



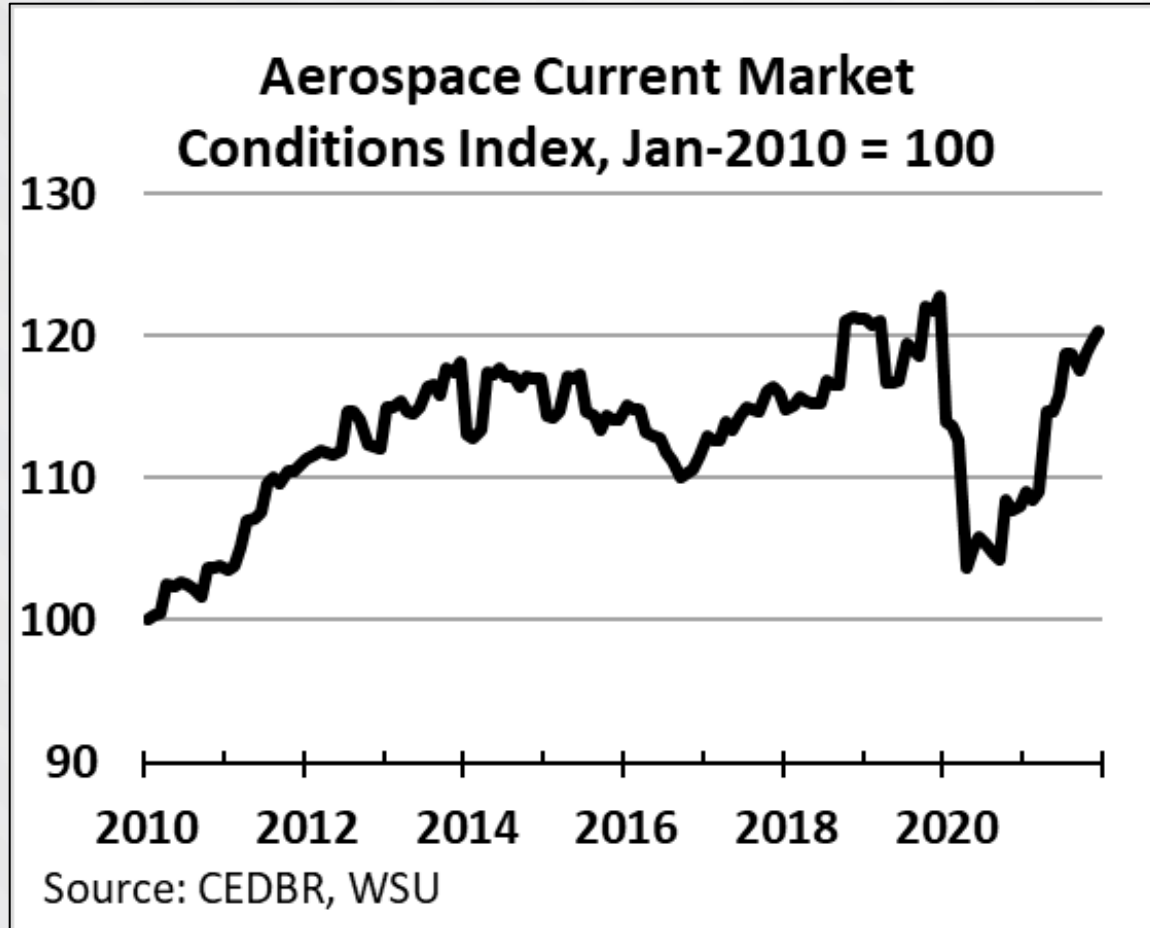
Aerospace – By the Numbers



Current Conditions Index

- **Producer Price Indexes of Aerospace Production and Transportation**
- **Civilian Aircraft Exports**
- **National Defense Investment in Aircraft**
- **Aerospace Industrial Production Index**
- **Aerospace Production Worker Wages and Employment**
- **Manufacturing Sector Labor Productivity**

Current conditions are now back to pre-pandemic levels

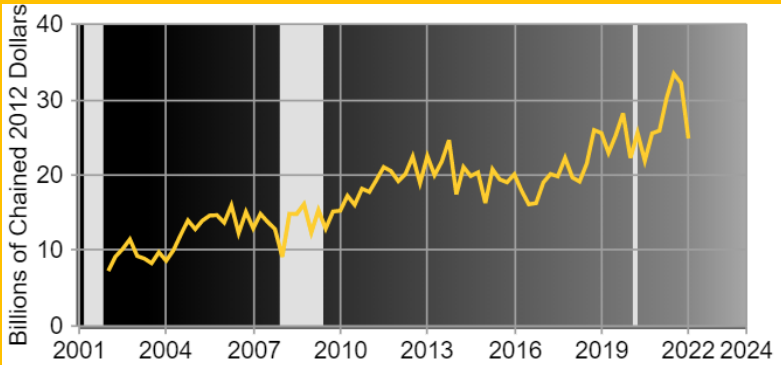


- **Components:**
 - Civilian Aircraft Exports,
 - Aerospace Production Index,
 - National Aerospace Defense Investment,
 - Aerospace Worker Wages and Employment
- **2022** – The index is up 7.1% over the previous year.
- **Average Annual Growth** – 2.3% since 2010

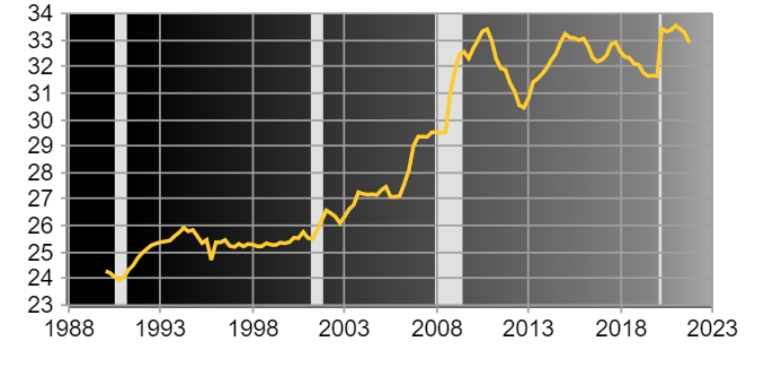
- Although the index has not fully recovered to pre-pandemic, trend remains optimistic.

Contributions to the Current Market Conditions Index

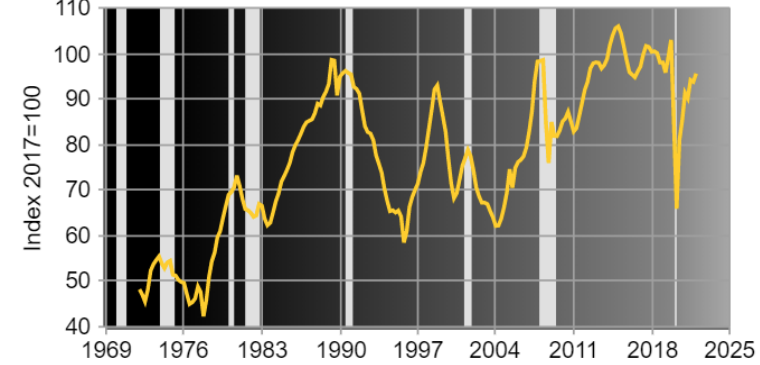
Aircraft Defense Investment



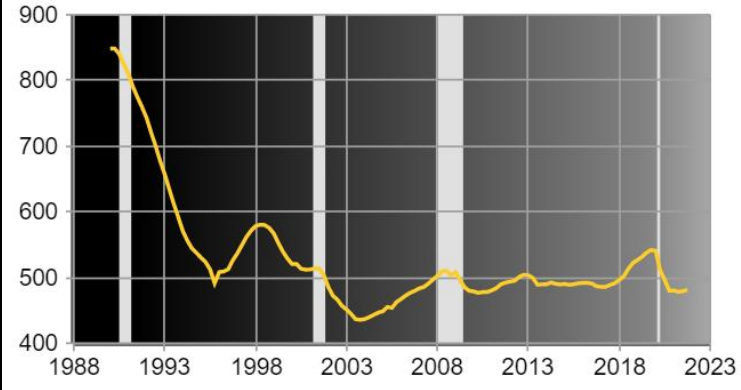
Aerospace Production Worker Real Wages



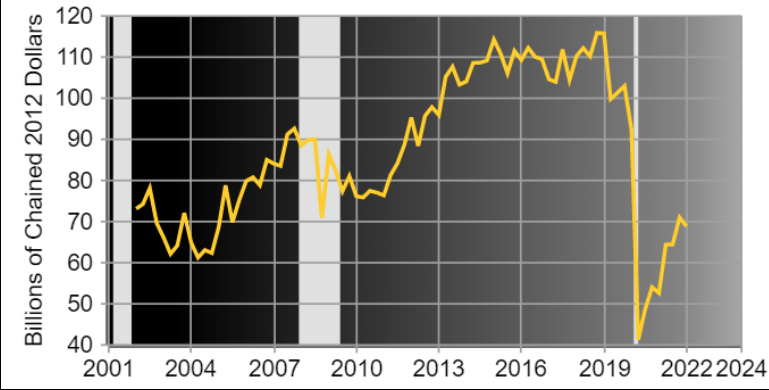
Industrial Production Index



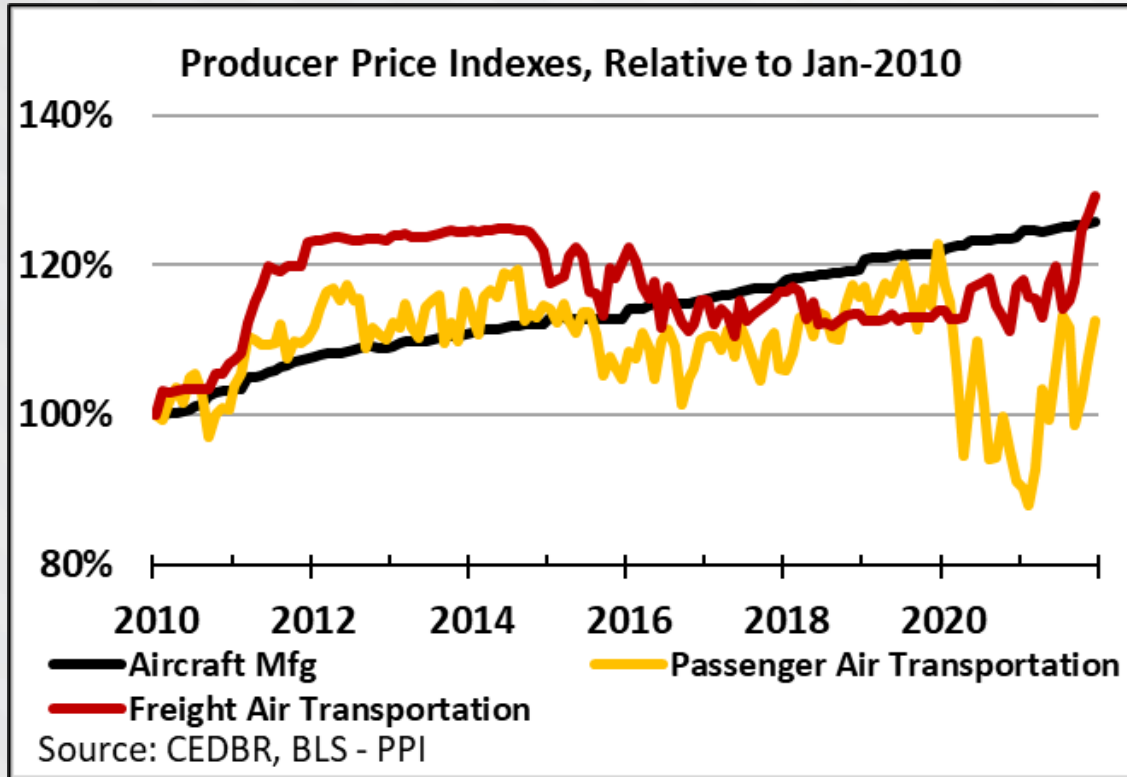
Aerospace Production Worker Employment



Civilian Aircraft Export Value

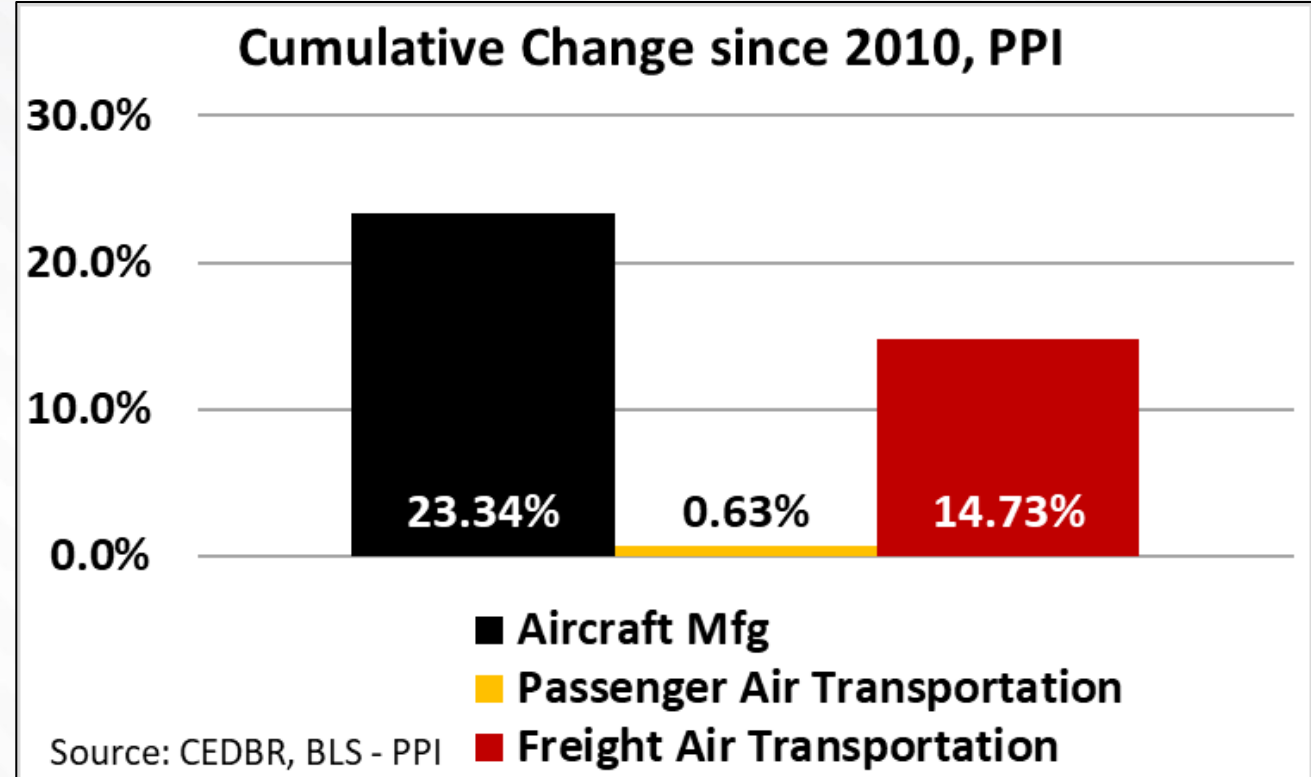


Aerospace business costs accelerate over the last year.



