THE ECONOMIC IMPACT OF U.S. CIVIL AVIATION

ISSUED SEPTEMBER 2024

Federal Aviation Administration

CONTENTS

FOREWORD

Civil aviation facilitates commerce and transportation in both the United States and across the world. It is what connects us. In the United States, more than 5,000 public-use airports support over 7,000 air transport and 200,000 general aviation aircraft performing more than 52 million airport operations.

In 2020, the COVID-19 pandemic and related restrictions reduced passengers at U.S. airports by 62%, and this directly impacted aviation's position in the U.S. economy. This reduced aviation's contribution to the U.S. gross domestic product from the historical baseline of five percent to the pandemic low of 2.3 percent in 2020. However, over the next two years, aviation has mounted a strong recovery, increasing its share of gross domestic product to four percent in 2022. The rebound, over those two years, not only doubled industry's output, it also supported close to ten million jobs by 2022.

Although many segments of aviation recovered by 2022, several segments are lagging behind. Aircraft manufacturing has not experienced the same recovery as rest of the aviation industry. Between 2020 and 2022, aircraft manufacturing experienced very little growth or remains well below its pre-pandemic output highs. Commercial airline operations have recovered, along with the visiting spending of domestic passengers, but foreign passengers and their expenditures are still below its historical baseline as of 2022. While foreign passengers traveling to the United States continued to grow in 2023, we will not have confirmation of this segment's rebound until the following National Economic Impact Report in 2026. These lagging segments help to explain the lower contribution of the aviation industry to U.S. gross domestic product compared to its historical baseline. However, this provides an opportunity to improve these lagging segments and fully recover aviation's position in the U.S. economy.

The FAA's Economic Impact Report demonstrates the resilience of the aviation sector in the U.S. economy. This report can aid policymakers, industry officials, and academia in understanding the critical role that aviation plays in supporting tourism and other

travel-related activities. The data (from the pandemic year of 2020 and the recovery years of 2021 and 2022) covers the economic importance of passenger and cargo transportation, from activities by commercial airlines, air couriers, airports, aircraft manufacturing, and of aviation research and development.

The FAA is committed to opening airspace to new technologies, such as electric vertical-take-off and-landing (eVTOL) aircraft, drones, and commercial space operations while protecting the safety of the public. These new technologies are revolutionizing the way we live and will only continue to evolve. The positive commercial benefits from these new technologies will grow the U.S. economy and sustain America's leadership in civil aviation. As these new technologies generate new business models, create value for consumers, and gather revenue from operations, we will strive to integrate these new entrants into our Economic Impact Report as reliable data become available. Additional information on the projected growth and positive impact of eVTOL aircraft, drones, commercial space operations, and other areas of aviation are available in the FAA's National Aerospace Forecast – www.faa.gov/data_research/aviation.

At the FAA, safety is our passion, and we are committed to keeping our skies safe as the aviation industry benefits the American public. With the pandemic behind us and new technology on the horizon, aviation is poised for a bright future.

Laurence Wildgoose

Assistant Administrator for Policy, International Affairs, and Environment
Federal Aviation Administration

OVERVIEW

The civil aviation industry is one of the keystones of the U.S. economy, transporting intermediate and final goods as well as supporting demand for goods and services throughout the country. This connectivity improves the quality of life for millions of consumers and facilitates business interactions from coast to coast and round the world, improving productivity and prosperity.

The COVID-19 pandemic and the related public-health emergency orders drastically reduced air travel throughout the world. Economic output from commercial airline operations fell by almost two thirds in 2020, reflecting fewer passengers using the civil aviation system. However, over the following two years, civil aviation has made a remarkable recovery, including an almost tripling of commercial airlines' economic output from 2020 to 2022.

Observations of civil aviation in 2022 include:[1]

- **U.S. air carriers transported 853 million passengers over 948 billion revenue passenger miles (RPM).**
- **More than 32 billion revenue ton-miles (RTM) of freight passed through U.S. airports.**
- **Civil commercial aircraft manufacturing total output was $57 billion.**
- **Commercial airline operations supported $363 billion of visitor expenditures on goods and services.**

Most segments of civil aviation have returned to their pre-pandemic highs in nominal terms by 2022, but several segments are still lagging. Commercial airline operations led the recovery along with the visitor spending from domestic commercial airline passengers. General aviation operations and the visitor spending from their passengers has also recovered, although general aviation was less affected by the pandemic than commercial airlines. Unlike the visitor spending from domestic commercial airline passengers, visitor spending from foreign commercial passengers have not fully recovered as of 2022. Similarly, aircraft manufacturing is still lagging behind, with estimated economic output below their pre-pandemic highs.

Overall, during 2022 the total U.S. economy generated $25.7 trillion in economic activity and supported 154 million jobs.[2] At the same time, civil aviation directly or indirectly supported:

- **$1.8 trillion in total economic activity,**
- **9.4 million jobs, and;**
- **contributed 4.0 percent of U.S. gross domestic product (GDP).**

INTRODUCTION

During the COVID-19 pandemic, the world was under lockdown, businesses met virtually, tourism was restricted, and other economic contributions worsened. However, the aviation civil industry has embarked on a resilient path to recovery. This report highlights the various segments of the civil aviation industry's road to recovery from the pandemic, and the promising future that lies ahead.

