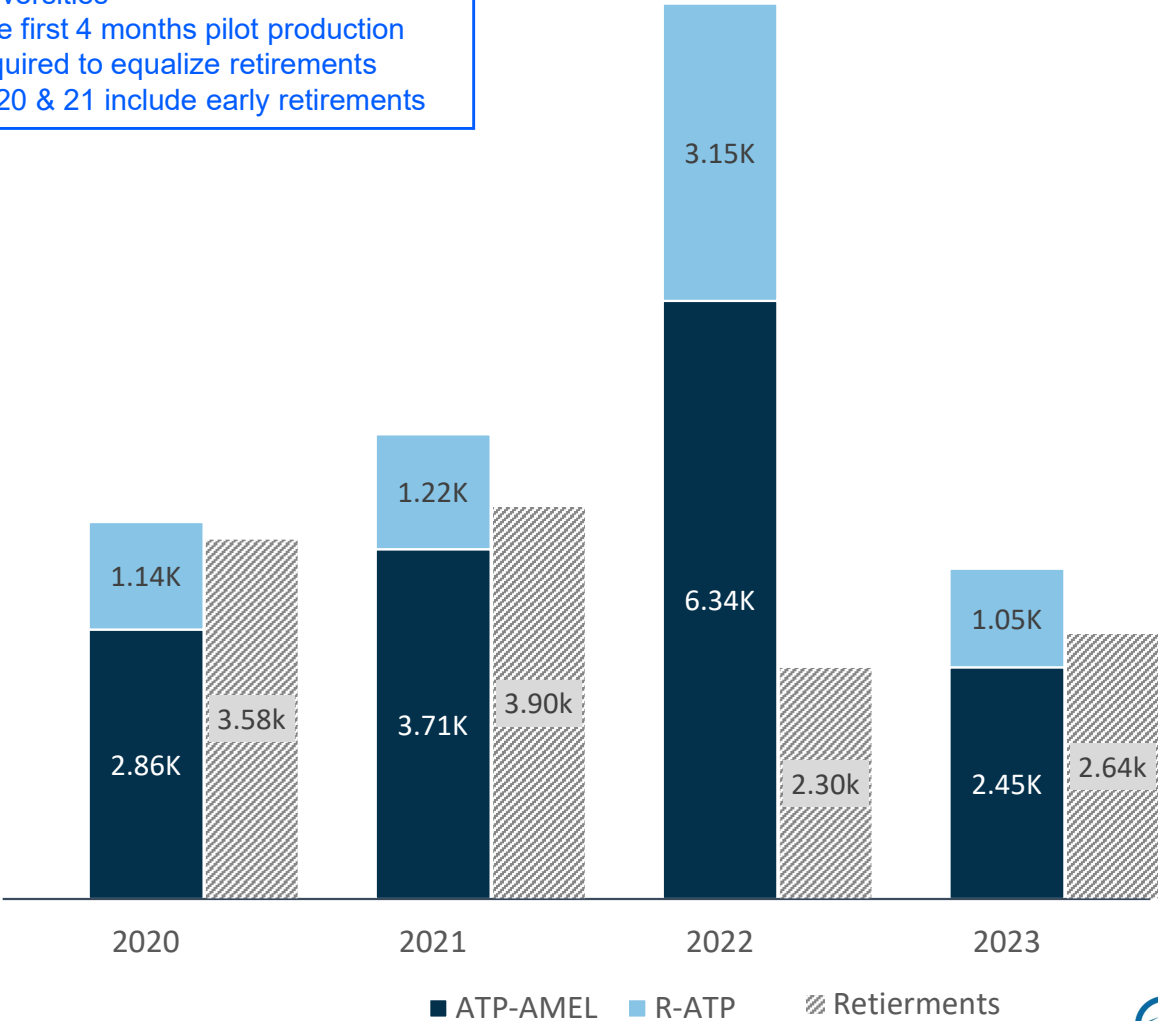
Retirements By Sector
2021 – 2033E

> ✈ ~15,000 mandatory retirements over next 5 years alone
> ✈ ~31,000 for the next decade
> ✈ Our forecast captures entire industry not just 80%

Values by year (totals): 1,980 (2021), 2,296 (2022), 2,635 (2023), 2,974 (2024), 3,227 (2025), 3,322 (2026), 3,231 (2027), 3,277 (2028), 3,295 (2029), 3,139 (2030), 3,169 (2031), 2,915 (2032), 2,774 (2033)

Legend: Total Majors, Total Regional, Total Cargo & Charter, Total Fractionals

ATP Production & Industry Retirements
2020 – April 2023

> ✈ ~30% of pilot production from 4-year universities
> ✈ The first 4 months pilot production required to equalize retirements
> ✈ 2020 & 21 include early retirements

2020: ATP-AMEL 2.86K, R-ATP 1.14K, Retirements 3.58k
2021: ATP-AMEL 3.71K, R-ATP 1.22K, Retirements 3.90k
2022: ATP-AMEL 6.34K, R-ATP 3.15K, Retirements 2.30k
2023: ATP-AMEL 2.45K, R-ATP 1.05K, Retirements 2.64k
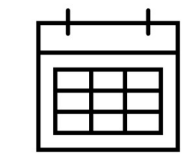
Legend: ATP-AMEL, R-ATP, Retirements

Productivity - why it isn't coming back

Contract changes from CBAs e.g. increased vacations and scheduling rule changes
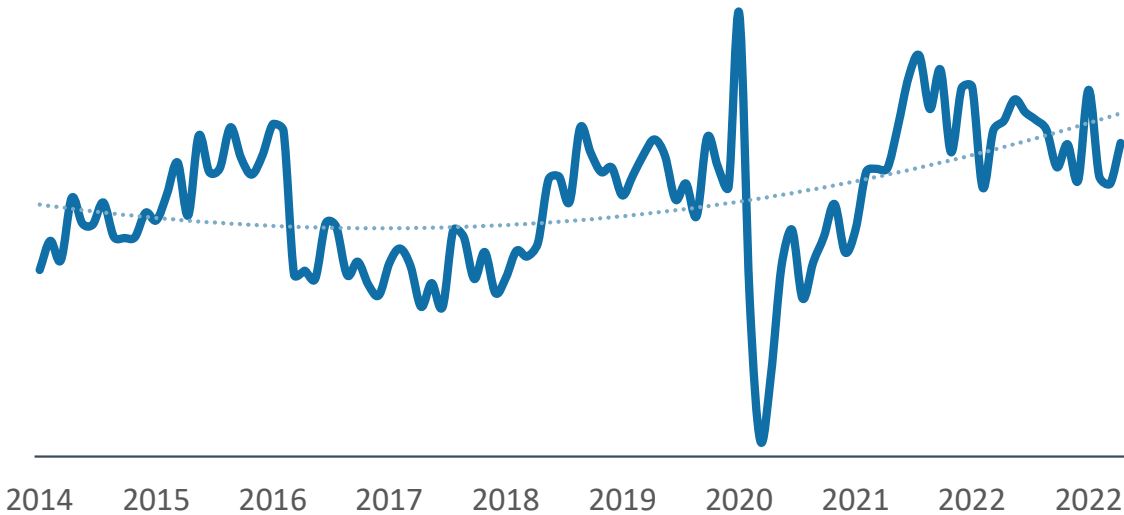
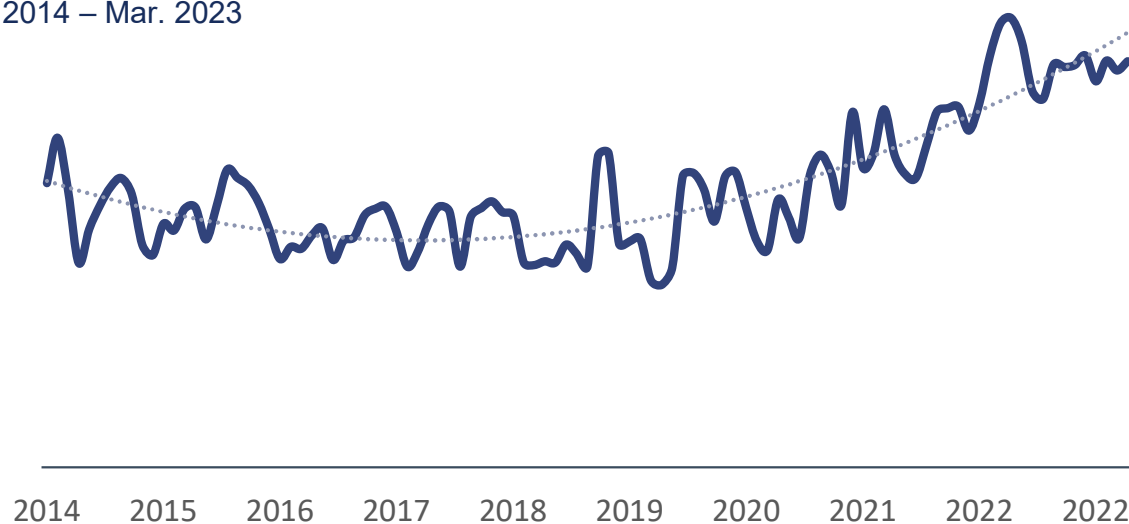Increased training events triggered by retirements above 2019 levels