Trends In Past Year

- CPI: 4.7%
- Private Worker Labor Cost: 3.6%
- Aircraft Manufacturing Labor Cost: 7.2%



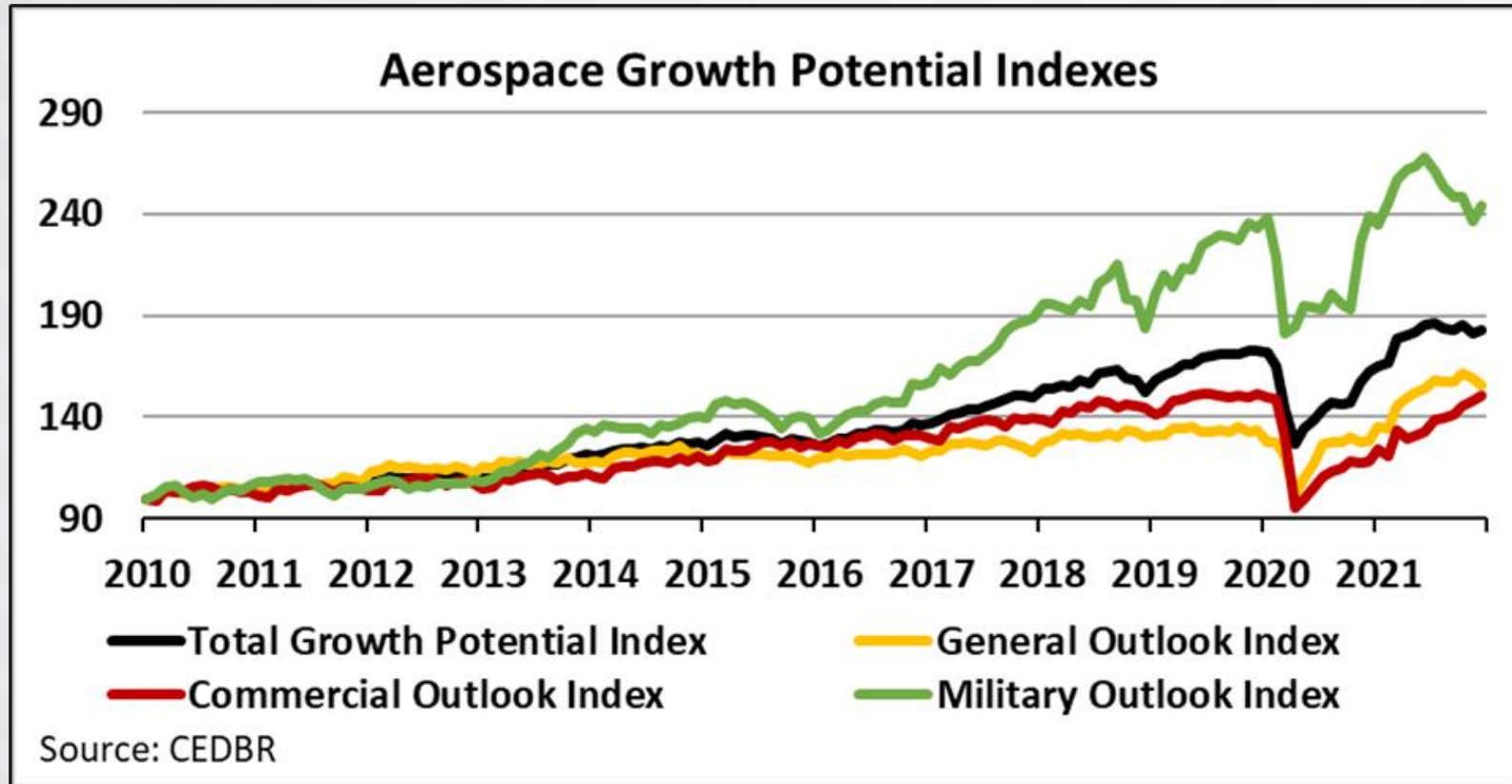
Trends Since 2010

- CPI: 24.3%
- Private Worker Labor Cost: 30.0%
- Aircraft Manufacturing Labor Cost: 36.0%



Aerospace Potential Indexes

Aerospace Growth Potential Index



- **2010 – 2016** – Great Recession recovery
- **2017 – 2020** – Strong growth
- **2020** – COVID-19 shock
- **2021 – Now** – Recovery and return to growth

Components

General

- Global and US Nominal GDP
- Corporate Profits
- Total Business Jet Operations

Commercial

- Real Gross Domestic Product
- Consumer Disposable Income
- Consumer Spending
- Unemployment Rate
- Airline Passenger Enplanements
- CPI – Airline Fares

Military

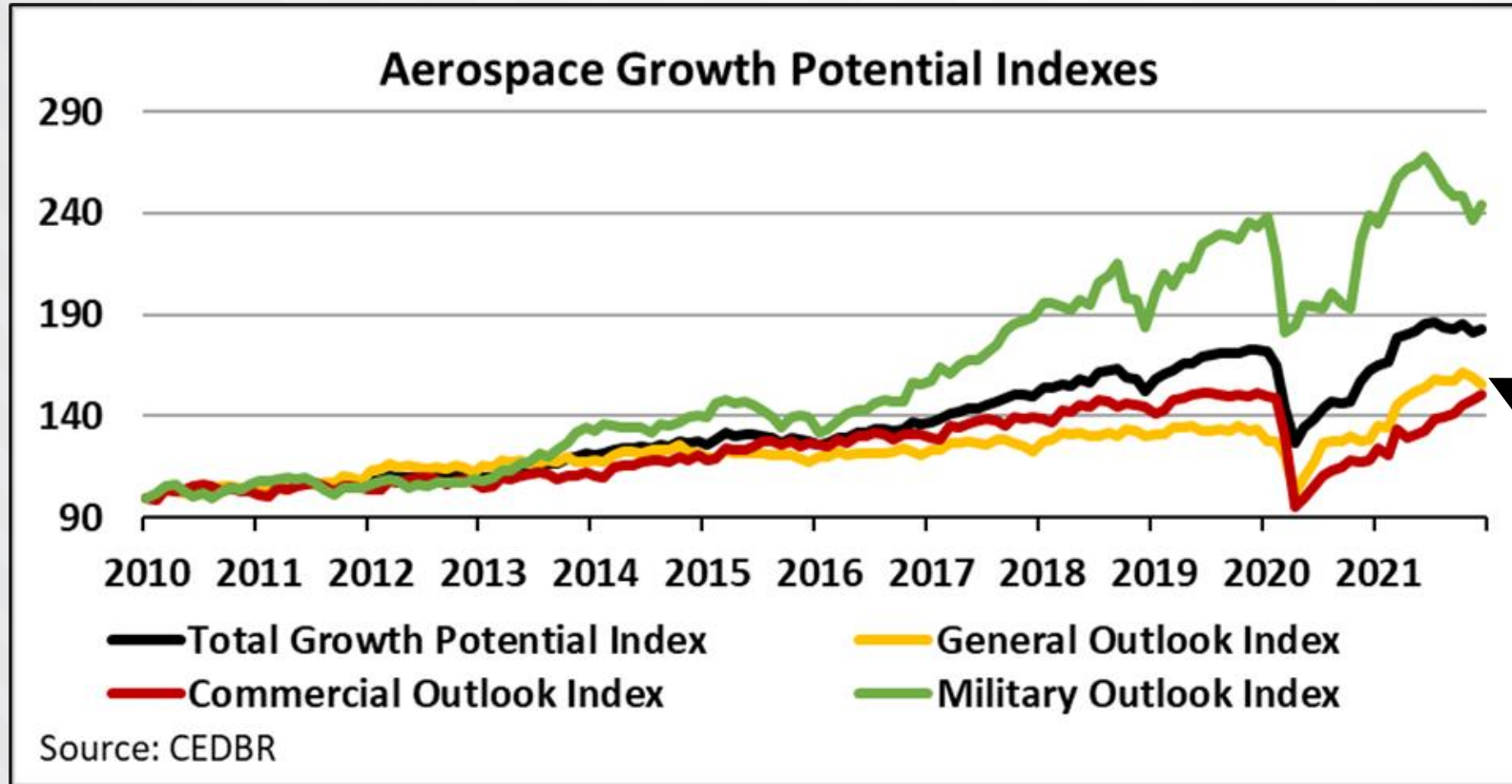
- National Defense Expenditures
- US Debt/GDP Ratio
- S&P Aerospace/Defense Index