In the report, data from the U.S. Department of Commerce, U.S. Department of Transportation, U.S. Department of Labor, and the National Science Foundation from the years 2018–2022 are used to show civil aviation's effects on the U.S. economy, both during and after the pandemic. The FAA also used the most recent Regional Input-Output Modeling System (RIMS II) multipliers from the Bureau of Economic Analysis (BEA) as part of the economic-impact estimates. These multipliers reflect the 2012 input-output benchmark table (I-O table) and the 2022 regional economic accounts.

Compared to the RIMS II multipliers used in the 2020, the RIMS II multipliers have changed considerably, reflecting major changes in the U.S. economy during and after the pandemic.[3] In 2022, the multipliers for aircraft manufacturing, support activities for transportation, and accommodations decreased in all four multiplier categories – output, earnings, jobs, and value added – and impacted jobs the most with a range of 14-18 percent decline in the industry segments from 2020 to 2022.[4] Conversely, the multipliers for aircraft engines and travel arrangements have increased over all categories, increasing the impact on jobs by almost 10 percent in aircraft engines and 3.5 percent in travel arrangements.[5] The multipliers for air transportation decreased for output, earnings, and jobs; but increased for value added by 5.6 percent.[6] Multipliers for couriers and messengers have only minor changes in most categories except for jobs, which has increased by almost 28 percent.[7] The remaining industry segments show only minor change from 2020 to 2022.[8]

This report continues to group industry segments by their primacy in relation to the function of providing air transport. The first category is Direct, which includes airline and airport operations, aircraft manufacturing, and other categories directly related to aviation. The second category is Catalytic, which is a broad category of economic activity that relies on aviation services to create demand. The Catalytic category comprises travel arranging services and visitor spending. This change brings the report more closely into alignment with common usage of the terminology that appears in other economic impact studies.

METHODOLOGY

The total economic impact of an industry is the summation of primary and secondary spending related to that particular industry. This definition is standard for economic-impact studies. It also helps to estimate aviation's unique economic contribution to the national economy. The data used to measure the primary economic impacts of civil aviation comes from reliable government and private sources. This study estimated those impacts by looking at industry output, earnings, and jobs. Application of the multipliers from the RIMS II Input-Output Model, a model developed by the U.S. Department of Commerce's Bureau of Economic Analysis, help derive the amounts of secondary spending.[9] The summation of primary and secondary amounts produces a measure of civil aviation's total impact on the U.S. economy.

Types of Economic Impacts

PRIMARY IMPACTS: The primary impacts of aviation are a summation of the revenue earned from the sale of goods and services or expenditures by each of the segments, whether whether categorized as direct or catalytic, relevant to the civil aviation industry. For example, these sources of revenue include:

- Air carrier ticket sales
- Value of aircraft manufacturer shipments
- General Aviation operating costs
- Visitor spending (excluding airfare) on trips taken by air

SECONDARY IMPACTS: Secondary impacts result from expenditures made by segment identified in the measurement of primary impacts to supporting businesses and entities, as well as the spending of employees. In other words, secondary impacts capture, through multiplier effects, the spending down the supply chain, and payroll impacts that circulate. As noted above, the RIMS II model derives the secondary impacts from their corresponding primary impacts.

Measures of Economic Impacts

OUTPUT: The total economic value of goods and services produced.

EARNINGS: Wages and salaries, other labor income, benefits, and proprietors' income paid to all employed persons who deliver final demand output and services.[10]

JOBS: The number of people employed full-time or the hourly equivalent in industries that provide civil-aviation services, manufactured aircraft and aircraft engines, or work in other industries (such as hospitality) that are indirectly affected by activity in the civil aviation sector.

Results

In 2019, U.S. civil aviation was a bustling contributor to the U.S. economy and, along with knock on effects from related economic activities, accounted for around 5% of U.S. Gross Domestic Product (GDP). The industry's impact was felt through traditional aviation activities – such as airline operations, airport services, and airplane manufacturing – which this report refers to as Direct economic activity, and through tourism and business travel supported by aviation, which this report refers to as Catalytic economic activity. However, with the onset of the pandemic in 2020, the civil aviation industry's contribution to GDP decreased by 2.6 percentage points. Employment in the civil aviation industry was particularly effected, with a 53% drop in aviation supported jobs. Economic output from Direct activities fell by over a third while Catalytic activities fell by almost two-thirds in 2020.

As the world began to adapt to the new normal, aviation showed early signs of recovery. Between 2020 and 2022, the civil aviation industry's contribution to GDP grew from 2.3% to 4.0% (Table 1). This upward trend reflects improved economic activity as travel restrictions were lifted and passenger confidence returned. Direct output grew by 60% while Catalytic output increased by 150%. Together, they almost double the output of the industry the industry from 0.9 trillion to 1.8 trillion between 2020 and 2022. This growth increased the Catalytic category's contribution to U.S. GDP to roughly 2.1% and the Direct category to 1.8% for a total of 3.9%. Although still below the 5% long-run baseline, the upward trend suggests the civil aviation industry should return to baseline by 2024.