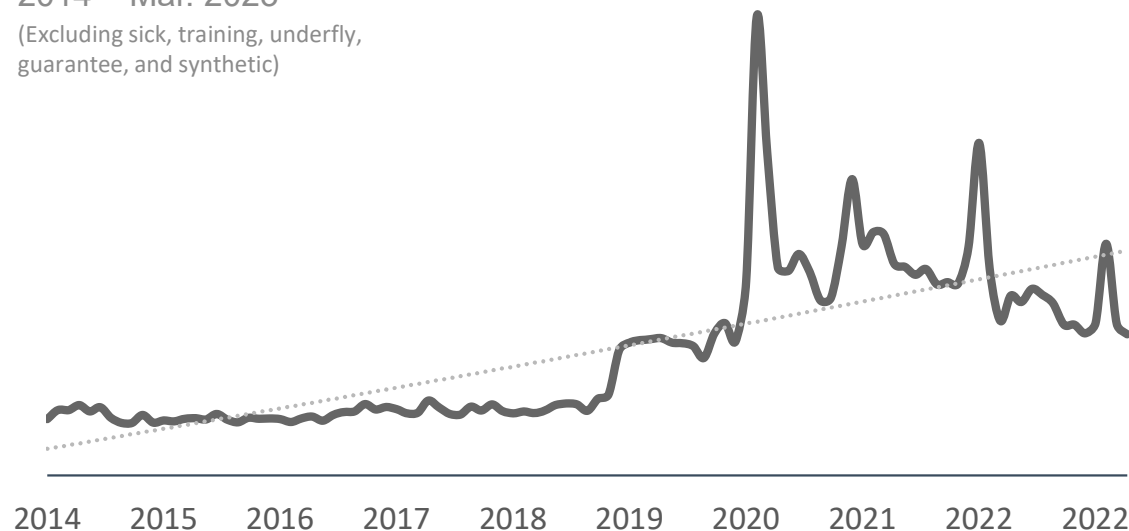Shifts in pilot behavior for sick & fatigue

Training Hours
2014 – Mar. 2023

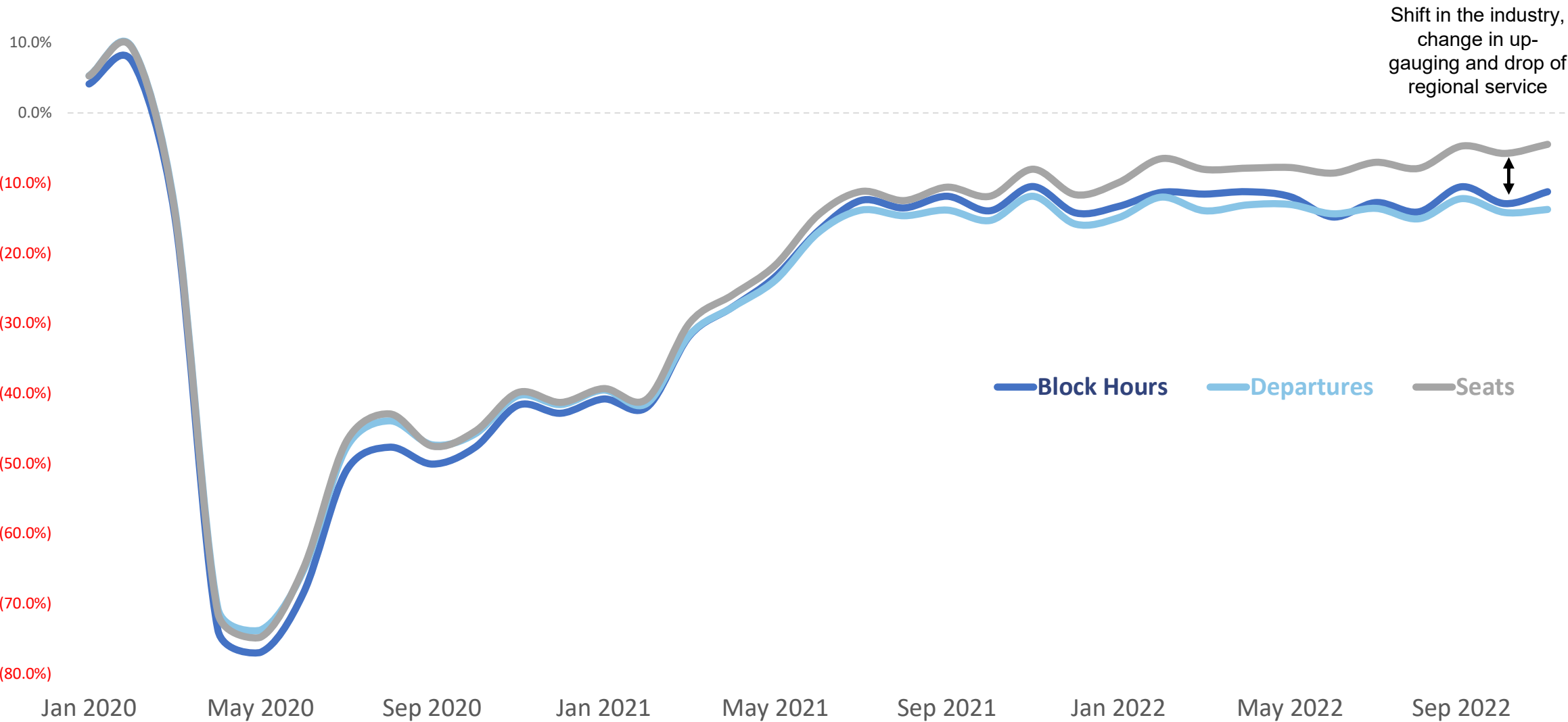2014 2015 2016 2017 2018 2019 2020 2021 2022 2022

Sick Hours
2014 – Mar. 2023

2014 2015 2016 2017 2018 2019 2020 2021 2022 2022

Other Soft Hours e.g. fatigue
2014 – Mar. 2023
(Excluding sick, training, underfly, guarantee, and synthetic)

2014 2015 2016 2017 2018 2019 2020 2021 2022 2022

Source: NACU

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The domestic recovery is still stalled

% Change in Domestic Departures vs 2019
Jan '20 – Nov '22 (Actual)

Shift in the industry, change in up-gauging and drop of regional service

Block Hours   Departures   Seats

Source: T100

Stalled recovery caused by differences between airline sectors

% Change in Domestic Departures vs 2019
Jan '20 – Dec '22 (Actual)

✈ ULCCs have recovered back to 2019 levels before any other sector of the industry
✈ **Two ULCCs started operations during the Pandemic** and have added to growth / recovery
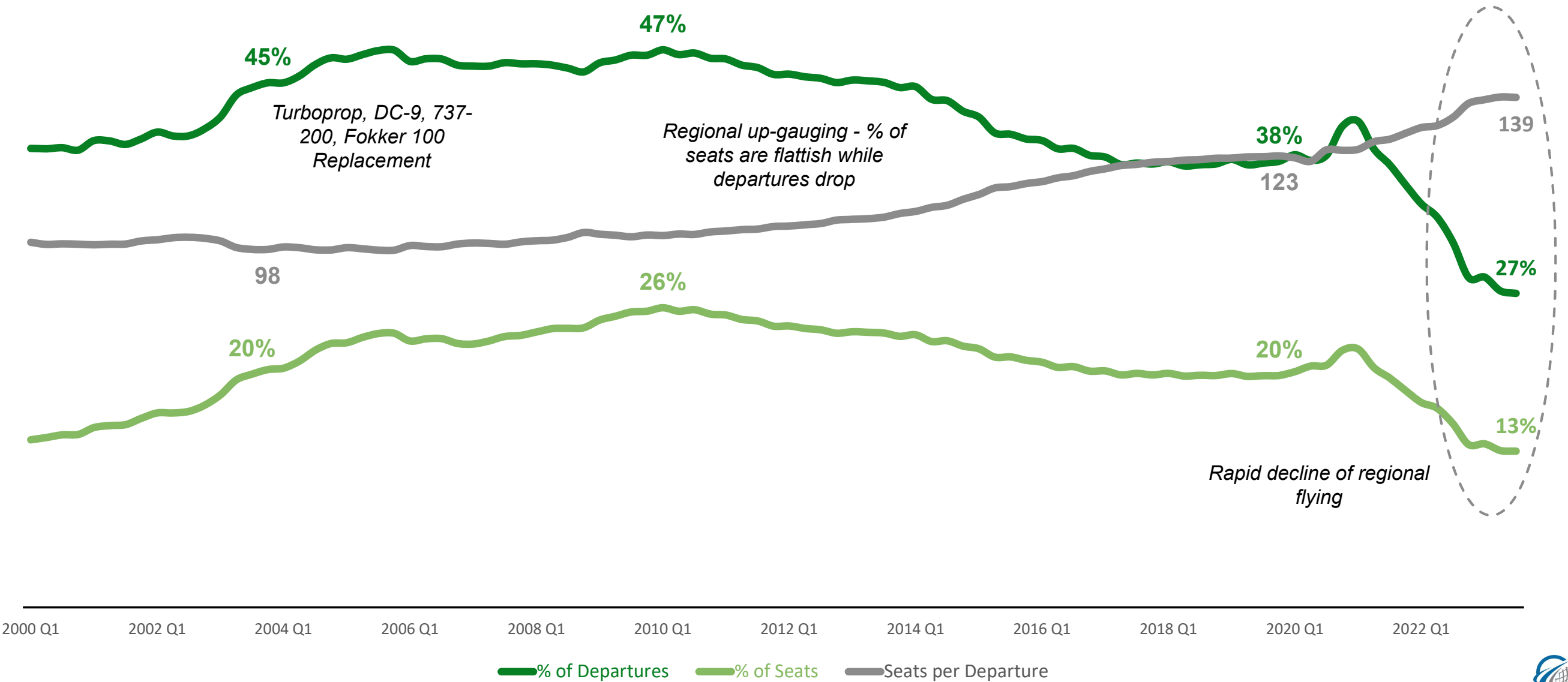✈ ULCC growth is threatened by regulation and lack of pilot supply