General Aerospace Outlook

- Global and US Nominal GDP
- Corporate Profits
- Total Business Jet Operations

Aerospace Growth Potential Index: **General Aerospace**

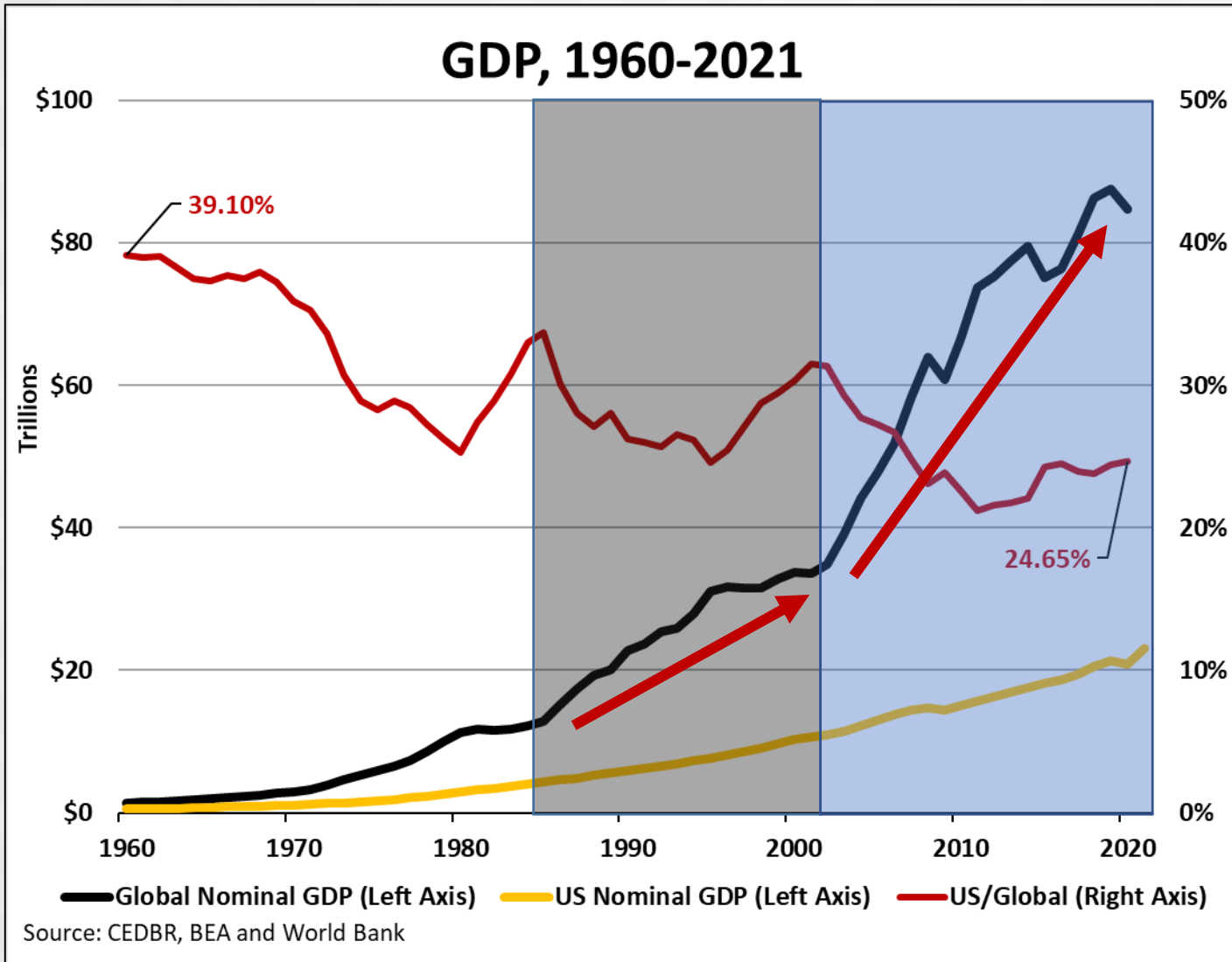


Components

- Global and US Nominal GDP
- Corporate Profits
- Total Business Jet Operations

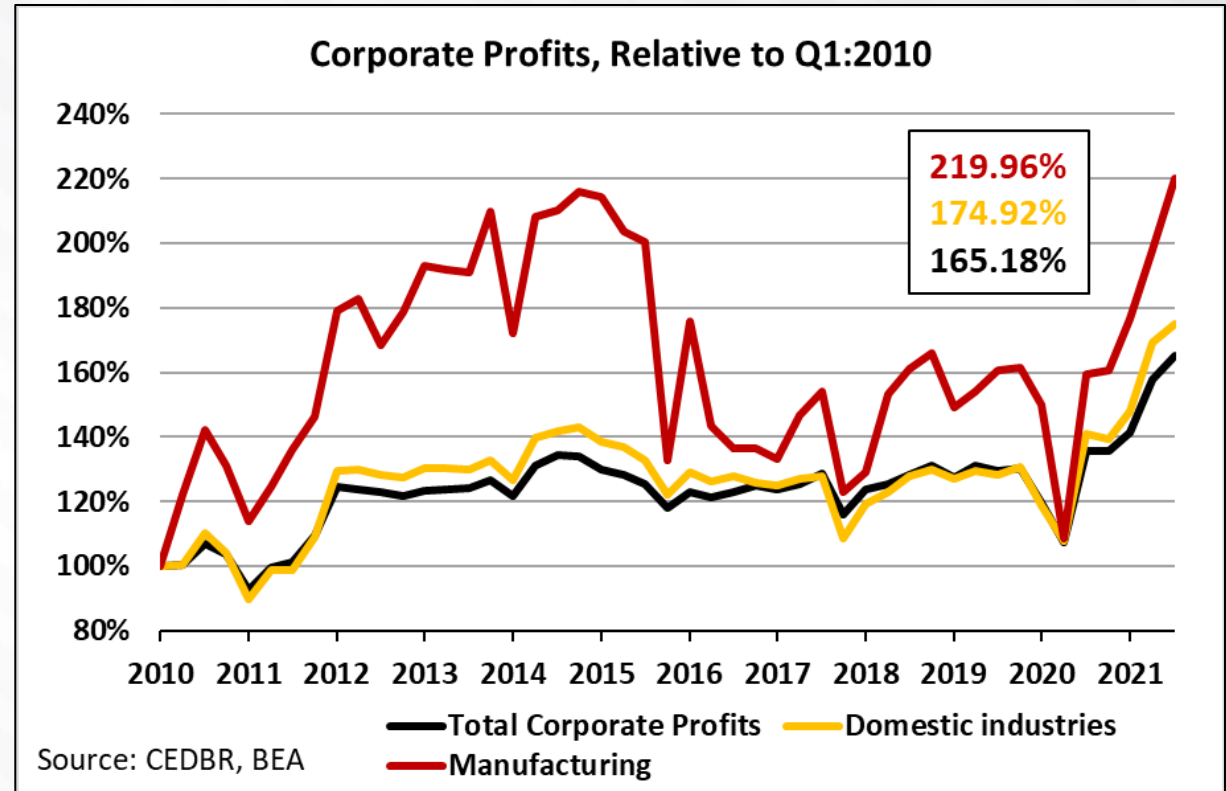
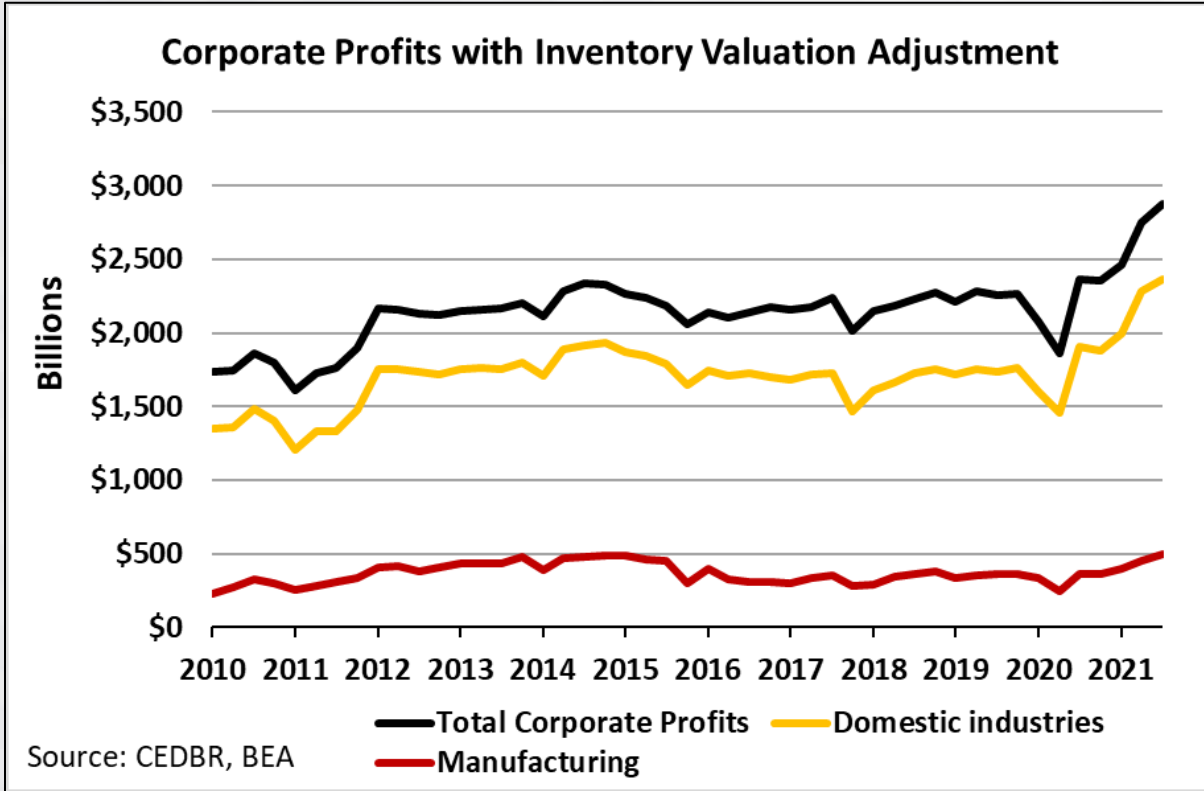
- **Since Jan-2010: 55.48%**
- **Since Jan-2020: 27.77%**

Global vs. US GDP



- **Global GDP** – Since 2002 growth accelerated
- **US GDP** – has consistently grown over the long-run
- **US/Global GDP**
 - US share has decline over the last 60 years
 - Now ¼ of the global economy

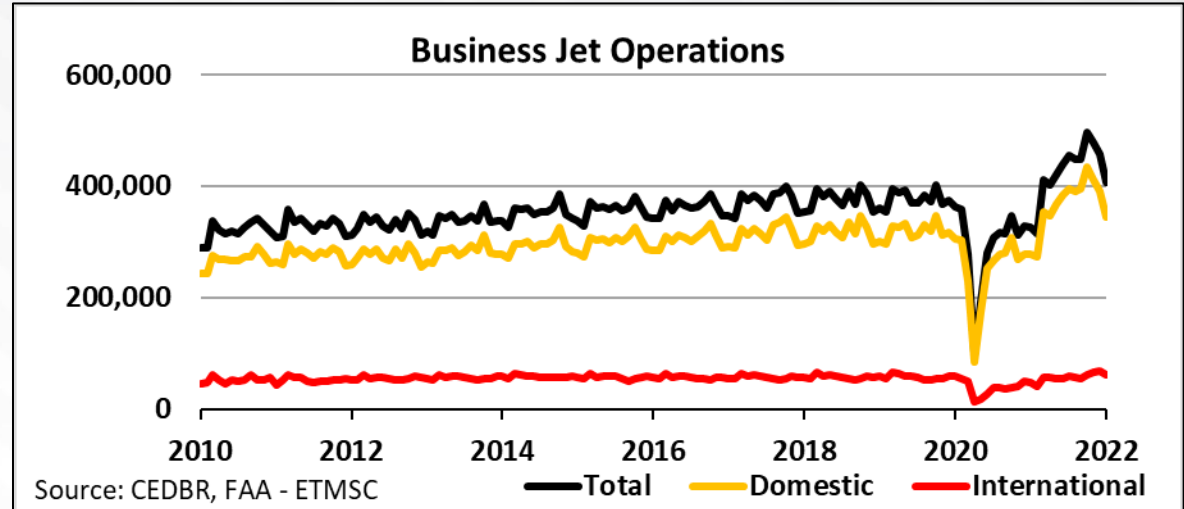
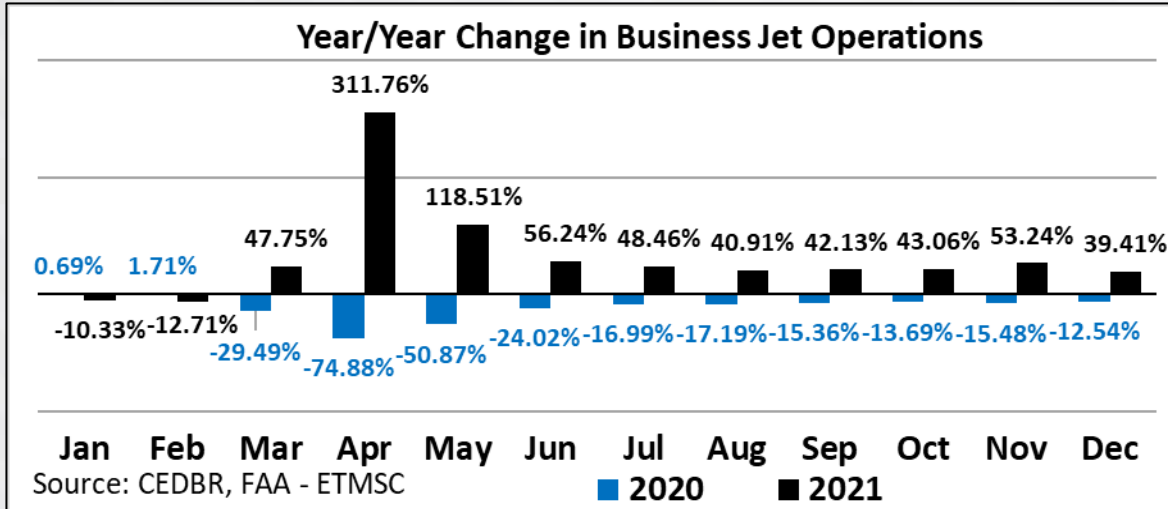
Corporate Profits are at historic highs



- **Total Profits** – accelerated post COVID
- **Manufacturing** – currently experiencing the fastest growth in a decade

- Will **Corporate Profits** return as a leading indicator?

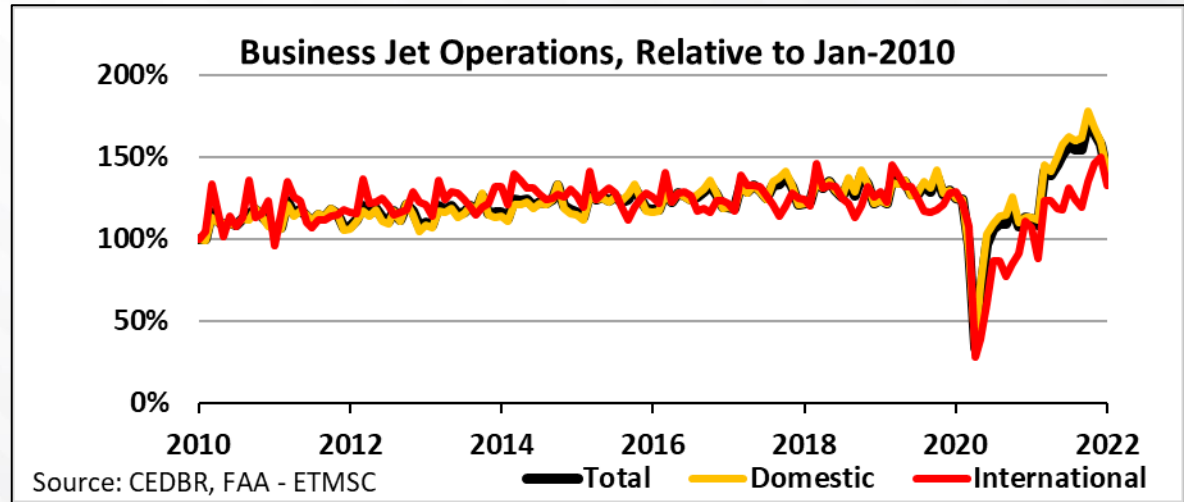
Business Jet Operations Trends



- **Year/Year Change** – significant and consistent growth in 2021

Jan-2022 Percent Change from Jan-2020

- **Total:** 11.8%
- **Domestic:** 13.4%
- **International:** 3.1%



Note: Operations refer to arrivals and departures. Business Jets are used for multiple purposes, including commuters, commerce, freight, specific business use, government, etc.