From 2020 to 2022, total earnings, value added, and employment levels have trended up. Total earnings grew from $261 billion in 2020 to $502 billion in 2022 (Table 1). Total value added increased from $488 billion to $1,020 billion, and employment levels rose from 4.9 million to 9.4 million. Overall, despite the significant impact of the COVID-19 pandemic, the civil aviation industry has shown signs of a strong recovery, contributing significantly to the U.S. GDP once again.

Table 1: Summary - Economic Impact of U.S. Civil Aviation 2020-2022 (Current Dollars)

Year	Sector Category	Output ($Billions)	Earnings ($Billions)	Jobs (Thousands)	Percent of GDP
2022	Direct	856.4	228.3	4,029	1.8
	Catalytic	941.3	273.3	5,365	2.1
	Total	**1,797.7**	**501.6**	**9,394**	**4.0**
2021	Direct	664.4	180.5	3,323	1.5
	Catalytic	657.8	191.0	3,749	1.6
	Total	**1,322.2**	**371.5**	**7,072**	**3.1**
2020	Direct	539.7	148.8	2,602	1.3
	Catalytic	376.5	111.7	2,348	1.0
	Total	**916.2**	**260.5**	**4,950**	**2.3**

Note: Details may not sum to totals due to rounding.

Table 2 reports primary output of each segment for 2020 and 2022 and is the basis for calculating the total economic impact of civil aviation for those years. As described above, secondary and total economic impacts are calculated as the product of the primary output and the BEA's RIMS II multipliers.

The largest components of the primary output for the direct category, both in 2020 and 2022, is Airline Operations, which has experienced a tripling of output between 2020 and 2022. The primary output of all direct subcategories grew between 2020 and 2022 except for airport operations, which declined by $3.7 billion. The decline in the primary output of airports is due to a decline in capital expenditures, likely from moving up construction timetables to take advantage of less air traffic at the airport and a low interest rate environment. In the catalytic category, domestic visiting expenditures is the largest component both in 2020 and 2022 and tripled its primary output between those years. Most of the catalytic subcategories at least doubled their primary output except for general aviation visitor expenditures. This reflects the recovery in airline tourism and business travel between 2020 and 2022 among the general population as pandemic restrictions eased.

The primary outputs of the 13 segments in conjunction with the RIMS II multipliers, produce the secondary economic impacts. Total output, or the sum of primary and secondary impacts, is reported in Table 3, shows the following:

- In 2022, Airline Operations generated $397 billion in total output, nearly a tripling from 2020. Airline Operations is the largest component of the direct category and makes up nearly half of the output in that category.
- Air Courier operations replaced Airport Operations as the second largest component of the direct category, accounting for $107 billion of total output in 2022. The rapid expansion of ecommerce during the pandemic and air cargo's pivotal position in the logistical networks has pushed up the total output of this segment of aviation. This along with the reduction in capital expenditures by airports in 2022 allowed air couriers to take the second spot.
- When domestic passengers reached their destinations in the 2022, their total expenditures on hotels, rental cars, and entertainment contributed $632 billion to the U.S. economy, more than triple the output of these domestic visitor expenditures in 2020.

Table 2: Primary Output (Current Dollars)

Description	2020 ($Billions)	2022 ($Billions)
Airline Operations	56.1	167.2
Airport Operations	34.6	30.9
Civilian Commercial Aircraft Manufacturing	16.2	25.9
Civilian Aircraft Engine and Engine Parts Manufacturing	5.9	7.0
Civilian Other Aircraft Parts and Equipment Manufacturing	22.0	22.2
Civilian Research and Development	8.9	10.3
GA Operations	19.0	34.2
GA Aircraft Manufacturing	11.1	11.4
Air Couriers	32.3	39.3
Subtotal - Direct	**206.1**	**348.3**
Airline Visitor Expenditures - Domestic	77.1	255.2
Airline Visitor Expenditures - Foreign	59.0	108.2
GA Visitor Expenditures	5.0	6.0
Travel Arrangements	5.1	10.7
Subtotal - Catalytic	**146.2**	**380.1**
Total Primary Output	**352.3**	**728.4**

Note: Details may not sum to totals due to rounding.

Among the direct aviation activities, air couriers or air cargo operations grew despite the pandemic. Between 2019 and 2020, there was a 14% increase in total output, followed by 17% increase in 2021, and 3% in 2022 (table 7, appendix). Meaning that from 2019 to 2022, air couriers went from $77 billion to $107 billion in total output. As such, air couriers emerged stronger in the post-pandemic years compared to pre-pandemic years due to its important role in maintaining supply chains during the pandemic.