Legend: Network | LCC | Hybrid | ULCC | Network Regionals | Cargo & Charters
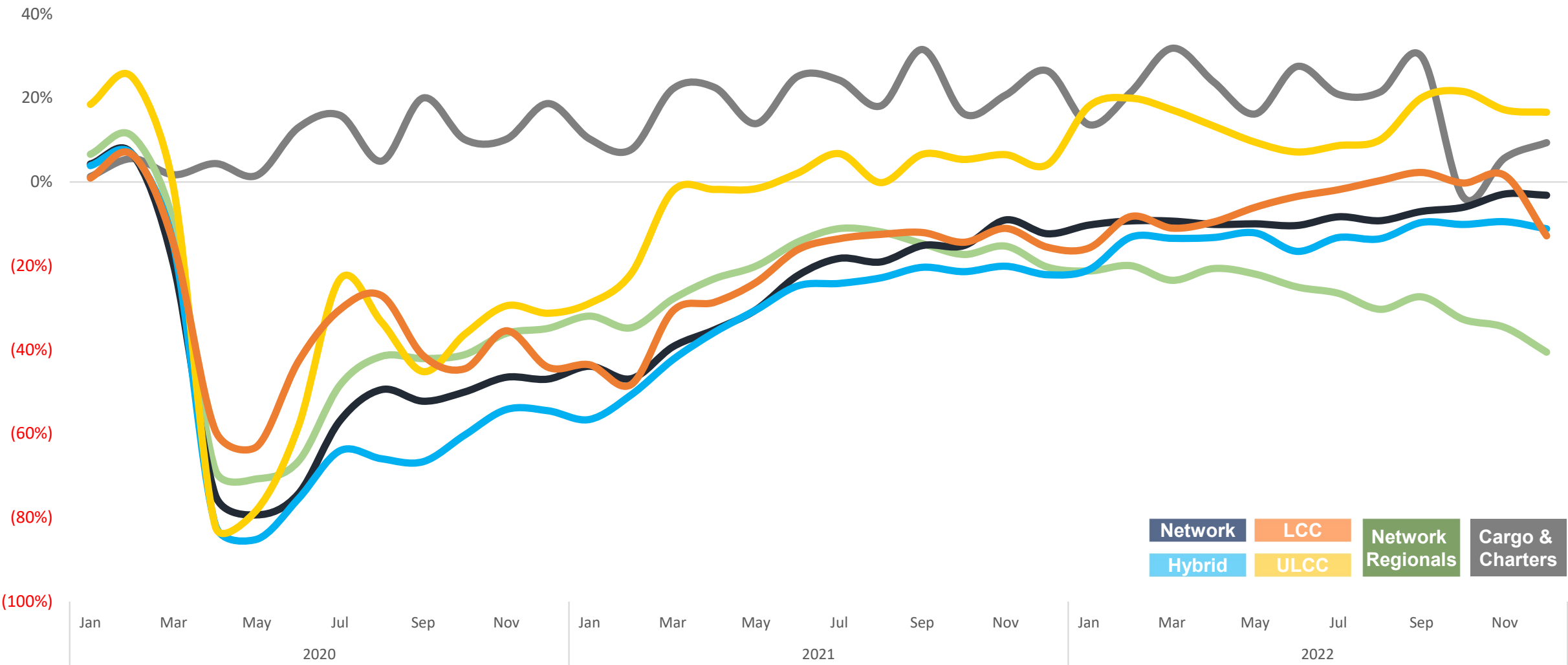
Source: T100 ; Note: See appendix for full list of carriers included.

Pilot scarcity is dramatically altering regional landscape

Regional % of Domestic Seats & Departures
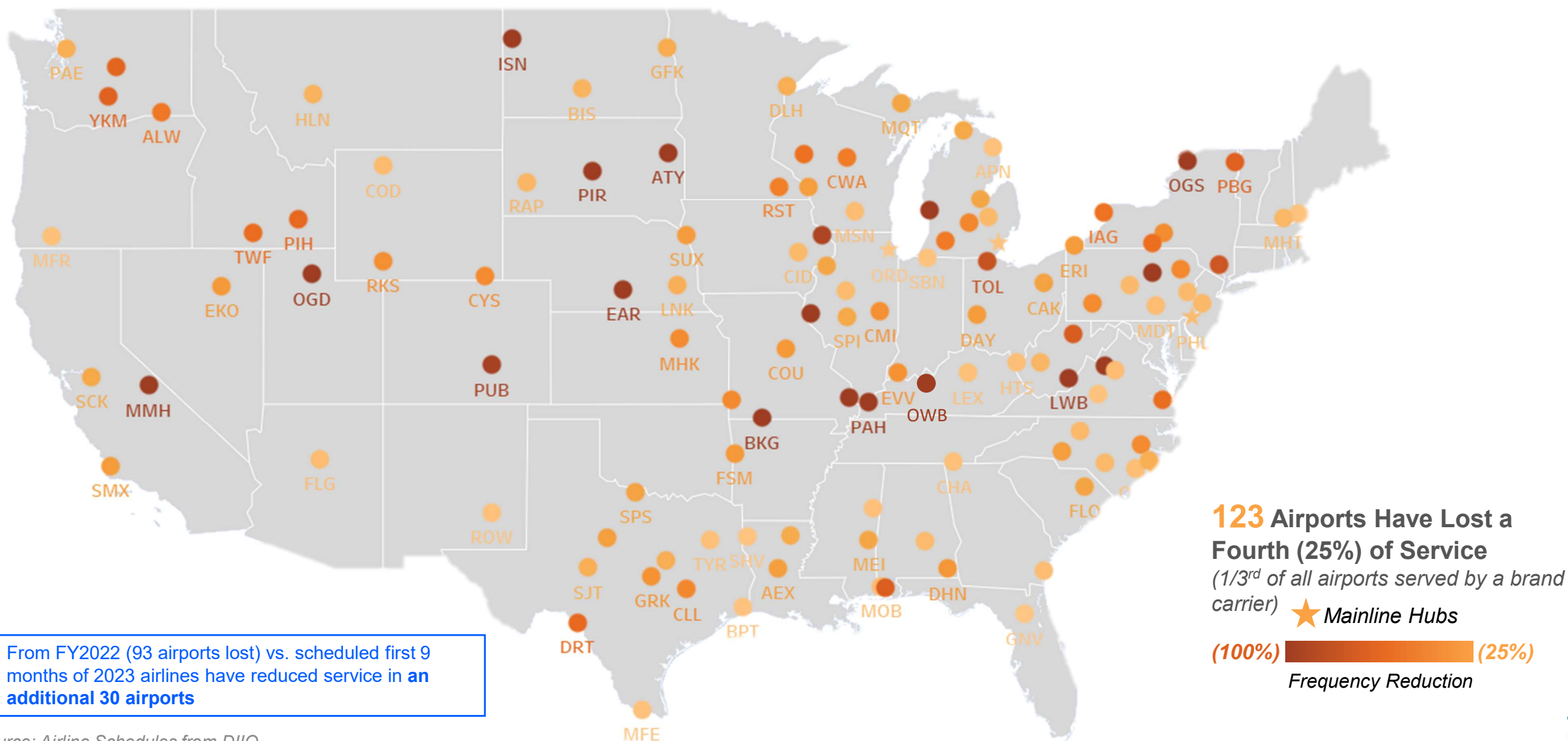*2003 Q4 - 2022 Q4(actual) / 2023 Q3(estimated)*

Turboprop, DC-9, 737-200, Fokker 100 Replacement

Regional up-gauging - % of seats are flattish while departures drop

45%   **47%**   **38%**

98   **123**   **139**

20%   **26%**   **20%**   **13%**

27%

Rapid decline of regional flying

━━ % of Departures   ━━ % of Seats   ━━ Seats per Departure

2000 Q1   2002 Q1   2004 Q1   2006 Q1   2008 Q1   2010 Q1   2012 Q1   2014 Q1   2016 Q1   2018 Q1   2020 Q1   2022 Q1

Source: Airline Schedules.

Result – meaningful loss of air service that is unlikely to be restored
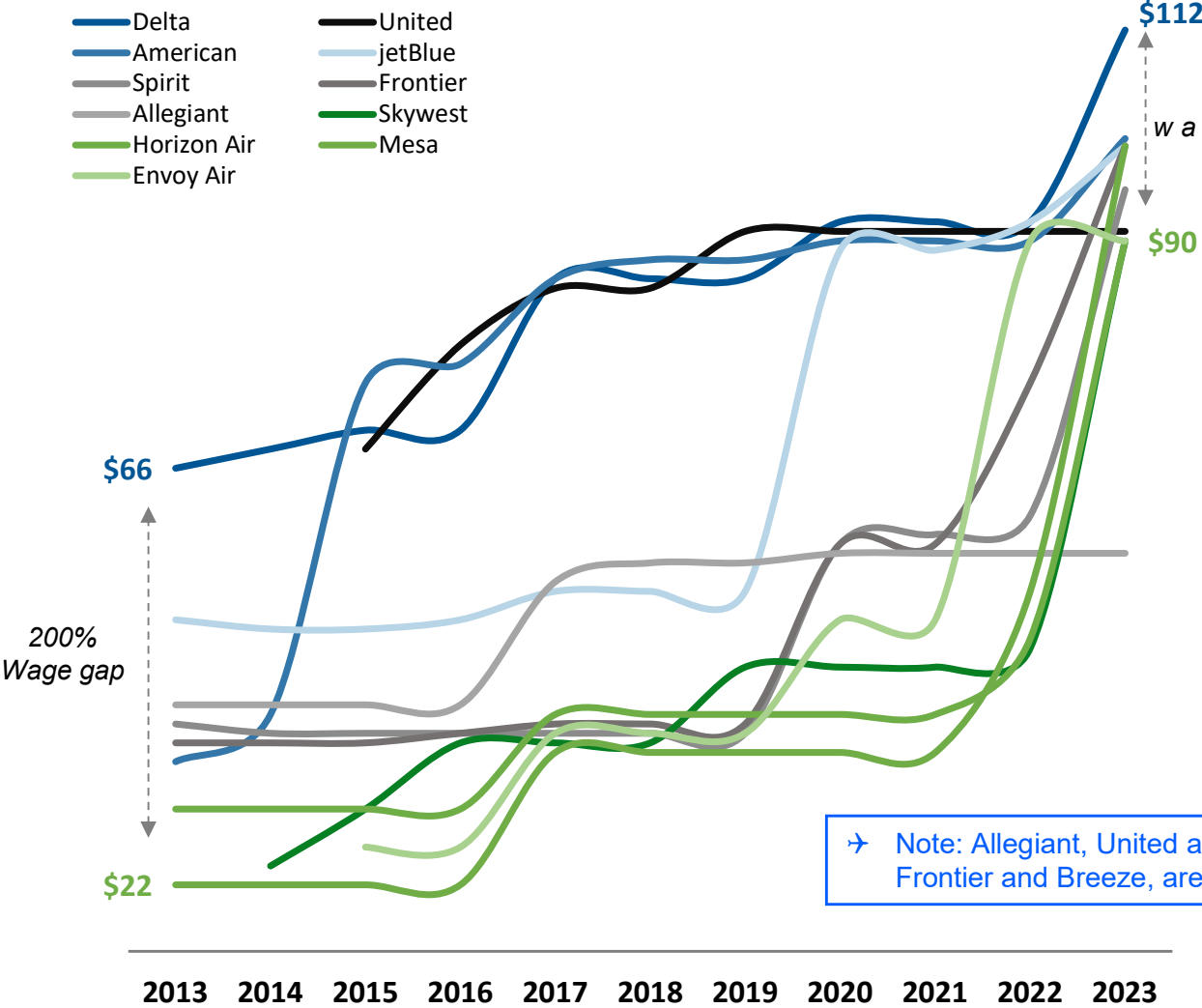
Airports with Lost Service from Brand Airline
First 9 months of 2023 vs. 2019