Section Summary: General Aerospace

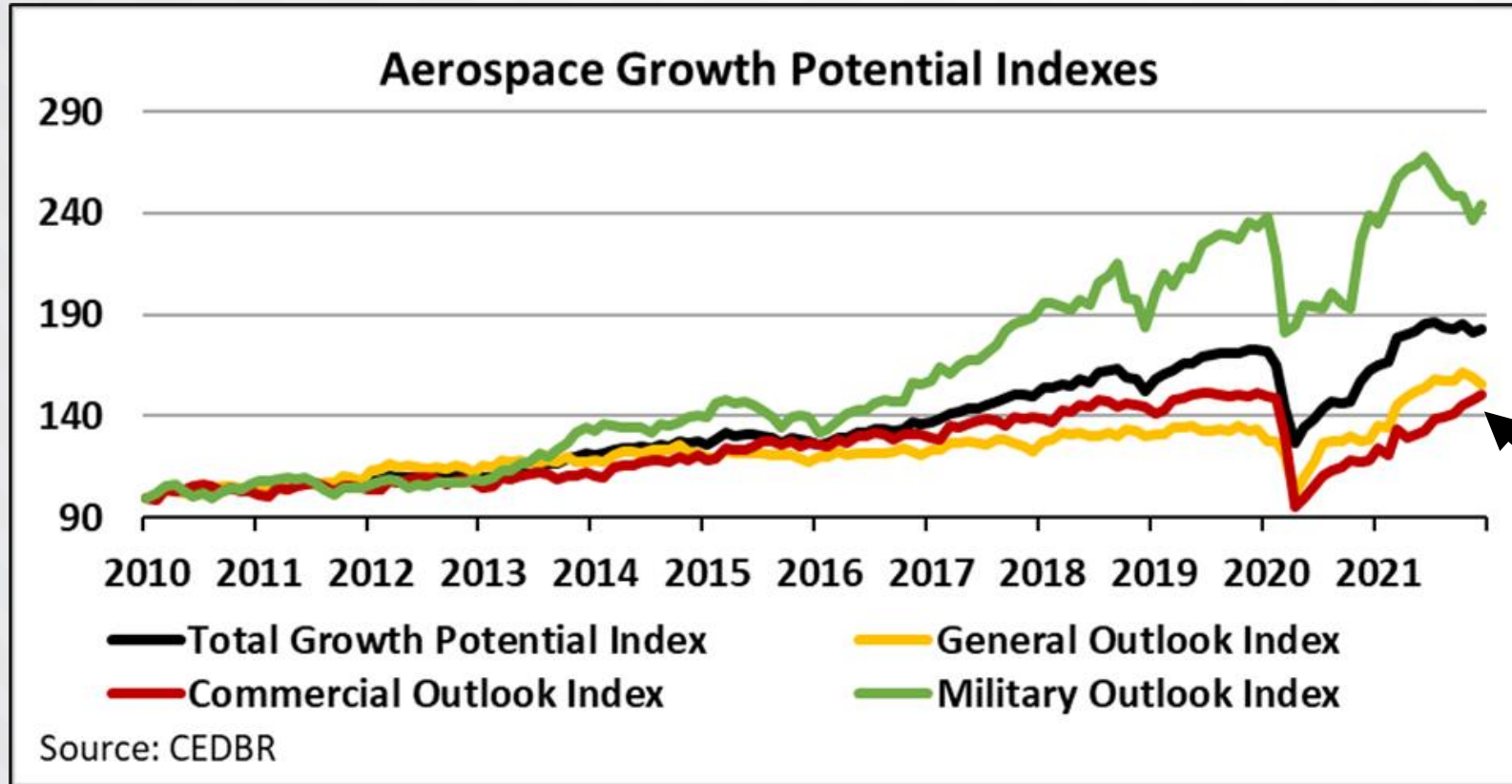
- General aerospace outlook entered its strongest growth potential over the past decade.
- It has grown both relative to 2010 and 2020 overall
- Strongest components are business jet operations and long-run GDP growth, both of which show little sign of slowing down in the long run.



Commercial Outlook

- **Real Gross Domestic Product**
- **Consumer Disposable Income**
- **Consumer Spending**
- **Unemployment Rate**
- **Airline Passenger Enplanements**
- **CPI – Airline Fares**

Aerospace Growth Potential Index: Commercial

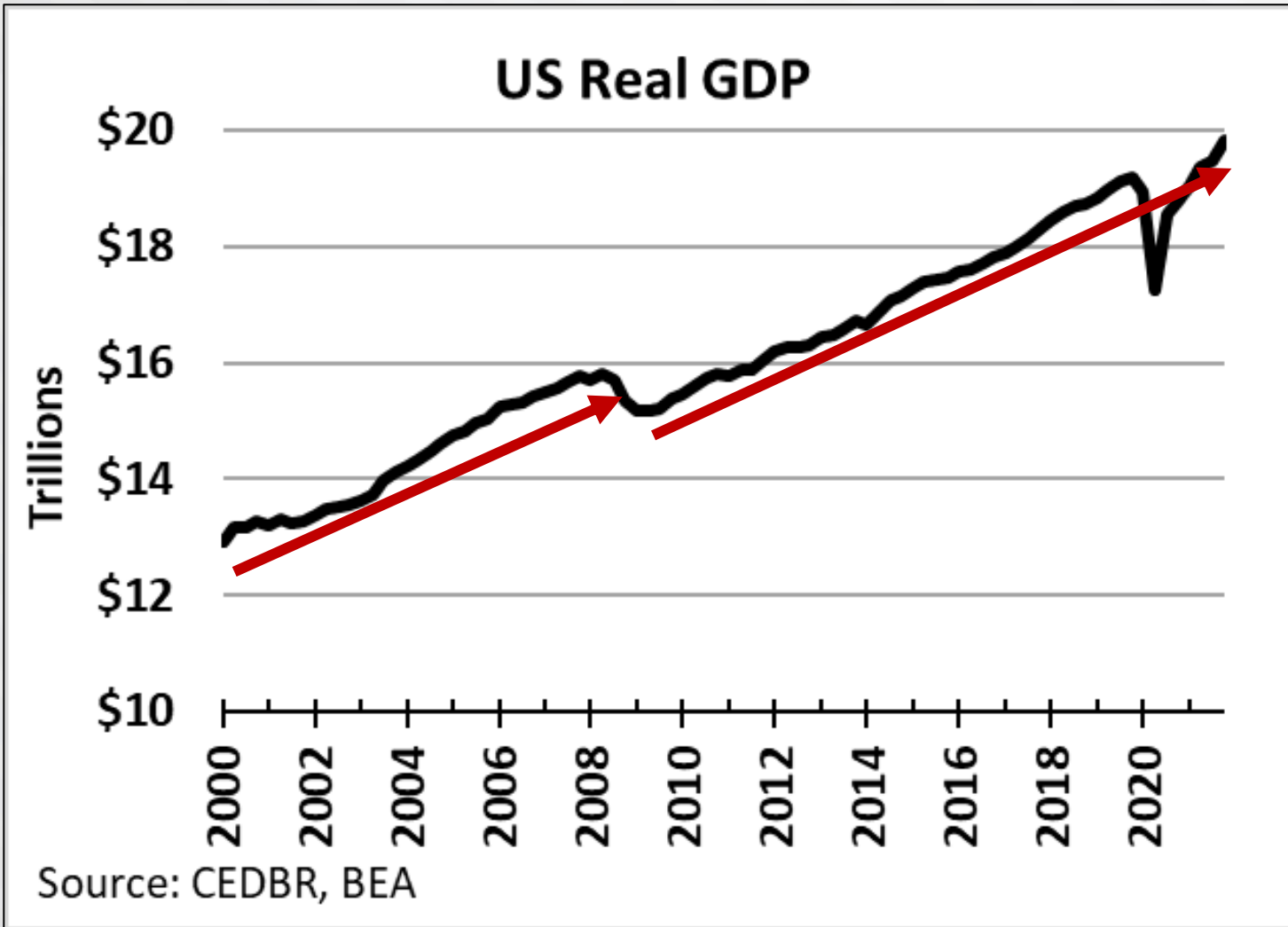


Components

- Real Gross Domestic Product
- Consumer Disposable Income
- Consumer Spending
- Unemployment Rate
- Airline Passenger Enplanements
- CPI – Airline Fares

- **Since Jan-2010: 50.29%**
- **Since Jan-2020: 0.83%**

Economic activity has returned to the pre-pandemic trend



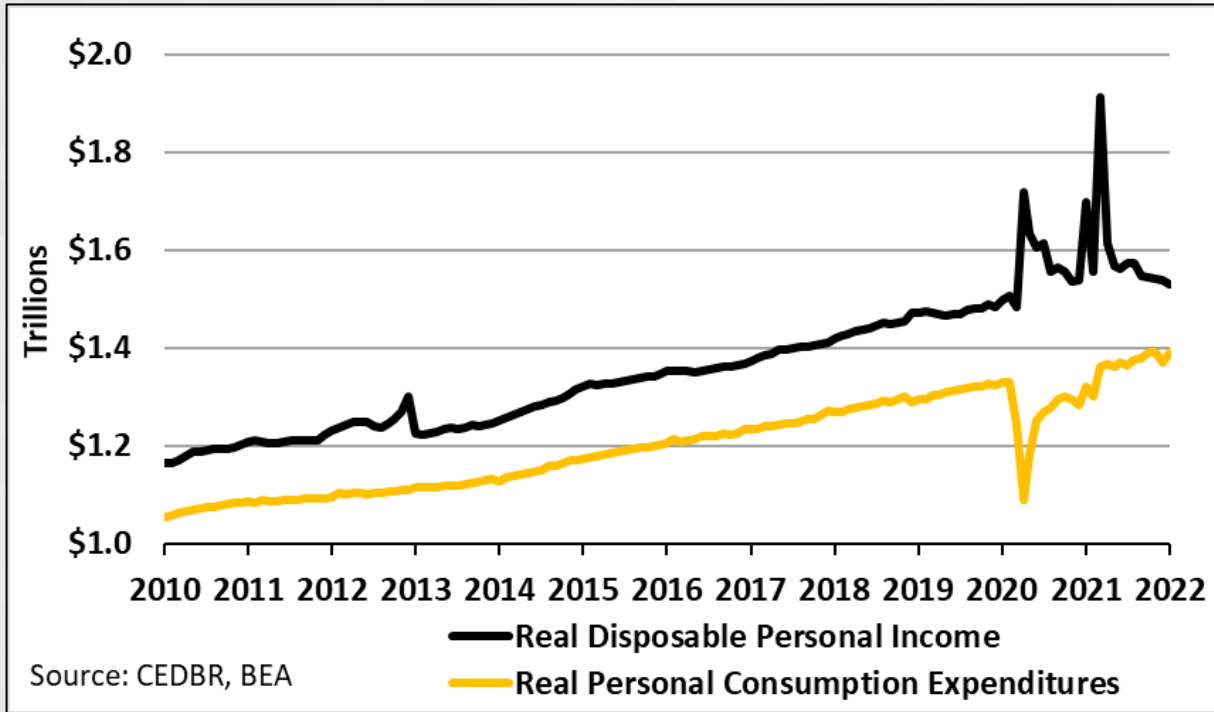
- **GDP** has completely recovered, and an expanding economy should feed into commercial growth

GDP Component Growth, Percent Change from Previous Year

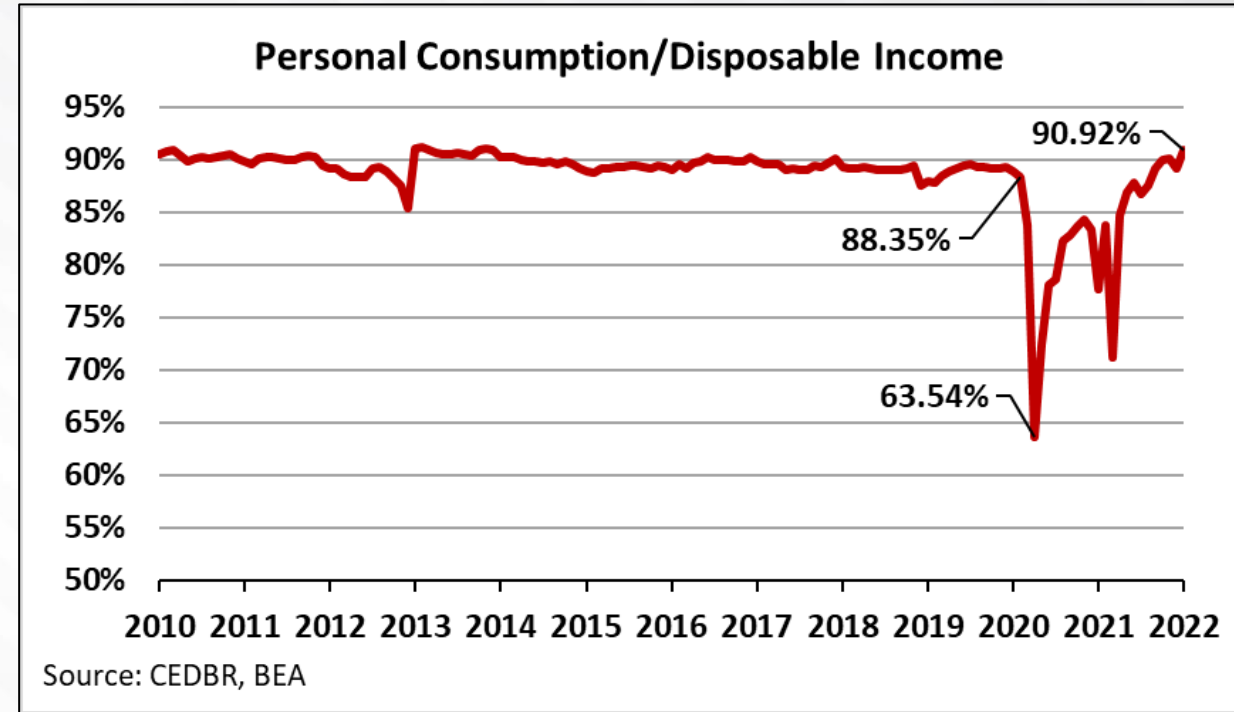
Component	2020	2021
Total GDP	-3.4%	5.7%
Personal Consumption Expenditures	-3.8%	7.9%
Government Consumption Expenditures	2.5%	0.5%
Private Domestic Investment	-5.5%	9.8%
Exports	-13.6%	4.5%
Imports	-8.9%	14.0%