In the direct category, commercial airline operations suffered the largest decline during the pandemic. From 2019 to 2020, commercial airline operations' output dropped by 64% (table 7, appendix). The same dropped was echoed in output of the visiting expenditures of commercial airline passengers, with domestic passengers' visiting expenditures dropping by 68% and foreign passengers' visiting expenditures dropping by 65%. However, commercial airlines bounded back in 2021 and 2022. Between 2020 and 2022, commercial airline operations' output grew by 183%, pushing the total impact of airline operations in 2022 above that of 2019. Similarly, the output of domestic passengers' visiting expenditures jumped 219% between 2020 and 2022, reflecting the recovery of commercial airline operations. However, the output from foreign passengers' visiting expenditures did not have the same recovery, growing only 76% over the same period. A similar but more muted pattern of output is observed from general aviation operations and its related visiting expenditures.

Table 3: Total Output, Earnings, and Jobs Estimates (Current Dollars)

Description	Output ($Billions)		Earnings ($Billions)		Jobs (Thousands)	
	2020	2022	2020	2022	2020	2022
Airline Operations	140.0	396.6	34.5	101.0	532	1,469
Airport Operations	107.3	89.7	35.8	28.3	597	457
Civilian Commercial Aircraft Manufacturing	38.2	57.1	8.9	12.7	129	176
Civilian Aircraft Engine and Engine Parts Manufacturing	12.4	16.0	2.9	3.8	43	57
Civilian Other Aircraft Parts and Equipment Manufacturing	54.0	54.3	14.2	13.8	227	209
Civilian Research and Development	25.6	29.8	8.4	9.4	121	132
GA Operations	47.4	81.2	11.7	20.7	180	301
GA Aircraft Manufacturing	26.3	25.1	6.1	5.6	89	77
Air Couriers	88.5	106.5	26.3	33.1	685	1,151
Subtotal - Direct	**539.7**	**856.4**	**148.8**	**228.3**	**2,602**	**4,029**
Airline Visitor Expenditures - Domestic	197.9	631.9	58.8	183.5	1,242	3,602
Airline Visitor Expenditures - Foreign	151.6	267.9	45.0	77.8	951	1,527
	12.9	14.9	3.8	4.3	81	85
Travel Arrangements	14.1	26.5	4.1	7.7	74	151
Subtotal - Catalytic	**376.5**	**941.3**	**111.7**	**273.3**	**2,348**	**5,365**
Total Impact	**916.2**	**1,797.7**	**260.5**	**501.6**	**4,950**	**9,394**

Note: Details may not sum to totals due to rounding.

The four segments of aircraft manufacturing were affected by the pandemic, but issues within commercial aircraft manufacturing, which started before the pandemic, also contributed to the declining output of these segments. Between 2019 and 2020, the output of aircraft manufacturing segments dropped by 20 to 50 percent (table 7, appendix). Although commercial aircraft manufacturing has grown between 2020 and 2022 by almost 50 percent, sharp declines in both 2019 and 2020 has push output of this segment of aviation to level's far below its peak in 2018. The output of general aviation aircraft manufacturing and aircraft parts and equipment both dropped in 2020 but neither segment has rebounded, with growth in output near zero between 2020 and 2022. However, aircraft engine manufacturing has seen a rebound from its pandemic lows, with output growing 29% from 2020 to 2022.

Two segments of aviation did not follow the pattern of drop in output during the pandemic and the subsequent recover. The output from Research and Development of civilian aircraft was declining each year between 2017 and 2020.[11] However, after the pandemic, this segment of aviation began to grow. Stimulus programs implemented during the pandemic likely helped this segment of aviation. The output from airport operations also seemed to defy the trend, which increased during the pandemic and decreased during the recovery. However, this pattern is driven by two factors: as shift in capital expenditures and a change in the economic flows. As mentioned earlier, airports moved up capital expenditures to take advantage of fewer commercial airline operations and a low interest rate environment, which increased output during the pandemic and decreased output in the following years. The second factor is more technical in nature and is a function of BEA's estimation of their RIMS II multipliers, which as reduced the estimates of the total output for airport operations.

Real Change from Previous Years

Thus far, the economic impact from civil aviation has been discussed in nominal terms. However, price change began to accelerate in the years following 2020. In table 4, 2022 output and earnings data are deflated to 2020 dollars to compare the two years in constant dollars. In general, the same pattern of growth is observed when comparing 2020 and 2022 output estimates in constant dollars, but two segments show continued struggles to recover from the pandemic lows. Aircraft manufacturing continues to show declining growth in real terms for general aviation aircraft and aircraft parts and equipment. Along with commercial aircraft manufacturing's output still far below its 2018 peak, aircraft manufacturing as a whole is struggling to return to previous levels.[12] Second, the output from general aviation visitor expenditures has experience negligible growth in real terms, despite the strong recovery in the output from general aviation operations. However, general aviation visitor expenditures' output did not see a meaningful decrease during or recovery after the pandemic in real term, particularly compared to commercial airlines and their passengers' visiting expenditures.