123 **Airports Have Lost a Fourth (25%) of Service**
(1/3rd of all airports served by a brand carrier) ⭐ *Mainline Hubs*

(100%) [===== Frequency Reduction gradient =====] **(25%)**
Frequency Reduction

✈ From FY2022 (93 airports lost) vs. scheduled first 9 months of 2023 airlines have reduced service in **an additional 30 airports**

Source: Airline Schedules from DIIO

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Raising pay has not addressed the scarcity

First Officer Hourly Pay Trend
Year One Rates
2013 - 2023

Legend: Delta, American, Spirit, Allegiant, Horizon Air, Envoy Air, United, jetBlue, Frontier, Skywest, Mesa

$112
25% wage gap
$90
$66
200% Wage gap
$22

→ Note: Allegiant, United and Southwest and shortly, Frontier and Breeze, are in open contract negotiations

2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

Captain Hourly Pay Trend
Year 12 Rates
2006 - 2023

Legend: Southwest, Airtran, United, Spirit, Allegiant, Horizon Air, Delta, American, US Airways, jetBlue, SkyWest, Mesa

9% Wage gap (Current negotiations bottom to top)
$335
$306
$206
82% Wage gap (bottom Mainline top Mainline)
$113
$191
$95
$79
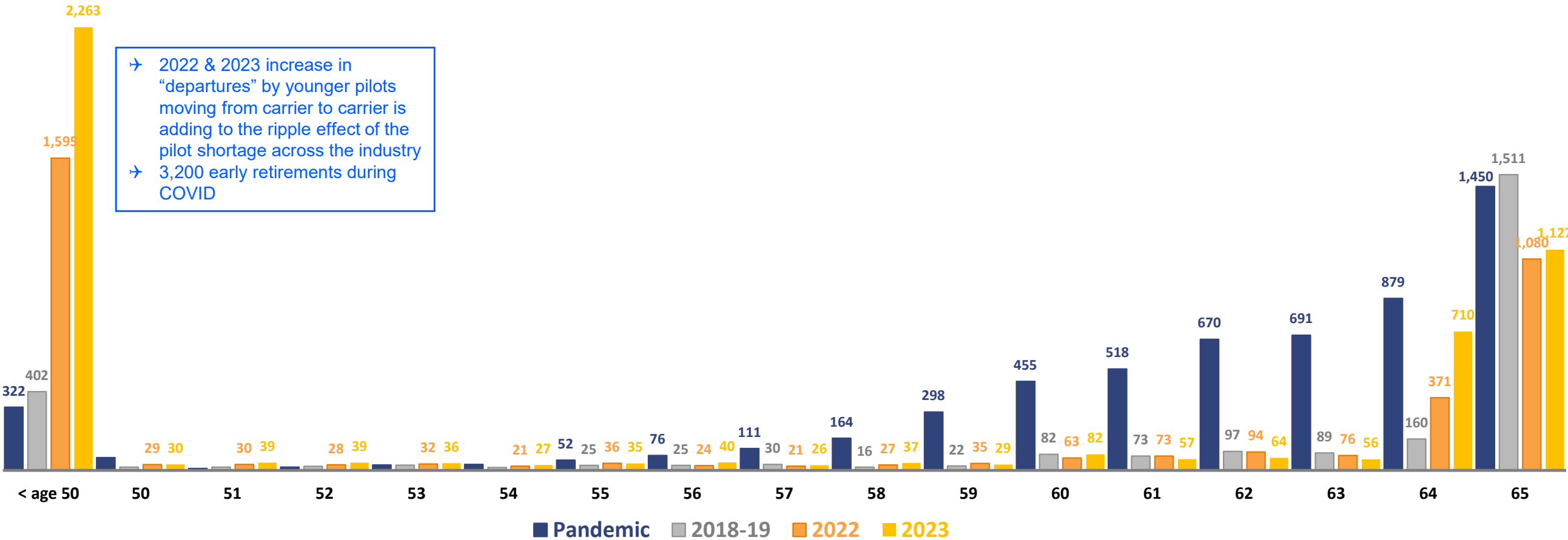
2006 2008 2010 2012 2014 2016 2018 2020 2022
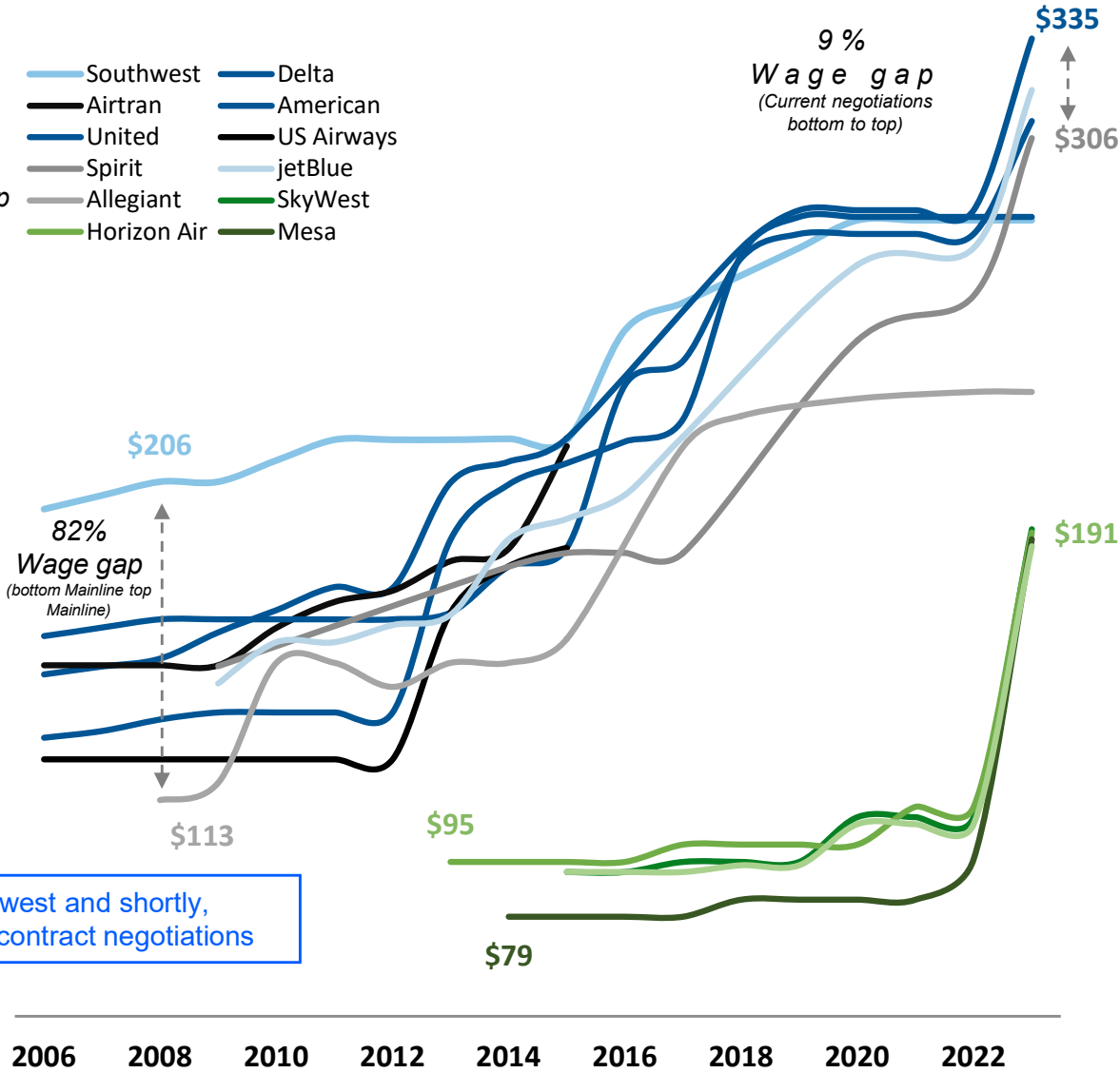
Source: Pilot CBA agreements and AirlinePilotCentral (WayBack Machine)

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Early retirements and behavior changes from COVID