Source: CEDBR, BEA

The public “savings mentality” has ceased

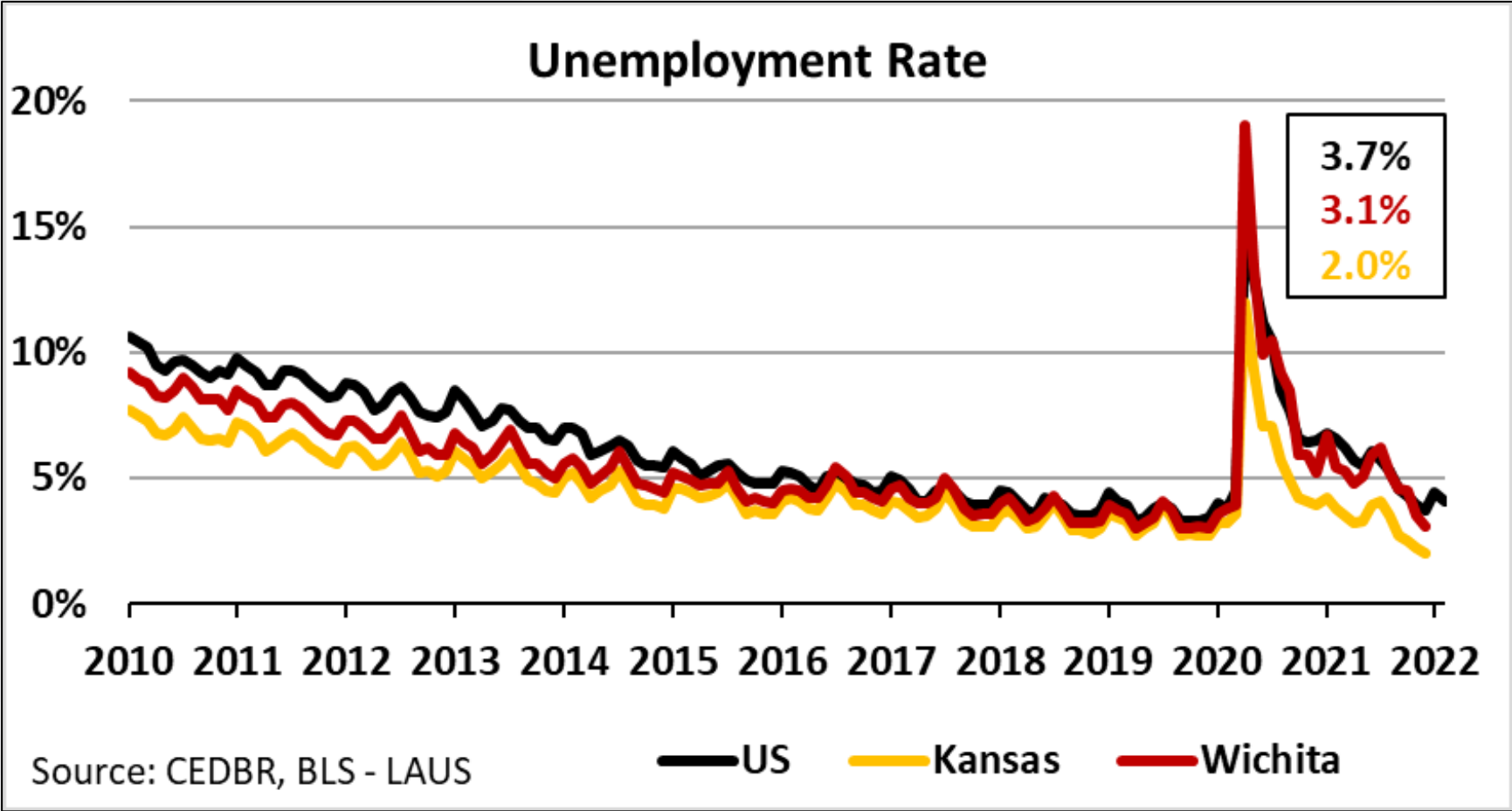


- **Personal income in 2020 & 2021** spiked are due to government support
- **Consumption** declined due to COVID, which increased the savings rate



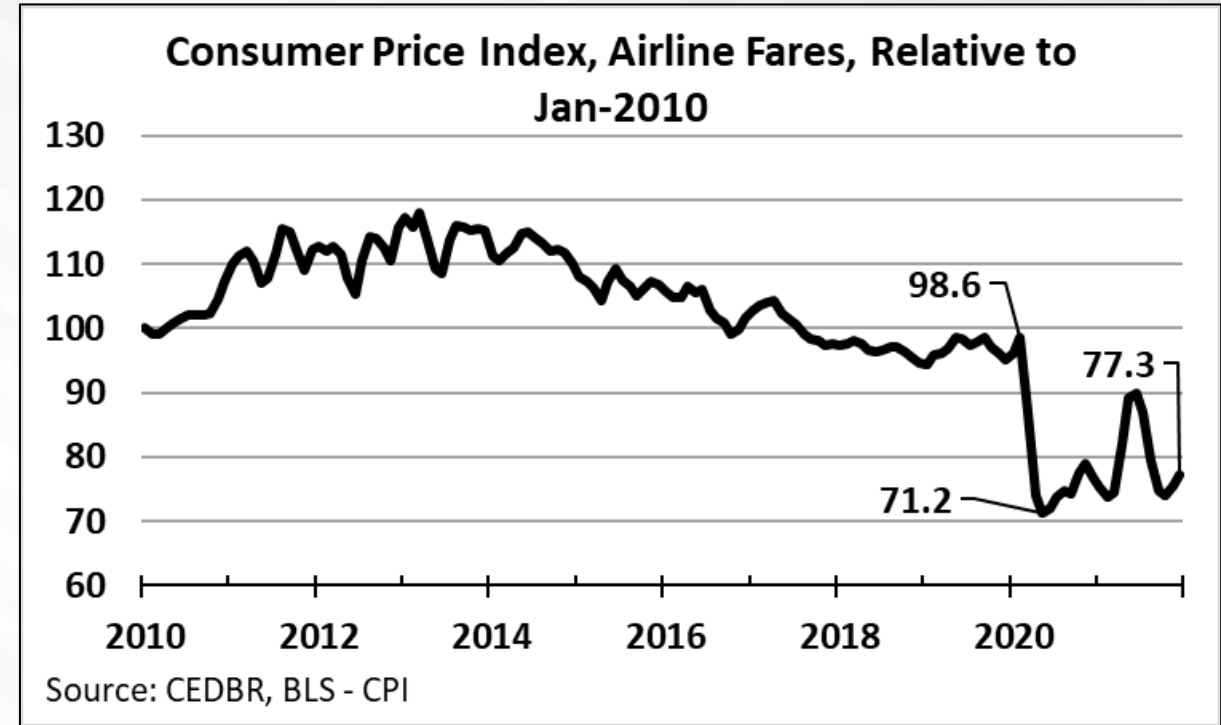
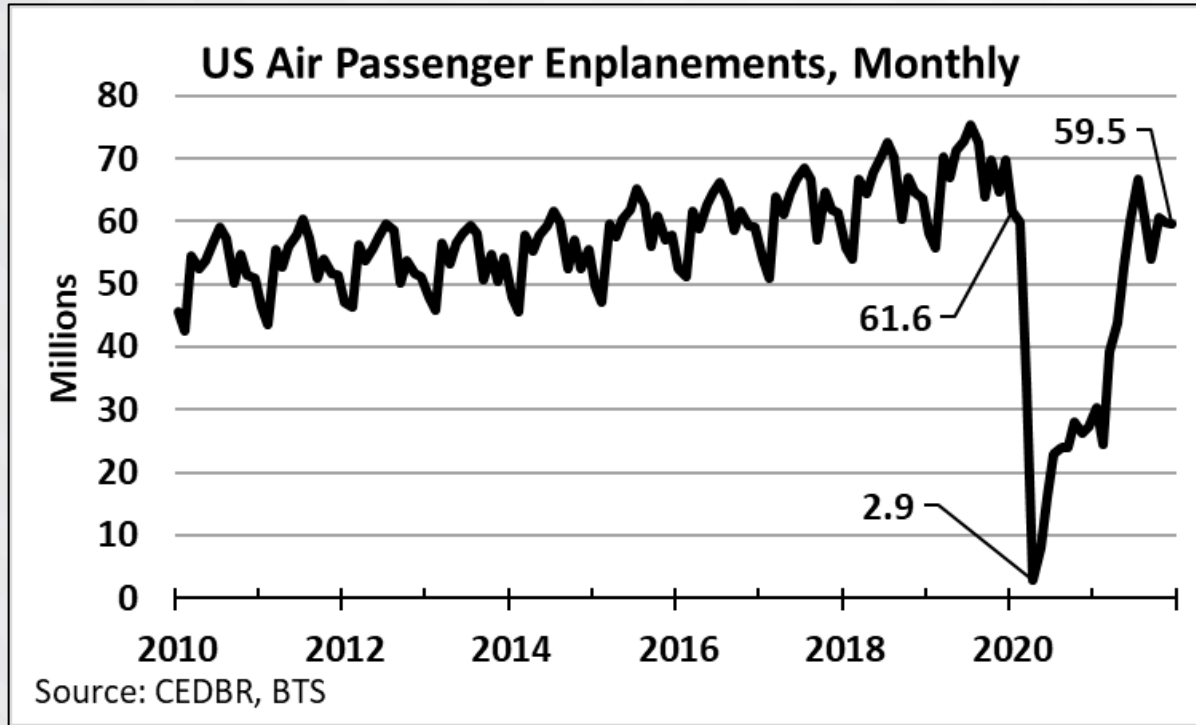
- **2020 & 2021** – Household consumption declined relative to income
- **2022** – Pent-up demand and savings are fueling current growth

Unemployment is back below 4%.



- **Full employment** indicates that households are in a better position and will help drive demand

Enplanements are up and prices are still accommodative



- **Enplanements** of air passengers have rebounded from the pandemic, though remain slightly lower than pre-pandemic trends.

- **Airline Fare** prices have been volatile throughout the pandemic but remain lower than pre-pandemic levels