Table 4: U.S. Civil Aviation: Growth of Total Output and Earning in Constant 2020 Dollars

	Output (2020 $Billions)			Earnings (2020 $Billions)		
Description	2020	2022	Percent Change	2020	2022	Percent Change
Airline Operations	140.0	354.3	153.0	34.5	90.2	161.9
Airport Operations	107.3	80.1	-25.3	35.8	25.3	-29.4
Civilian Commercial Aircraft Manufacturing	38.2	51.0	33.5	8.9	11.3	27.5
Civilian Aircraft Engine and Engine Parts Manufacturing	12.4	14.3	15.4	2.9	3.4	16.2
Civilian Other Aircraft Parts and Equipment Manufacturing	54.0	48.5	-10.2	14.2	12.3	-13.3
Civilian Research and Development	25.6	26.7	4.2	8.4	8.4	-0.4
GA Operations	47.4	72.5	53.0	11.7	18.5	58.4
GA Aircraft Manufacturing	26.3	22.5	-14.5	6.1	5.0	-18.3
Air Couriers	88.5	95.2	7.5	26.3	29.6	12.5
Subtotal - Direct	**539.7**	**765.0**	**41.8**	**148.8**	**204.0**	**37.1**
Airline Visitor Expenditures - Domestic	197.9	564.5	185.2	58.8	163.9	178.8
Airline Visitor Expenditures - Foreign	151.6	239.3	57.9	45.0	69.5	54.4
GA Visitor Expenditures	12.9	13.3	3.7	3.8	3.9	1.4
Travel Arrangements	14.1	23.7	67.4	4.1	6.9	68.2
Subtotal - Catalytic	**376.5**	**840.8**	**123.3**	**111.7**	**244.1**	**118.5**
Total Impact	**916.2**	**1,605.9**	**75.3**	**260.5**	**448.1**	**72.0**

Note: Details may not sum to totals due to rounding.

Table 5: Civil Aviation's Contribution to GDP 2022 (Current Dollars)

Description	Value Added ($Billions)	Percent of GDP
Airline Operations	216.2	0.8
Airport Operations	48.1	0.2
Civilian Commercial Aircraft Manufacturing	29.9	0.1
Civilian Aircraft Engine and Engine Parts Manufacturing	7.7	0.0
Civilian Other Aircraft Parts and Equipment Manufacturing	27.8	0.1
Civilian Research and Development	16.2	0.1
GA Operations	44.3	0.2
GA Aircraft Manufacturing	13.1	0.1
Air Couriers	60.0	0.2
Subtotal - Direct	**463.3**	**1.8**
Airline Visitor Expenditures - Domestic	373.6	1.5
Airline Visitor Expenditures - Foreign	158.4	0.6
GA Visitor Expenditures	8.8	0.0
Travel Arrangements	15.7	0.1
Subtotal - Catalytic	**556.4**	**2.2**
Total Impact	**1,019.7**	**4.0**

Note: Details may not sum to totals due to rounding.

Aviation's Contribution to Gross Domestic Product

U.S. GDP was $25.7 trillion in 2022. GDP represents the sum of all value-added activities in an economy, so intermediate goods and services used in the production of other goods and services are not included. This contrasts with the previous section where the total output calculation included intermediate goods and services that were purchased as part of the production process. To assess aviation's contribution to GDP, these intermediate goods and services must be subtracted from total output.

To estimate civil aviation's contribution to GDP, each expenditure category is calculated separately using the RIMS II value added coefficients. Table 5 shows the results. In 2022, value added economic activity from civil aviation and other related sectors totaled just over $1 trillion, or 4.0 percent of U.S. GDP.

In 2022, the direct sectors contributed $463 billion or 1.8 percent of GDP, while the catalytic sectors contributed $556 billion or 2.2 percent of GDP. Among all sectors, the largest component is Airline Domestic Visitor Expenditures totaling $374 billion, or 1.5 percent of GDP, followed by Airline Operations at $216 billion, or 0.8 percent of GDP. General Aviation, including operations, manufacturing, and visitor expenditures, while small in comparison to commercial aviation, still contributed roughly 0.3 percent to GDP, or $66.2 billion.

See the Appendix for civil aviation's contribution to GDP for the years 2018 through 2020.

Revision to Previous Years

Table 6 reports the change from previously published FAA economic impact estimates for civil aviation. For 2020, the total difference between the current and previously published estimates were about $4.4 billion greater in total output. The upward revisions to output, earnings, and jobs are primarily attributable to revisions in underlying source data.