Retirements / Departures by Age
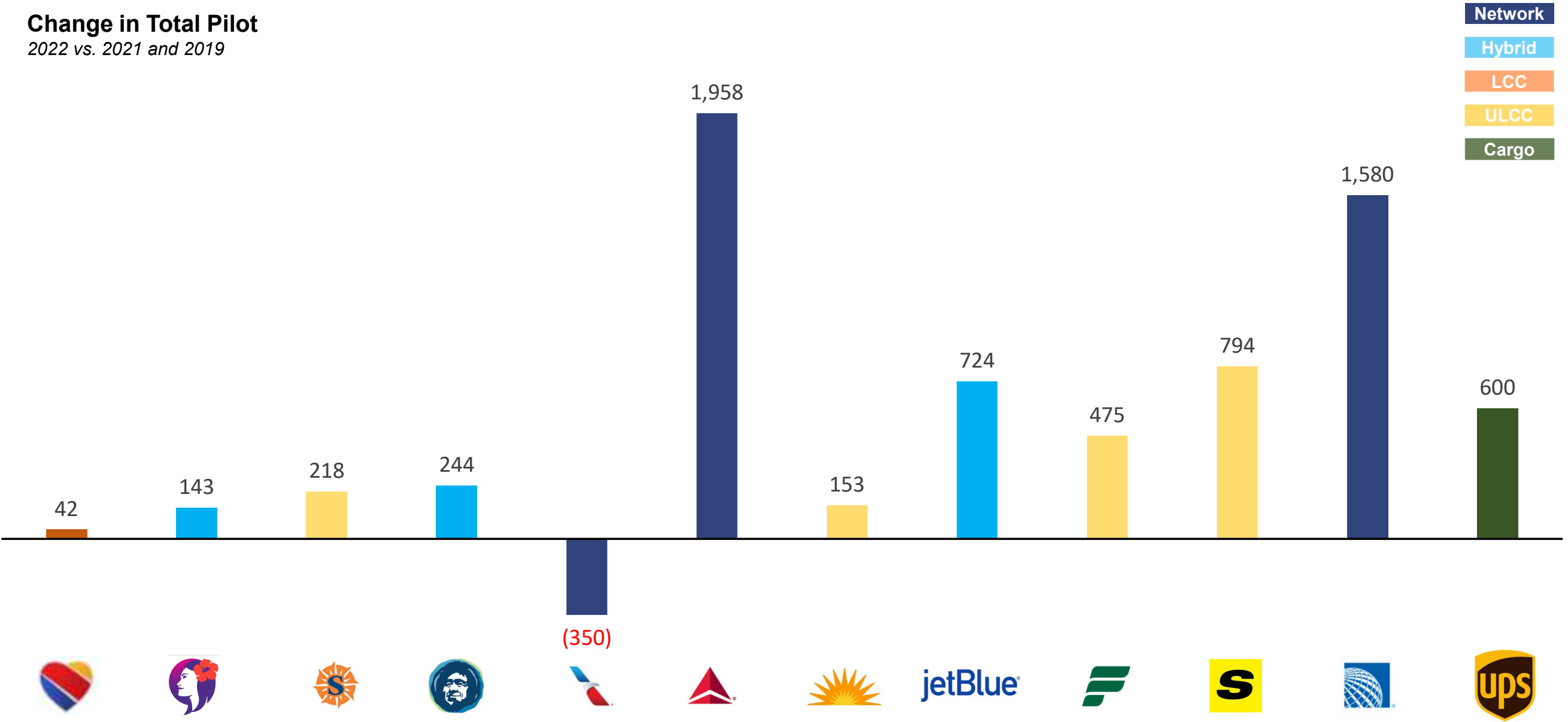*TTM Aug. 19 vs Jan 20 to May 21 vs Jun 21 to April 22, April 22 – May 23*

✈ 2022 & 2023 increase in "departures" by younger pilots moving from carrier to carrier is adding to the ripple effect of the pilot shortage across the industry
✈ 3,200 early retirements during COVID

Legend: ■ Pandemic ■ 2018-19 ■ 2022 ■ 2023

Source: NACU pilot age data. Carriers that provided data included.

Pilot ranks grew but… not enough to get back to 2019 capacity levels

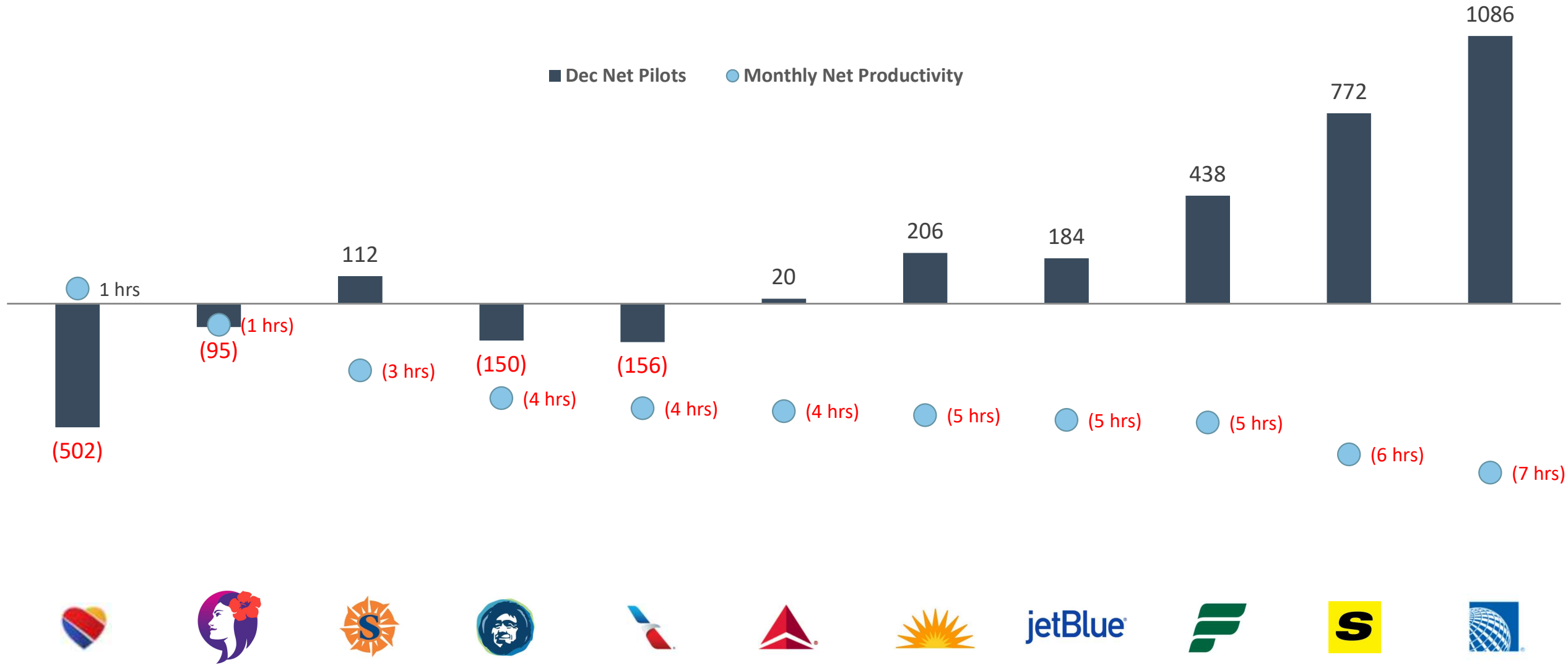**Change in Total Pilot**
2022 vs. 2021 and 2019

Legend:
- Network
- Hybrid
- LCC
- ULCC
- Cargo

Values: 42, 143, 218, 244, (350), 1,958, 153, 724, 475, 794, 1,580, 600

Pilot execution – where did we end up?

Net Mainline Line Holders & Hard Productivity
Dec. 2019 vs. Dec. 2022

Source: NACU

Industry Options

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Alternative means of compliance – FAA approval?

Extend pilot use – As part of our analysis, we looked at the option of pushing the federal retirement age to 67, however this only really kicks the problem further out by two years rather than solving the scarcity.

Reduce pilot demand – Could provide an opportunity to rethink crew staffing and improve productivity by reducing total pilots required in the cockpit to one (1) while driving down costs. This is likely several years away from widespread adoption especially in passenger flights, however, presents an opportunity to reduce total number of pilots required to operate an airline fleet.

Reinforce the pipeline – Actionable steps could be taken now. Airlines have the control and means to continue investing in training programs and pilot recruitment. Furthermore, there have been numerous advances in simulator technology allowing for sophisticated training programs to be developed permitting airlines to take innovative steps to help reduce the pressures on the pipeline. Recruiting new pilots is critical and training programs need to provide the resources to allow pilots to be successful.

Expand visas for international pilots – Visas for prospective international pilots could be expanded potentially mirroring the Australian E-3 program as a template. To be successful, this program would also need a pathway to a Green Card. *US Talent is going abroad.*
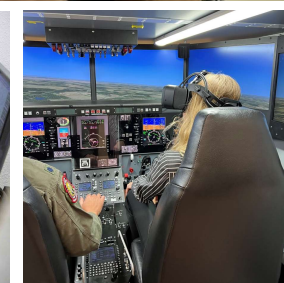
age