Section Summary: **Commercial Aerospace**

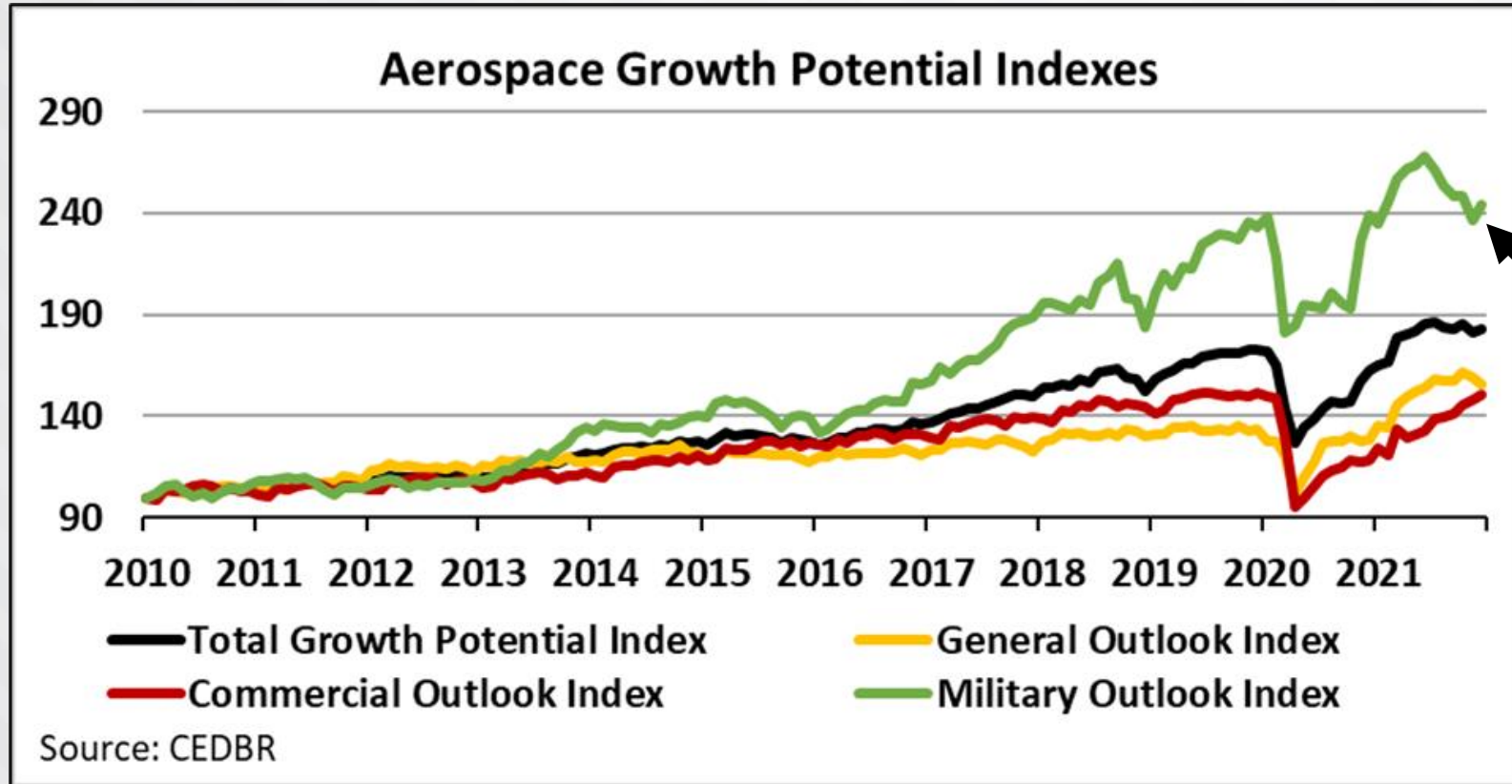
- Commercial aerospace has rebounded but not fully back to its pre-pandemic levels.
- Recent changes in global immunizations and risks associated with COVID bode well for the industry.
- Growth within this segment is now dependent on capacity, prices, and maintaining an expanding economy.
- Growth components of the index is driven by lower airline fares, strong employment levels, and the return to normal consumption patterns and inflation-adjusted GDP trends.



Military Outlook

- National Defense Expenditures
- US Debt/GDP Ratio
- S&P Aerospace/Defense Index

Aerospace Growth Potential Index: **Military**

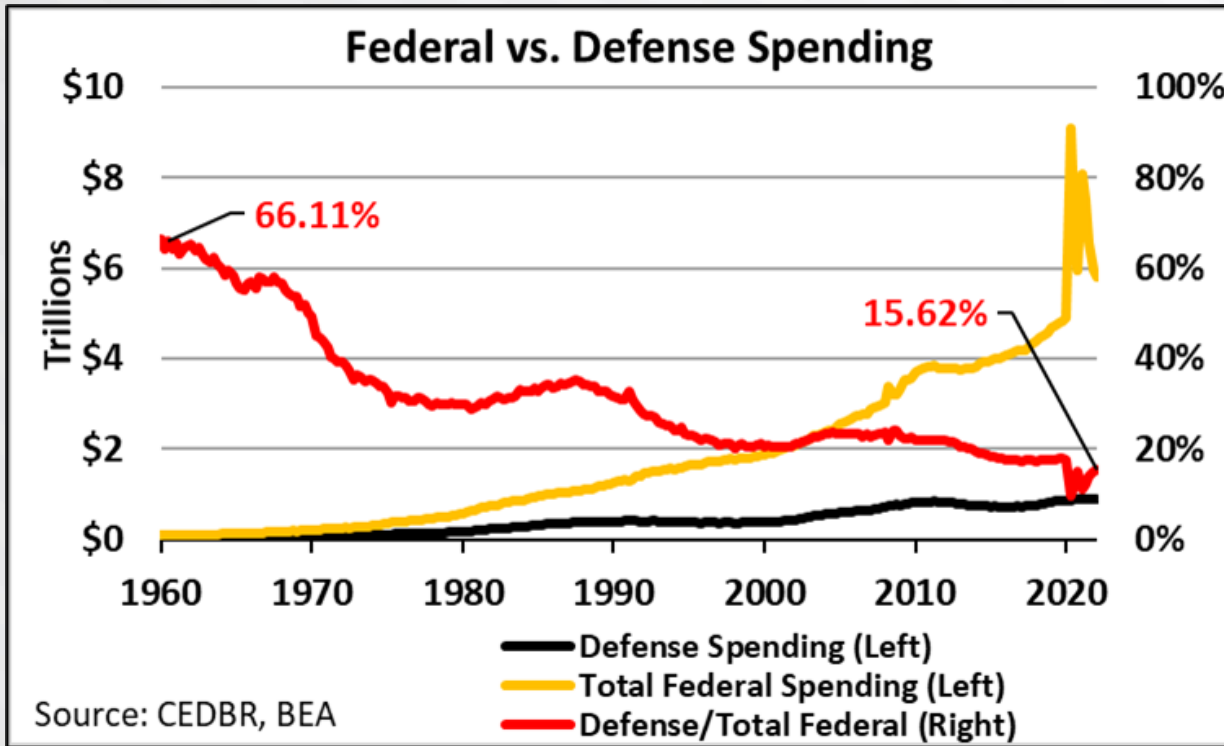


Components

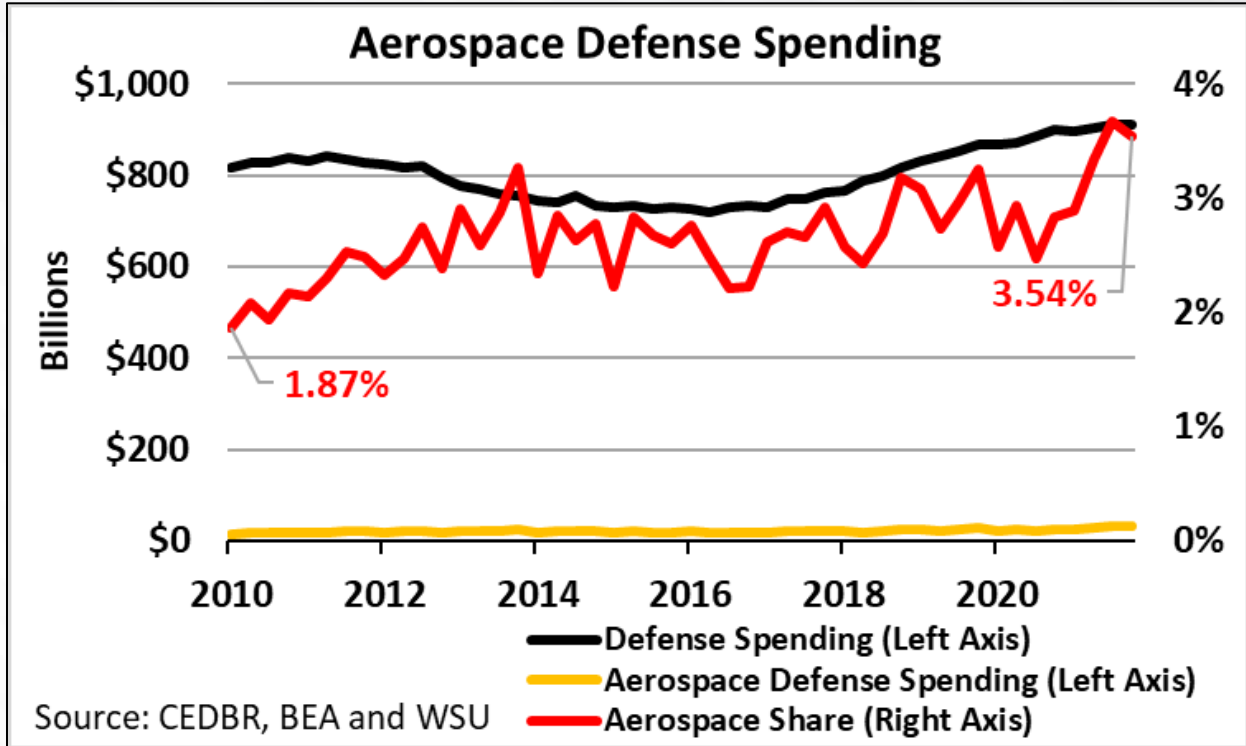
- National Defense Expenditures
- US Debt/GDP Ratio
- S&P Aerospace/Defense Index

- **Since Jan-2010: 144.18%**
- **Since Jan-2020: 6.0%**

Aerospace Defense spending continues to grow

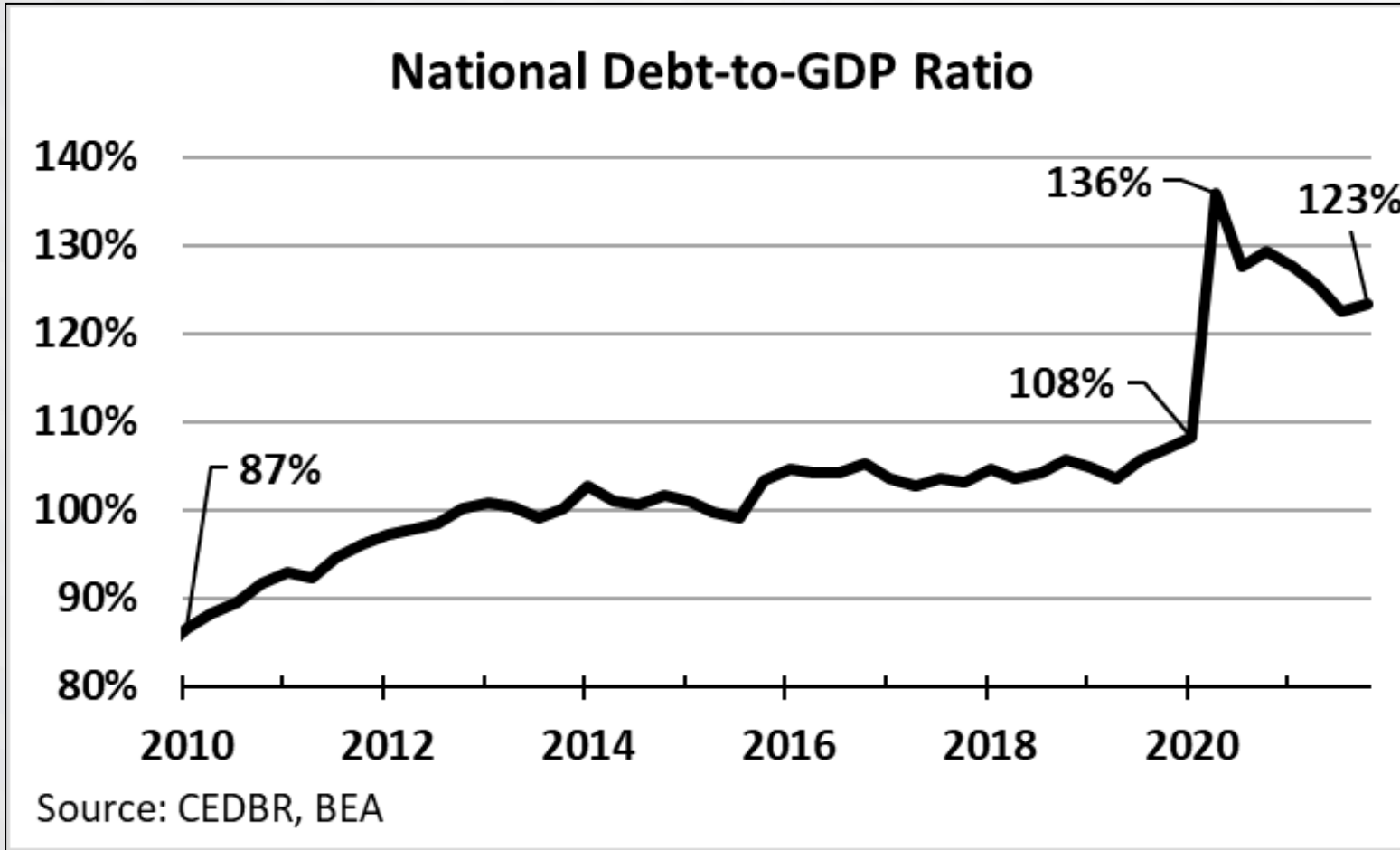


- **Total spending** has continued to increase overtime
- **Defense spending** had its strongest growth between 2000 and 2010 and has since moderated.