Table 6: Revisions to Previously Estimates (Current Dollars)

	Data Year	Output ($Billions)	Earnings ($Billions)	Jobs (Thousands)	Value Added ($Billions)
Current Total:	2020	916.2	260.5	4,950	490.4
Previous Total:	2020	911.7	259.1	4,931	488.0
Difference (Revision):		**4.4**	**1.4**	**20**	**2.4**

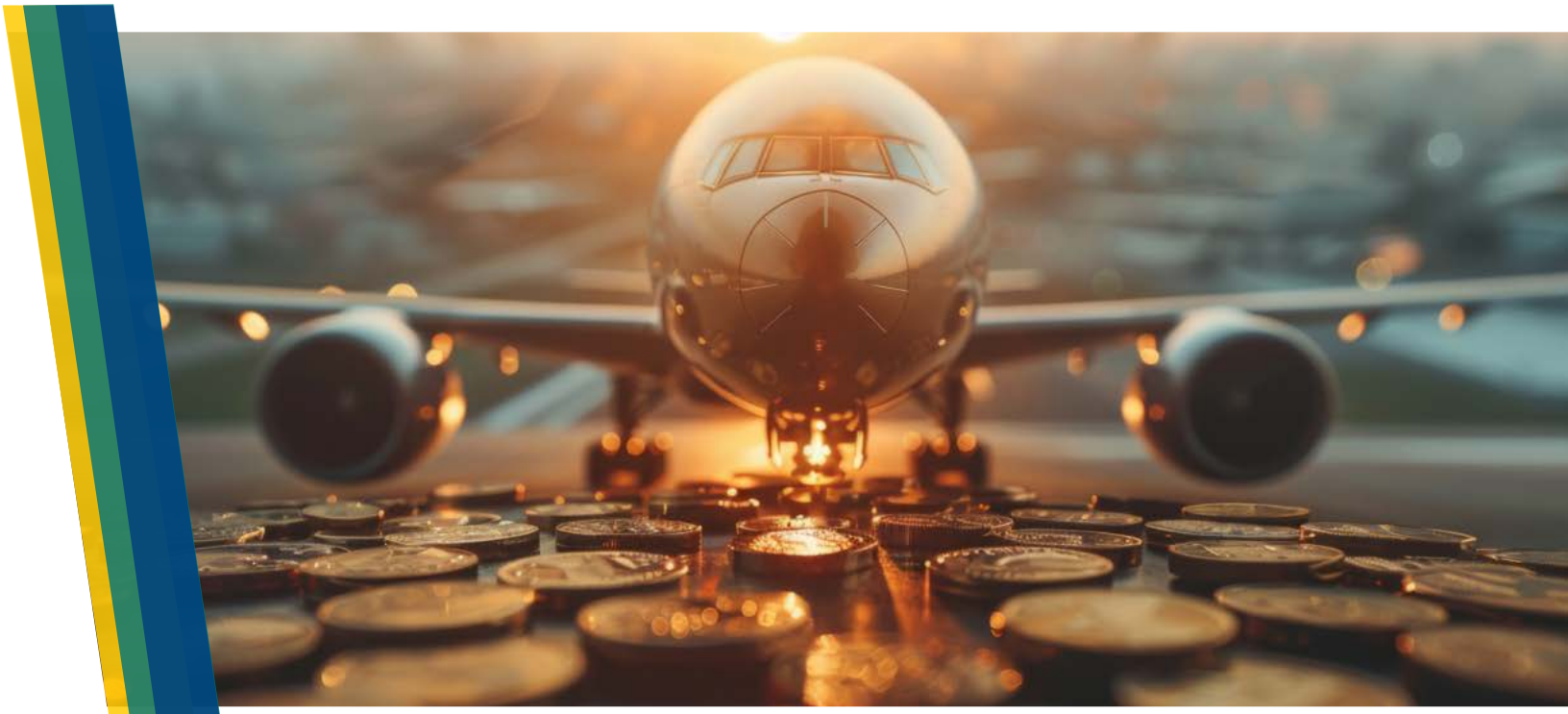
Revision by Sector	Output ($Billions)	Earnings ($Billions)	Jobs (Thousands)	Value Added ($Billions)
Airline Operations	0.0	0.0	0.0	0.0
Airport Operations	0.0	0.0	0.0	0.0
Civilian Commercial Aircraft Manufacturing	0.0	0.0	0.0	0.0
Civilian Aircraft Engine and Engine Parts Manufacturing	0.0	0.0	0.0	0.0
Civilian Other Aircraft Parts and Equipment Manufacturing	1.5	0.4	6.4	0.8
Civilian Research and Development	3.4	1.1	16.1	1.9
GA Operations	0.0	0.0	0.0	0.0
GA Aircraft Manufacturing	0.0	0.0	0.0	0.0
Air Couriers	0.1	0.0	0.5	0.0
Subtotal - Direct	**5.0**	**1.5**	**23.0**	**2.7**
Visitor Expenditures - Domestic	0.1		0.4	0.0
Airline Visitor Expenditures - Foreign	-0.4	-0.1	-2.8	-0.2
GA Visitor Expenditures	-0.1	0.0	-0.6	-0.1
Travel Arrangements	-0.1	0.0	-0.5	-0.1
Subtotal - Catalytic	**-0.6**	**-0.2**	**-3.5**	**-0.3**

Note: Details may not sum to totals due to rounding.