67

Cockpit Pilots

student

commercial pilot
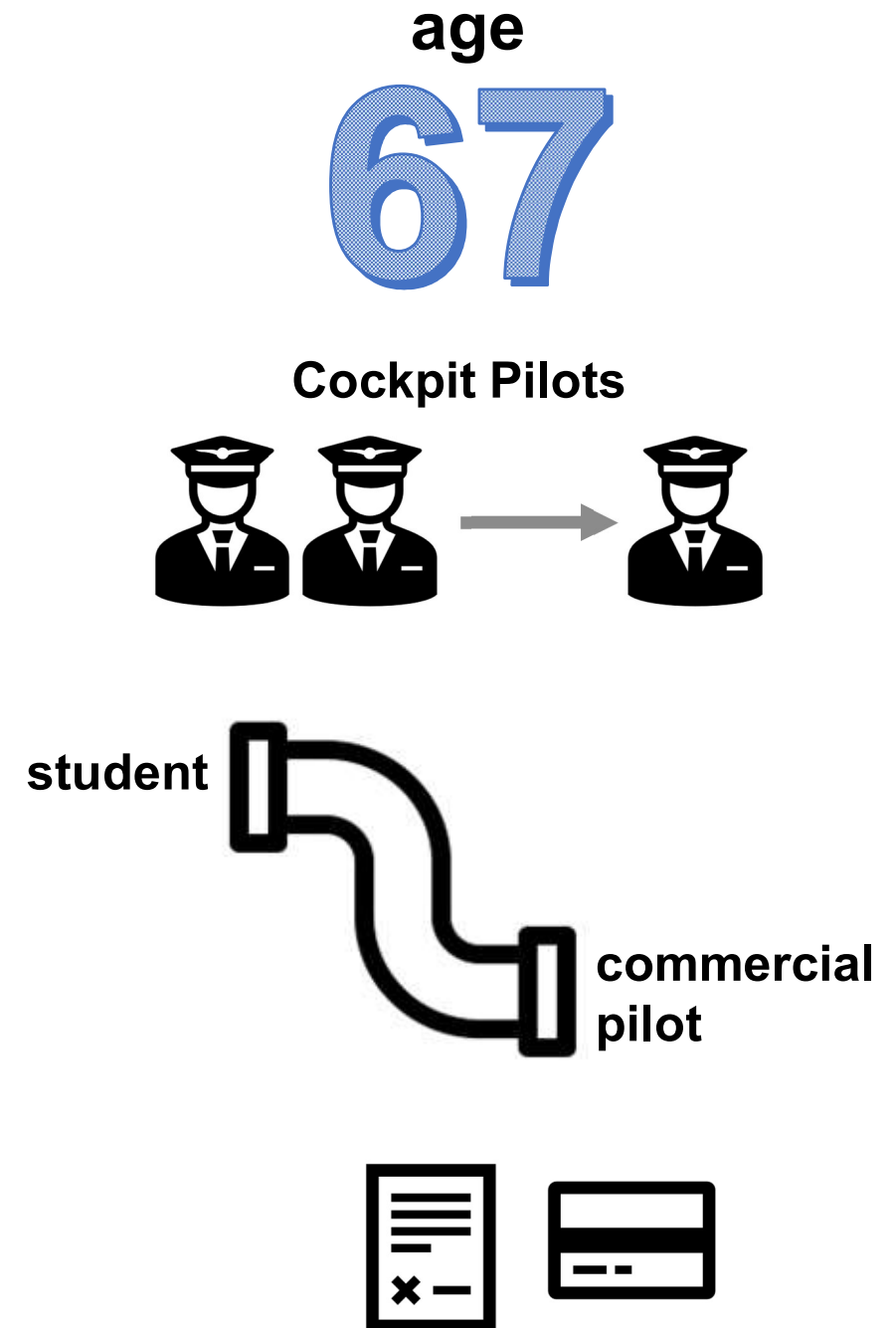
Insights from our Military

U.S. AIR FORCE

Pilot Training Next (PTN)

- Immersive technology * Biggest ROI
- Student center learning
- Human performance optimization
- Seamless access to quality content
- Quality Instructor Pilots
- Encourage Questions – more asking
- Coach / Athlete mentality
- Modernize the way the world's biggest air arm trains its new aviators

T-1A Training course

Before — Aircraft-heavy

After — Simulator-heavy

0 Weeks   5 Weeks   10 Weeks   15 Weeks   20 Weeks   25 Weeks

Source: The Air Force's Virtual Reality Fighter Training Is Working Best for 5th-Gen Pilots | Military.com

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Safety above all else?

3.2 Probable Cause

The NTSB determines that the probable cause of this accident was the inappropriate response by the first officer as the pilot flying to an inadvertent activation of the go-around mode, which led to his spatial disorientation and nose-down control inputs that placed the 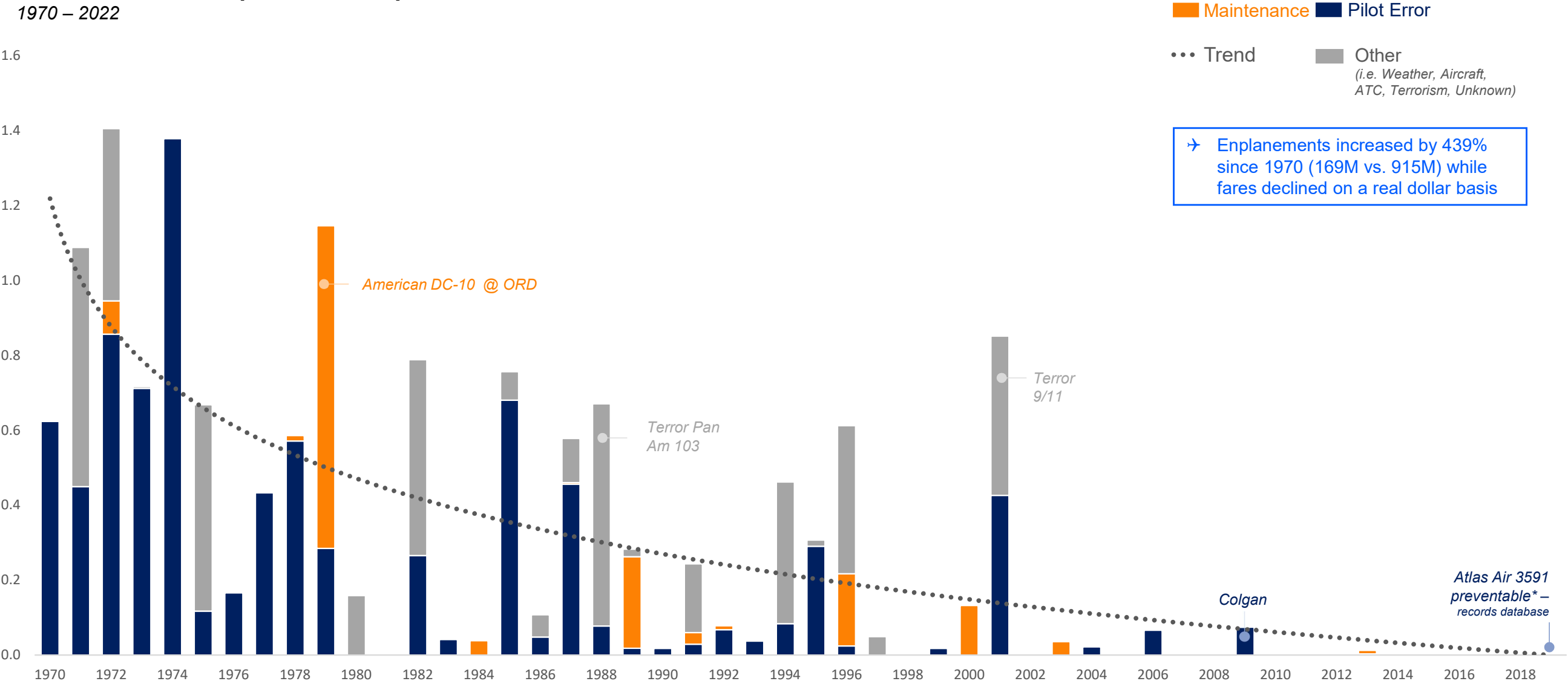airplane in a steep descent from which the crew did not recover. Contributing to the accident was the captain's failure to adequately monitor the airplane's flightpath and assume positive control of the airplane to effectively intervene. Also contributing were systemic deficiencies in the aviation industry's selection and performance measurement practices, which failed to address the first officer's aptitude-related deficiencies and maladaptive stress response. Also contributing to the accident was the Federal Aviation Administration's failure to implement the pilot records database in a sufficiently robust and timely manner.

2014 –
Part 117 Fatigue Rules implemented

2013 –
ATP (1,500hrs) required certificates conversation deadline

2021 –
Start: Pilot Record Database (PRD)

2009 –
Colgan Air Crash; 50 Fatalities

COLGAN AIR

2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029

2010 –
Airline Safety and Federal Aviation Administration Extension Act of 2010
New Policy
1. Part 117 Fatigue Rules
2. ATP (1,500hrs) required (implemented)
3. Pilots Record Database (PRD)
4. Commuting Rules *(Never implemented blocked by ALPA)*

2019 –
Atlas Air; 3 Fatalities
Tragic but preventable accident

ATLAS AIR

See appendix for NTSB 3.2 Probable Cause

2029 –
Target Date for completed implementation of Pilot Record Database (PRD) finished
20 years post accident

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Commercial aviation safety had dramatically improved since the 70s

Historical Fatalities per Million Enplanements
1970 – 2022

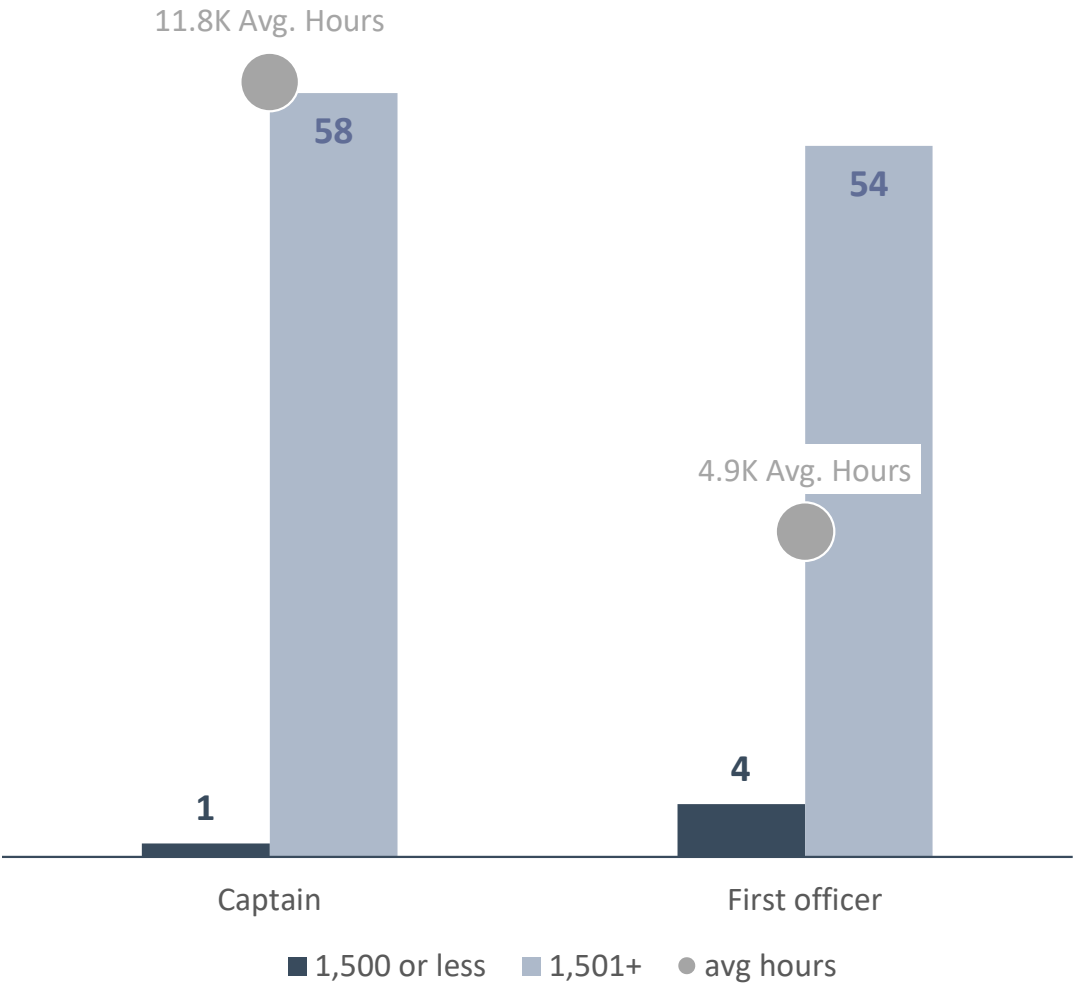Legend: Maintenance (orange), Pilot Error (dark blue), Trend (dotted), Other (gray) *(i.e. Weather, Aircraft, ATC, Terrorism, Unknown)*