- **Aerospace spending** has grown by 111% since 2010, from \$15.2B to \$32.2B
- **Share of aerospace spending** has continued to increase over the decade

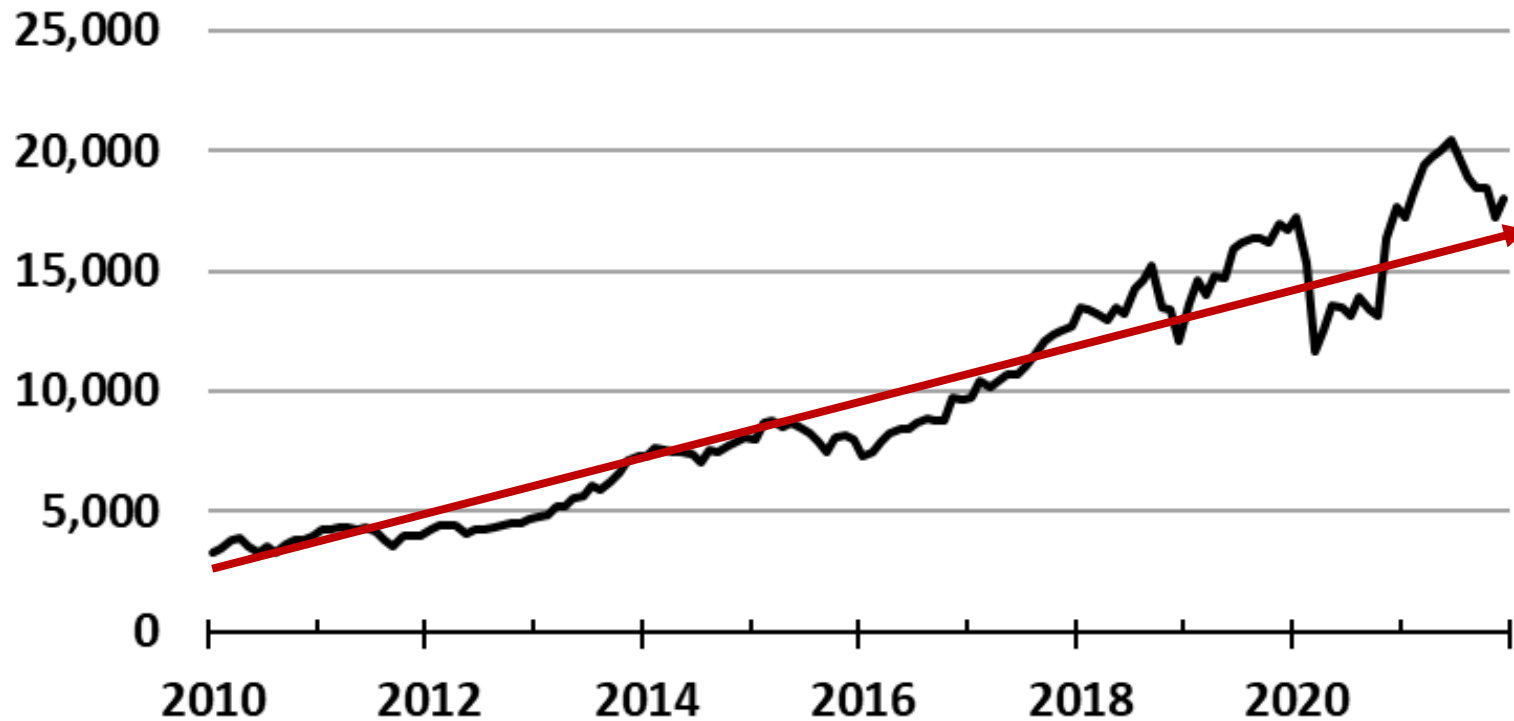
National Debt remains greatly elevated relative to GDP



- Although the share of Debt-to-GDP has declined, it poses a dampening effect on long-term military aerospace consumption.
- Tapering since the 2020 peak is expected to continue, potentially setting up more favorable conditions in the future.

Aerospace Defense Index remains above pre-pandemic levels

S&P Aerospace/Defense Index



Source: CEDBR, S&P Global

- **Index components:** 33 defense/aerospace firms
- **2022** – the index is up 31.7% over the previous year
- **5-year annual growth:** 24.1%
- **10-year annual growth:** 35.9%

- Although the index declined in recent months, the overall trend points to optimism



Labor Specialization

Aerospace employment goes beyond a typical engineer

Aerospace Products and Parts Manufacturing Employment Share by Occupation Type, 2021

Occupation Title	% of Employment
Production Occupations	34.0%
Architecture and Engineering Occupations	21.2%
Business and Financial Operations Occupations	11.0%
Computer and Mathematical Occupations	8.8%
Management Occupations	7.2%
Installation, Maintenance, and Repair Occupations	7.2%
Office and Administrative Support Occupations	5.5%
Transportation and Material Moving Occupations	2.1%
Sales and Related Occupations	0.8%
Construction and Extraction Occupations	0.6%
Life, Physical, and Social Science Occupations	0.5%
Arts, Design, Entertainment, Sports, and Media Occupations	0.4%
Protective Service Occupations	0.3%
Building and Grounds Cleaning and Maintenance Occupations	0.3%
Legal Occupations	0.1%
Healthcare Practitioners and Technical Occupations	0.04%
Educational Instruction and Library Occupations	0.01%
Food Preparation and Serving Related Occupations	0.01%

Source: BLS - OEWS

- **Production** and **engineering** account for 55.2% of the aerospace occupations.
- **44.8%** of a typical aerospace firm are in other sectors like business, office support, and transportation.

Wichita's labor market is optimized for aerospace

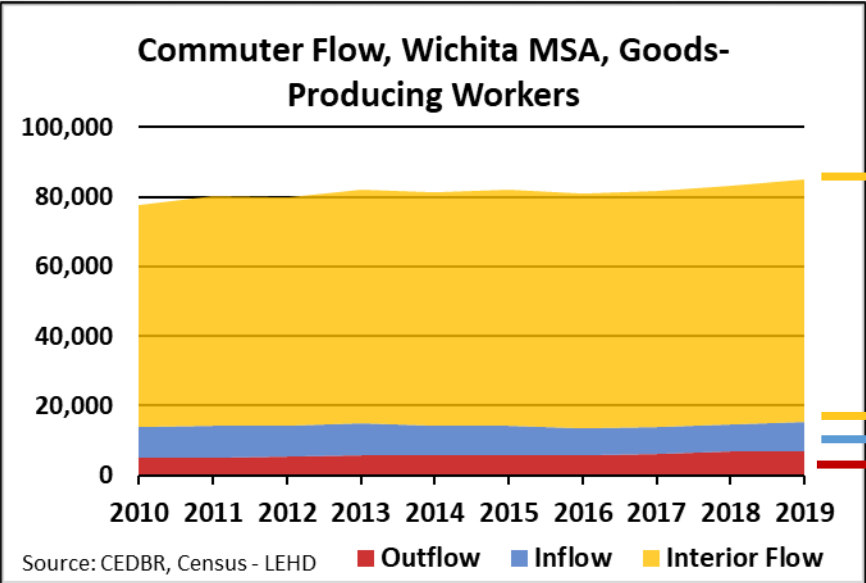
Wichita MSA Employment by Occupation Type, May 2021

Occupation Type	Employment	Location Quotient	Annual Mean Wage
Production	26,490	1.56	\$46,670
Architecture and Engineering	7,150	1.46	\$84,290
Personal Care and Service	6,630	1.28	\$28,160
Installation, Maintenance, and Repair	13,680	1.22	\$51,590
Construction and Extraction	13,400	1.14	\$48,330
Food Preparation and Serving Related	25,090	1.11	\$24,360
Educational Instruction and Library	18,140	1.10	\$47,610
Healthcare Practitioners and Technical	17,830	1.01	\$78,230
Office and Administrative Support	37,170	1.01	\$38,330
Healthcare Support	13,330	1.00	\$28,340
Community and Social Service	4,400	0.98	\$45,600
Sales and Related	25,110	0.94	\$39,540
Building and Grounds Cleaning and Maintenance	7,570	0.91	\$29,740
Transportation and Material Moving	22,000	0.86	\$37,980
Business and Financial Operations	14,780	0.81	\$69,270
Protective Service	5,490	0.80	\$46,340
Arts, Design, Entertainment, Sports, and Media	2,890	0.79	\$46,060
Management	13,420	0.75	\$101,120
Computer and Mathematical	5,980	0.64	\$78,890
Legal	1,520	0.64	\$75,160
Life, Physical, and Social Science	1,470	0.57	\$67,510
Farming, Fishing, and Forestry	350	0.38	\$31,330

Source: CEDBR, BLS - OEWS

- **Wichita labor specialization**
 - Production
 - Engineering
 - Personal care
 - Installation, maintenance
- **Location quotient**
 - 1 = US average
 - Greater than 1 = high concentration
 - Less than 1 = low concentration

Softness within the labor market created more outflow

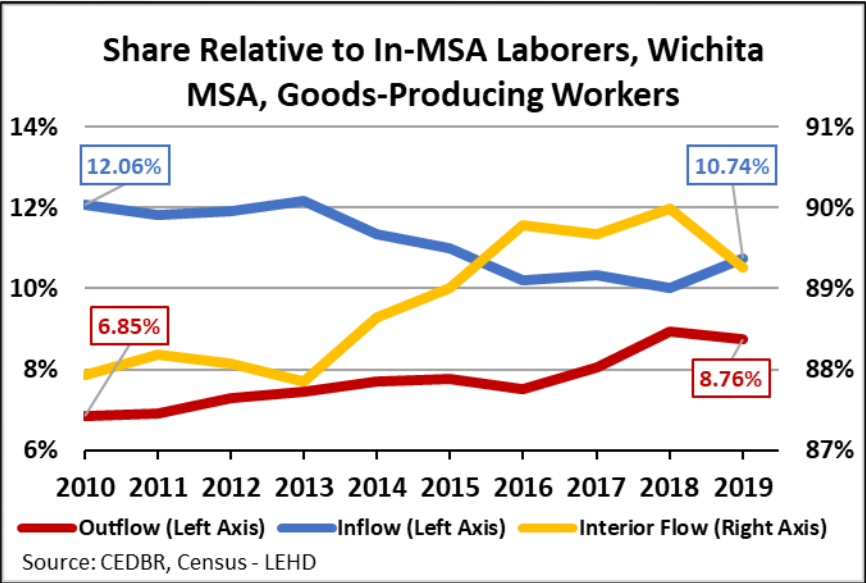


People living and working locally

People living abroad and working locally

People living locally and working abroad

- As aerospace took off in 2017, the market captured a higher share of the interior flow.



2010

Inflows: 8,752
Outflows: 4,967
Interior: 63,795

2019

Inflows: 8,403
Outflows: 6,853
Interior: 69,813

Aerospace opportunity flipped the outmigration issue

Net Annual Average Migration to KS Manufacturing Occupations - Top Ten

Rank	MSA	2017	2018	2019	2020	Annual Average
1	Miami-Fort Lauderdale-Pompano Beach, FL	6	0	3	9	4.50
2	Columbia, MO	-1	0	1	6	1.50
3	Joplin, MO	-9	-9	11	13	1.50
4	Gadsden, AL	0	0	2	3	1.25
5	Fond du Lac, WI	1	1	1	1	1.00
6	McAllen-Edinburg-Mission, TX	2	-1	2	1	1.00
7	Buffalo-Cheektowaga, NY	1	1	0	2	1.00
8	Huntington-Ashland, WV-KY-OH	0	-2	3	3	1.00
9	Chicago-Naperville-Elgin, IL-IN-WI	-1	4	1	-1	0.75
10	Jefferson City, MO	1	2	0	0	0.75

*Net migration calculated by count of workers from all sectors migrating to Kansas manufacturing jobs minus count of workers from Kansas manufacturing jobs migrating to all sectors in other areas.

Source: CEDBR, Census - LEHD - J2J

Net Annual Average Migration to KS Manufacturing Occupations - Bottom Ten

Rank	MSA	2017	2018	2019	2020	Annual Average
1	Dallas-Fort Worth-Arlington, TX	-23	-32	-29	-35	-29.75
2	St. Louis, MO-IL	-1	-17	-3	-20	-10.25
3	Denver-Aurora-Lakewood, CO	-11	-8	-10	-6	-8.75
4	Phoenix-Mesa-Chandler, AZ	-1	-9	-6	-15	-7.75
5	Nashville-Davidson--Murfreesboro--Franklin, TN	-3	-9	-11	-2	-6.25
6	Oklahoma City, OK	-1	-8	-3	-12	-6.00
7	Tulsa, OK	4	-5	-8	-11	-5.00
8	Minneapolis-St. Paul-Bloomington, MN-WI	-4	-7	-4	-3	-4.50
9	Houston-The Woodlands-Sugar Land, TX	-4	-13	-2	4	-3.75
10	Cincinnati, OH-KY-IN	-4	-2	-3	-5	-3.50

*Net migration calculated by count of workers from all sectors migrating to Kansas manufacturing jobs minus count of workers from Kansas manufacturing jobs migrating to all sectors in other areas.

Source: CEDBR, Census - LEHD - J2J

- **Aerospace, manufacturing, and regional markets** are the source of net in-migration of manufacturing occupations.
- **Top three communities** – Miami, Columbia, and Joplin.
- **Bottom three communities** – Dallas-Forth Worth, St. Louis, Denver
- Outflows have historically been greater in magnitude than inflows among the top and bottom communities.

Deeper dive into specific occupation types:

Design, Oversight, and Evaluation

Aerospace Engineers

- Direct and coordinate the design, manufacture, and testing of aircraft and aerospace products
- Assess proposals for projects to determine if they are technically and financially feasible
- Determine if proposed projects will result in safe operations that meet the defined goals
- Evaluate designs to see that the products meet engineering principles, customer requirements, and environmental regulations
- Develop acceptance criteria for design methods, quality standards, sustainment after delivery, and completion dates
- Ensure that projects meet quality standards
- Inspect malfunctioning or damaged products to identify sources of problems and possible solutions

Repair, Maintenance, Testing, and Support

Avionics Technicians

- Diagnose mechanical or electrical problems
- Repair wings, brakes, electrical systems, and other aircraft components
- Replace defective parts, using hand tools or power tools
- Examine replacement aircraft parts for defects
- Read maintenance manuals to identify repair procedures
- Test aircraft parts with gauges and other diagnostic equipment
- Inspect completed work to ensure that it meets performance standards
- Keep records of maintenance and repair work

Fabrication and Assembly

Aircraft Structure Assemblers

- Read and understand schematics and blueprints
- Position or align components and parts either manually or with hoists
- Use handtools or machines to assemble parts
- Conduct quality control checks
- Clean and maintain work area and equipment, including tools
- Fit, fasten, and install parts of airplanes, missiles, or space vehicles, including the wings, landing gear, and heating and ventilating systems.