CONCLUSION

With the headwinds of COVID-19, real economic output of aviation fell by half between 2018 and 2020. However, in the following years, aviation recovered much of that lost output, growing 75% in real terms. This remarkable recovery helped the civil aviation industry support support an estimated 9.4 million jobs in 2022 with half a trillion dollars in earnings. Although aviation has not returned to contributing its historical five percent of the U.S. GDP, it has increased from the pandemic lows of 2.3 percent in 2020 to 4.0 percent in 2022.

Despite significant challenges from the pandemic, the civil aviation industry is on track to regain its vital role in the U.S. economy. As the civil aviation industry navigates through this period of recovery and transformation, U.S. civil aviation remains a cornerstone of global connectivity and economic growth.



DESPITE SIGNIFICANT CHALLENGES FROM THE PANDEMIC, THE AVIATION INDUSTRY IS ON TRACK TO REGAIN ITS VITAL ROLE IN THE U.S. ECONOMY.

APPENDIX – SUPPLEMENTAL TABLES

Table 7: U.S. Civil Aviation Economic Impact, Total Output: Primary plus Secondary Impacts (Current Dollars)

	Total Output ($Billions)			
Description	**2019**	**2020**	**2021**	**2022**
Airline Operations	385.5	140.0	230.2	396.6
Airport Operations	105.2	107.3	103.0	89.7
Civilian Commercial Aircraft Manufacturing	76.3	38.2	43.1	57.1
Civilian Aircraft Engine and Engine Parts Manufacturing	17.8	12.4	13.7	16.0
Civilian Other Aircraft Parts and Equipment Manufacturing	75.7	54.0	53.4	54.3
Civilian Research and Development	25.7	25.6	28.5	29.8
GA Operations	55.7	47.4	65.3	81.2
GA Aircraft Manufacturing	33.0	26.3	23.8	25.1
Air Couriers	77.3	88.5	103.4	106.5
Subtotal - Direct	**852.3**	**539.7**	**664.4**	**856.4**
Airline Visitor Expenditures - Domestic	597.3	197.9	483.2	631.9
Airline Visitor Expenditures - Foreign	428.2	151.6	144.1	267.9
GA Visitor Expenditures	13.4	12.9	13.4	14.9
Travel Arrangements	27.2	14.1	17.2	26.5
Subtotal - Catalytic	**1,066.1**	**376.5**	**657.8**	**941.3**
Total Impact	**1,918.4**	**916.2**	**1,322.2**	**1,797.7**

Note: Details may not sum to totals due to rounding.

IN 2022, AIRLINE OPERATIONS GENERATED $397 BILLION IN TOTAL OUTPUT, NEARLY A TRIPLING FROM 2020.

Table 8: U.S. Civil Aviation Economic Impact, Total Earnings: Primary plus Secondary

	Total Output ($Billions)			
Description	**2018**	**2019**	**2020**	**2022**
Airline Operations	94.8	34.5	58.6	101.0
Airport Operations	35.1	35.8	32.5	28.3
Civilian Commercial Aircraft Manufacturing	17.7	8.9	9.6	12.7
Civilian Aircraft Engine and Engine Parts Manufacturing	4.2	2.9	3.2	3.8
Civilian Other Aircraft Parts and Equipment Manufacturing	20.0	14.2	13.6	13.8
Civilian Research and Development	8.5	8.4	9.0	9.4
GA Operations	13.7	11.7	16.6	20.7
GA Aircraft Manufacturing	7.7	6.1	5.3	5.6
Air Couriers	23.0	26.3	32.1	33.1
Subtotal - Direct	**224.7**	**148.8**	**180.5**	**228.3**
Airline Visitor Expenditures - Domestic	177.4	58.8	140.3	183.5
Airline Visitor Expenditures - Foreign	127.2	45.0	41.8	77.8
GA Visitor Expenditures	4.0	3.8	3.9	4.3
Travel Arrangements	7.9	4.1	5.0	7.7
Subtotal - Catalytic	**316.4**	**111.7**	**191.0**	**273.3**
Total Impact	**541.1**	**260.5**	**371.5**	**501.6**

Note: Details may not sum to totals due to rounding.

Table 9: U.S. Civil Aviation Economic Impact, Total Jobs

	Total Jobs ($Billions)			
Description	**2019**	**2020**	**2021**	**2022**
Airline Operations	1,464	532	853	1,469
Airport Operations	585	597	525	457
Civilian Commercial Aircraft Manufacturing	258	129	133	176
Civilian Aircraft Engine and Engine Parts Manufacturing	62	43	48	57
Civilian Other Aircraft Parts and Equipment Manufacturing	318	227	205	209
Civilian Research and Development	121	121	126	132
GA Operations	211	180	242	301
GA Aircraft Manufacturing	112	89	73	77
Air Couriers	599	685	1,118	1,151
Subtotal - Direct	**3,730**	**2,602**	**3,323**	**4,029**
Airline Visitor Expenditures - Domestic	3,749	1,242	2,754	3,602
Airline Visitor Expenditures - Foreign	2,688	951	821	1,527
GA Visitor Expenditures	84	81	77	85
Travel Arrangements	141	74	98	151
Subtotal - Catalytic	**6,663**	**2,348**	**3,749**	**5,365**
Total Impact	**10,393**	**4,950**	**7,072**	**9,394**

Note: Details may not sum to totals due to rounding.