Callout: ✈ Enplanements increased by 439% since 1970 (169M vs. 915M) while fares declined on a real dollar basis

Chart annotations: American DC-10 @ ORD; Terror Pan Am 103; Terror 9/11; Colgan; Atlas Air 3591 preventable* – records database

*Source: NTSB and BTS T-100. *NTSB probable cause statement cites lack of pilot records database as contributing factor to accident. Concurring opinions went even further.*

Pilot error accidents: comparative analysis of total pilot hours

**Pilots Total Hours in Pilot Error Accidents
in Passenger Operations**
1970 – 2023

11.8K Avg. Hours
58
4.9K Avg. Hours
1
4
Captain
First officer

■ 1,500 or less   ■ 1,501+   ● avg hours

**Pilot Error Accidents on Passenger Flights
by Pilot Hours**
1970 – 2023

■ Captain   ■ First officer

1,500
Hours

0-750, 751-1500, 1501-2250, 2251-3000, 3001-3750, 3751-4500, 4501-5250, 5251-6000, 6001-6750, 6751-7500, 7501-8250, 8251-9000, 9001-14000, 14001-21000, 21001-26000, 26001+

Pilots' total flight hours
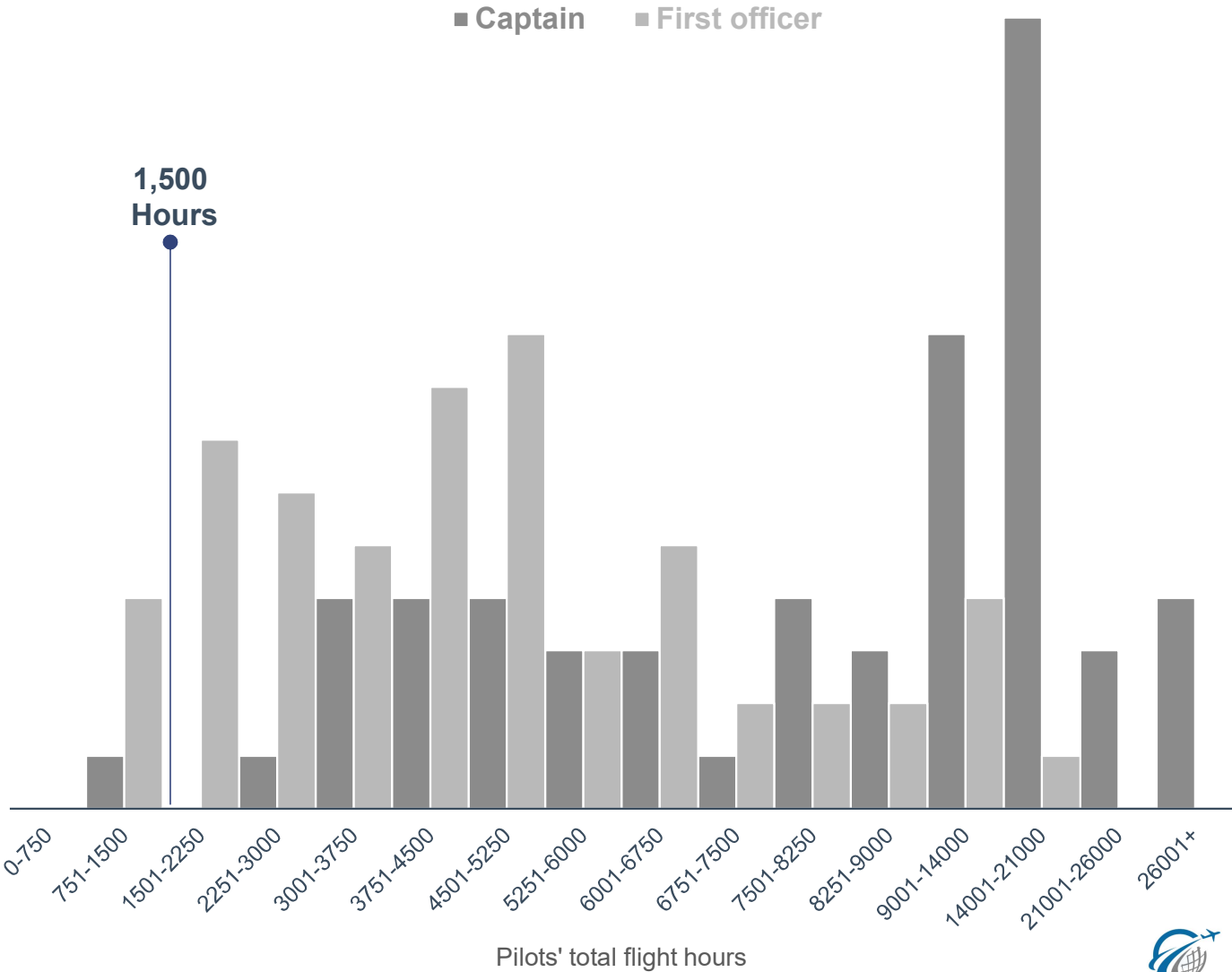
Source: NTSB reports

Sims – reduce training fatalities & CO2 emissions

Training Fatalities
2019 – 2023

At Least 56 Flight Training Fatalities Since 2019

17

14

10

8

7

2019   2020   2021   2022   2023
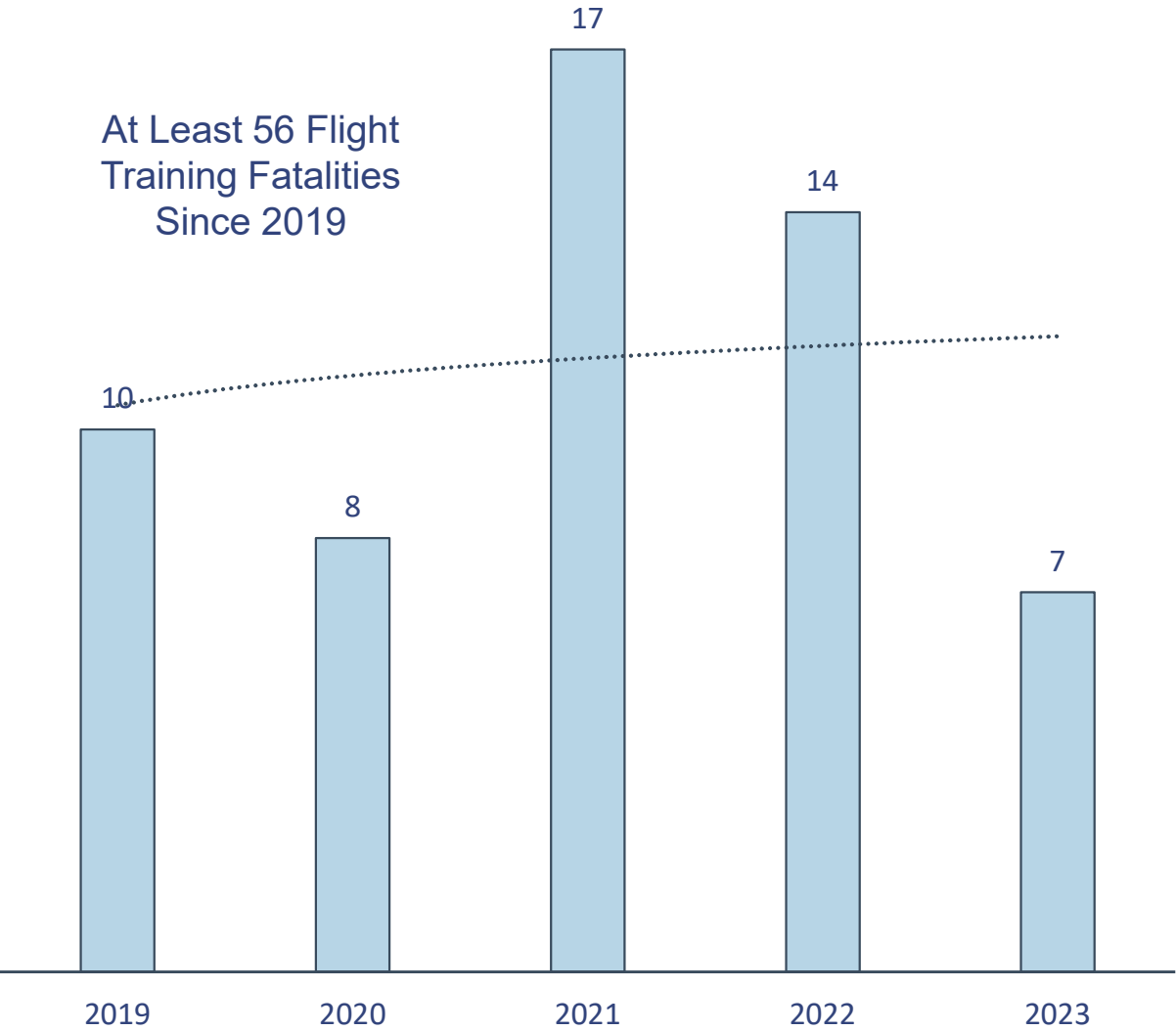
Training Impact on the Environment
Illustrative Cessna 172 vs sim training