Top 15 Relevant Skills and Knowledge Sets:

Knowledge

Computers and Electronics
Customer and Personal Service
Design
Engineering and Technology
Mathematics Knowledge
Mechanical
Physics
Production and Processing

Skills

Active Listening
Complex Problem Solving
Critical Thinking
Operations Monitoring
Quality Control Analysis
Reading Comprehension
Science

Aerospace labor market competition

MSAs with Highest Concentration, Aerospace Engineers				
Rank	Metropolitan Area	Employment	Location Quotient	Annual Mean Wage
1	California-Lexington Park, MD	1,120	60.30	\$120,160
2	Huntsville, AL	3,340	36.13	\$122,880
3	Boulder, CO	1,170	16.03	\$148,990
4	Palm Bay-Melbourne-Titusville, FL	1,240	13.98	\$112,710
5	Wichita, KS	1,510	13.20	\$108,960
6	Crestview-Fort Walton Beach-Destin, FL	390	8.45	\$104,400
7	Dayton, OH	1,040	7.29	\$113,120
8	Las Cruces, NM	170	6.22	\$93,940
9	Bakersfield, CA	650	5.23	\$116,150
10	Colorado Springs, CO	600	5.18	\$130,440

Source: CEDBR, BLS - OEWS

MSAs with Highest Concentration, Aircraft Structure, Surfaces, Rigging, and Systems Assemblers				
Rank	Metropolitan Area	Employment	Location Quotient	Annual Mean Wage
1	Wichita, KS	4,740	70.61	\$53,370
2	Savannah, GA	1,050	25.02	\$62,660
3	Tulsa, OK	1,060	10.75	\$46,540
4	San Diego-Carlsbad, CA	1,150	3.51	\$46,760
5	Palm Bay-Melbourne-Titusville, FL	180	3.46	\$40,780
6	Huntsville, AL	180	3.23	\$53,860
7	Dallas-Fort Worth-Arlington, TX	2,610	3.08	\$51,320
8	Waco, TX	80	2.83	\$50,890
9	Port St. Lucie, FL	80	2.35	\$40,980
10	Hartford-West Hartford-East Hartford, CT	230	1.75	\$55,010

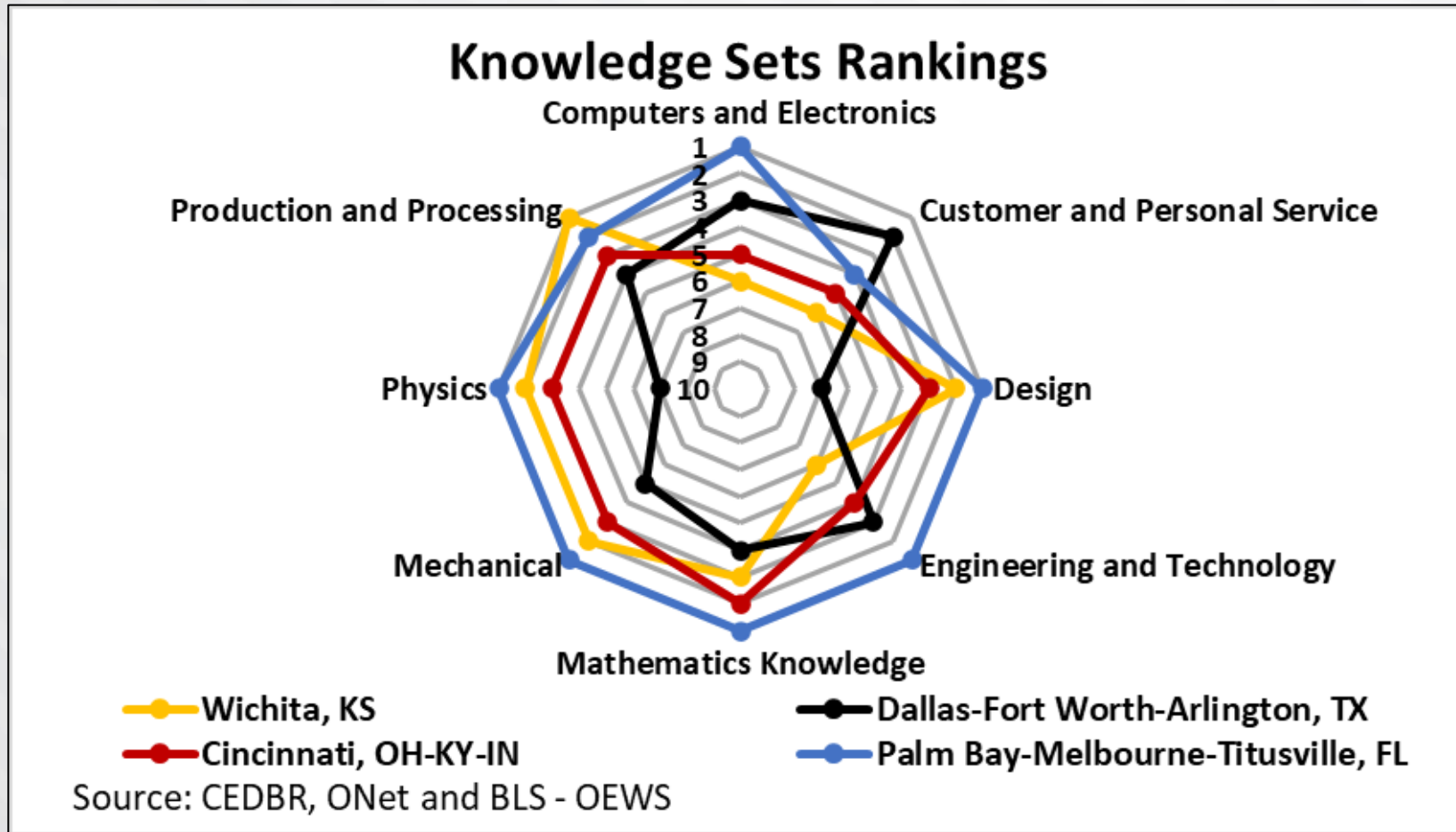
Source: CEDBR, BLS - OEWS

MSAs with Highest Concentration, Avionics Technicians				
Rank	Metropolitan Area	Employment	Location Quotient	Annual Mean Wage
1	California-Lexington Park, MD	140	22.76	\$83,930
2	Wichita, KS	500	13.22	Not Available
3	New Bern, NC	70	11.52	\$65,810
4	Palm Bay-Melbourne-Titusville, FL	230	7.84	\$61,400
5	Jacksonville, NC	40	6.54	\$64,000
6	Greensboro-High Point, NC	240	5.27	\$53,600
7	Ogden-Clearfield, UT	180	5.03	\$69,150
8	Oklahoma City, OK	360	4.46	\$57,130
9	Jacksonville, FL	380	4.09	\$60,570
10	Tucson, AZ	200	4.04	\$65,450

Source: CEDBR, BLS - OEWS

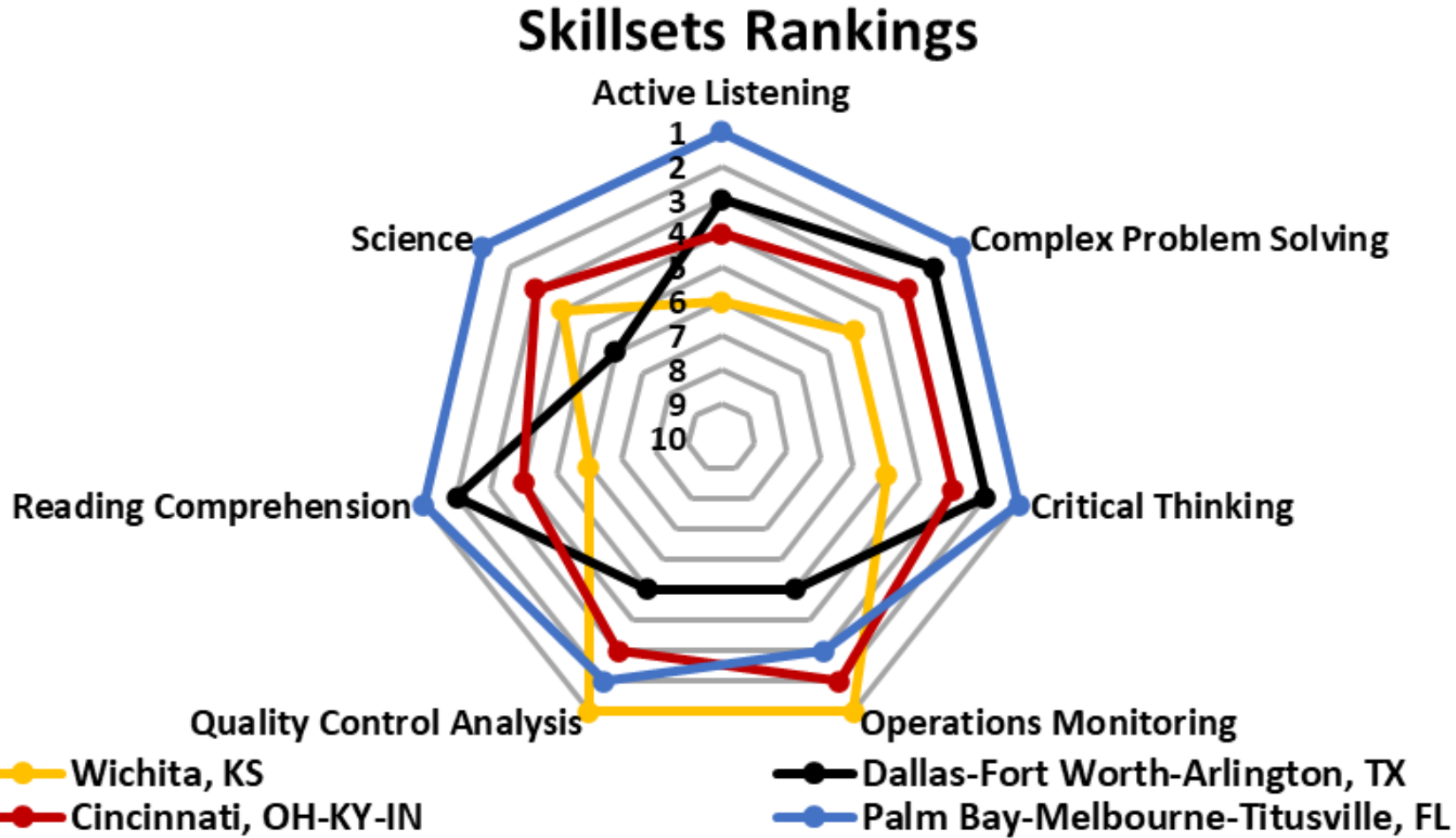
- **Wichita** is highly concentrated among the aerospace communities
- **Aerospace engineers** – California-Lexington Park, Huntsville, and Boulder.
- **Avionics technicians** – California-Lexington, New Bern, and Palm Bay
- **Aircraft structure assemblers** – Savannah, Tulsa, and San Diego.

Knowledge – Wichita's competitive ranking



- **Production** – Knowledge of raw materials, production processes, QC, etc. for effective manufacturing and distribution
- **Physics** – Understanding of principles, laws, and relationships to understand fluid, material, chemical, electrical, and atmospheric dynamics.
- **Mechanical** – Machine/tool purpose, use, repair, and maintenance
- **Design** – Techniques, tools, and principles for production of plans, blueprints, drawings, and models

Knowledge – Wichita's competitive ranking



Source: CEDBR, ONet and BLS - OEWS

- **Quality control** – Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
- **Operations Monitoring** – Watching gauges, dials, or other indicators to make sure a machine or system is working properly.

Labor quality competitiveness – How does ICT rank?

Overall Aerospace Workforce Skill Ranking

Rank	MSA
1	Palm Bay-Melbourne-Titusville, FL
2	Wichita, KS
3	Cincinnati, OH-KY-IN
4	Dallas-Fort Worth-Arlington, TX
5	Mobile, AL
6	Phoenix-Mesa-Scottsdale, AZ
7	Seattle-Tacoma-Bellevue, WA
8	Oklahoma City, OK
9	Los Angeles-Long Beach-Anaheim, CA
10	Hot Springs, AR
11	San Diego-Carlsbad, CA

Source: CEDBR, ONet and BLS - OEWS

- **Palm Bay** – L3Harris, Northrop Grumman, and BAE Systems
 - Complementary production types (other defense, IT, C6ISR) create high skill/knowledge labor base
- **Cincinnati** – Boeing and GE Aviation
 - Assembly of aerospace systems, not production
 - Primary production category: Medical appliances and instruments
- **Dallas** – Lockheed Martin, Bell, Textron, and Raytheon
 - Many skill-complementary production types: machinery, electronics and integrated circuits, communications systems)

Summary

- The Wichita labor market is optimized for the aerospace industry, which includes both core and non-core aerospace jobs.
- Prior to 2017, aerospace manufacturing workers were migrating out for opportunity.
- Now that aerospace is in an up-business cycle, the regional labor market is shifting to fit that demand
- Wichita was ranked second in overall labor quality, when measuring all aerospace related jobs
- Wichita has a competitive labor market edge based on the following
 - **Knowledge: Production, Physics, Mechanical, and Design**
 - **Skills: Quality Control and Operations Monitoring**