Burns 116 tons of CO2 or 13 Tyrannosaurus Rex

Burns only 0.3 tons or 3% of 1 Tyrannosaurus

1,500 hours of Cessna 172 time

1,500 hours of Level D simulator time
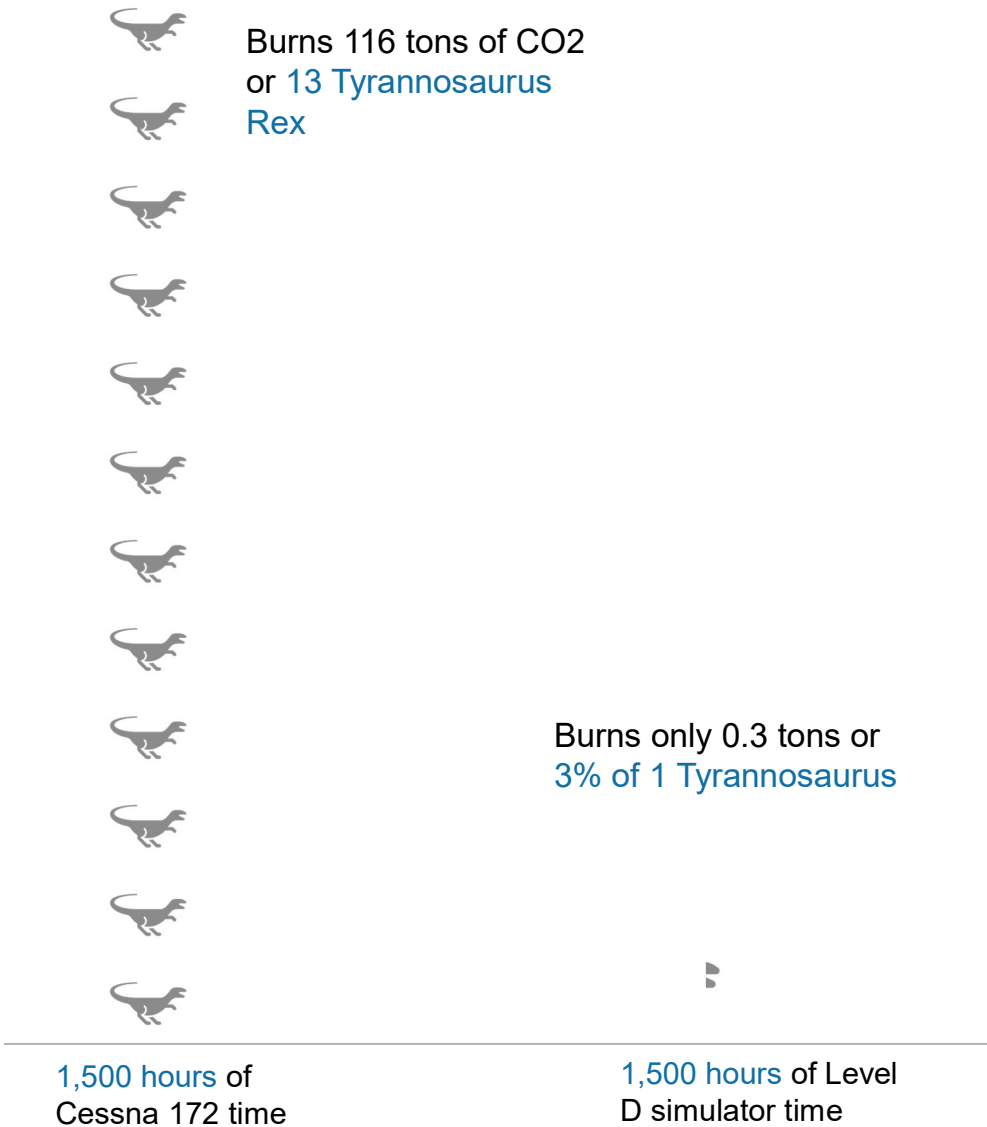
Source: aviation-safety.net, includes fatalities reported in their database involving flight instruction in common training aircraft types
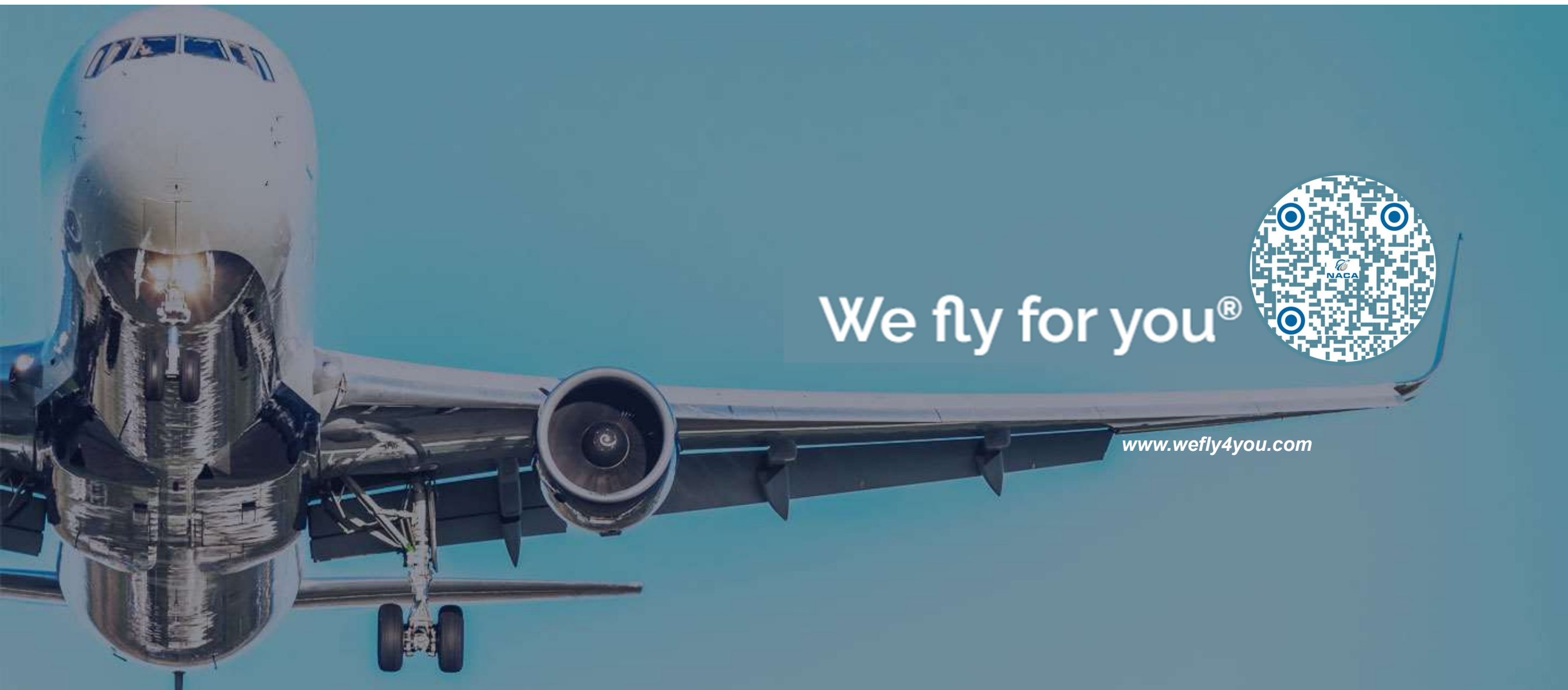
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Allegiant's pilot outlook analysis

2022

We conducted a comprehensive and dynamic analysis of the pilot outlook for the U.S aviation industry through 2030.

Our forecasts are made based on the number of pilots in 2019 and 2021 and block hours @ 2019 & 2021 flying levels –this allowed us to establish a productivity baseline and pilot utilization baseline for the industry.

We further included two economic input assumptions – fuel and GDP. By changing these variable inputs, we are able see the different potential outcome severities of the scarcity.

We believe every dollar of fuel price is worth about 1% of industry growth and created a **Low** ($1 per gallon), **Baseline** ($2 per gallon) and **High** ($3 per gallon) input model manipulation ability. Further we believe every point in GDP growth is worth ~2% of industry capacity growth and created a **Low** (1.3%), **Baseline** (2.3%) and **High** (3.3%) GDP input model manipulation ability.

2023

We **UPDATED** our comprehensive and dynamic analysis of the pilot outlook for the U.S aviation industry through 2032.

Our forecast use updated based on the number of pilots in 2022 and block hours in 2022 – we removed the feathering back to 2019 productivity levels as we don't foresee this happening over the near to mid-term.

We further included the same two economic input assumptions – fuel and GDP. (See above for the details).

The graphs and charts in this presentation use baseline assumptions for Fuel and GDP.

100% of industry sectors

Industry dynamics considered

10+ data unique data sources

CARRIERS INCLUDED IN THE ANALYSIS

Majors (13) – *American, United, Delta, Hawaiian, Alaska, JetBlue, Spirit, Allegiant, Frontier, Sun Country, Avelo, Breeze*

☐ Color code

Regionals (11) – *GoJet, Endeavor, Enovy, SkyWest, Republic, CommutAit, PAS Airline, Air Wisconsin, Horizon Air, Mesa Airlines, Piedmont Airlines*

☐ Color code

Cargo & Charters (16) – *Air Transport International, Amerijet, Atlas Air, Everts Air , GlobalX, iAero Airways, Kalitta Air, Lynden Air, Miami International, Northern Air, Omni Air International, USA Jet Airlines, Western Global Airlines, World Atlantic Airlines, FedEx, UPS*

☐ Color code

Fractional (4) - *NetJets, Airshare, FlexJet, PlaneSense*

☐ Color code