Table 10: U.S. Civil Aviation Economic Impact, Value Added (Current Dollars)

	Value Added ($Billions)			
Description	**2019**	**2020**	**2021**	**2022**
Airline Operations	188.5	68.5	125.5	216.2
Airport Operations	55.1	56.2	55.2	48.1
Civilian Commercial Aircraft Manufacturing	37.9	19.0	22.5	29.9
Civilian Aircraft Engine and Engine Parts Manufacturing	9.1	6.3	6.6	7.7
Civilian Other Aircraft Parts and Equipment Manufacturing	38.5	27.5	27.4	27.8
Civilian Research and Development	14.3	14.2	15.5	16.2
GA Operations	27.2	23.2	35.6	44.3
GA Aircraft Manufacturing	16.4	13.0	12.5	13.1
Air Couriers	41.1	47.1	58.2	60.0
Subtotal - Direct	**428.1**	**274.9**	**358.9**	**463.3**
Airline Visitor Expenditures - Domestic	342.6	113.5	285.6	373.6
Airline Visitor Expenditures - Foreign	245.6	86.9	85.2	158.4
GA Visitor Expenditures	7.7	7.4	7.9	8.8
Travel Arrangements	14.7	7.6	10.1	15.7
Subtotal - Catalytic	**610.6**	**215.5**	**388.9**	**556.4**
Total Impact	**1,038.7**	**490.4**	**747.8**	**1,019.7**

Note: Details may not sum to totals due to rounding.

IN 2022, THE VALUE ADDED FROM AVIATION AND OTHER RELATED SECTORS TOTALED JUST OVER $1 TRILLION, OR AROUND 4.0 PERCENT OF U.S. GDP.

Table 11: U.S. Civil Aviation Economic Impact, Percent Contribution to GDP

	Percent of Percent of GDP			
Description	**2019**	**2020**	**2021**	**2022**
Airline Operations	0.88	0.33	0.53	0.84
Airport Operations	0.26	0.27	0.23	0.19
Civilian Commercial Aircraft Manufacturing	0.18	0.09	0.10	0.12
Civilian Aircraft Engine and Engine Parts Manufacturing	0.04	0.03	0.03	0.03
Civilian Other Aircraft Parts and Equipment Manufacturing	0.18	0.13	0.12	0.11
Civilian Research and Development	0.07	0.07	0.07	0.06
GA Operations	0.13	0.11	0.15	0.17
GA Aircraft Manufacturing	0.08	0.06	0.05	0.05
Air Couriers	0.19	0.23	0.25	0.23
Subtotal - Direct	**2.00**	**1.32**	**1.52**	**1.80**
Airline Visitor Expenditures - Domestic	1.60	0.54	1.21	1.45
Airline Visitor Expenditures - Foreign	1.15	0.42	0.36	0.62
GA Visitor Expenditures	0.04	0.04	0.03	0.03
Travel Arrangements	0.07	0.04	0.04	0.06
Subtotal - Catalytic	**2.86**	**1.03**	**1.65**	**2.16**
Total Impact	**4.86**	**2.35**	**3.10**	**3.96**

Note: Details may not sum to totals due to rounding.

GLOSSARY OF ECONOMIC TERMS

Catalytic

This is a term used to categorize the various segments within the civil aviation industry. In this report, these segments provide goods and services that are related to, and partially dependent upon, civil aviation, but their main function is not to support aviation. The segments categorized as catalytic are visitor expenditures and travel arrangers.[13]

Direct

This is a term used to categorize the various segments within the civil aviation industry. In this report, these segments provide goods and services that are fundamental to, and inseparable from, civil aviation. Airline operations, aircraft manufacturing, air couriers and others are grouped in this category.

Domestic Visitor Expenditures

Domestic visitor expenditures refer to the spending by individuals traveling within their own country. This includes money spent on accommodations, food, transportation, entertainment, and other services during their trips.

Earnings

Earnings are wages and salaries and other labor income, such as overtime, benefits, and proprietors' income, paid to all employed persons by employers for a given unit of work or time. The Bureau of Labor Statistics (BLS) publishes earnings data.

Employment (Jobs)

The BLS is responsible for collecting and publishing data on the number of persons employed within the United States. According to BLS:

- Employment data refer to persons on establishment payrolls who received pay for any part of the pay period that includes the 12th day of the month.

Data exclude proprietors, the unincorporated self-employed, unpaid volunteer or family workers, farm workers, and domestic workers. Salaried officers of corporations are included. Government employment covers only civilian employees; military personnel are excluded. Employees of the Central Intelligence Agency, the National Security Agency, the National Imagery and Mapping Agency and the Defense Intelligence Agency also are excluded.[14]

GLOSSARY OF ECONOMIC TERMS (CONTINUED)

Foreign Visitor Expenditures

Foreign visitor expenditures refer to the spending by international travelers visiting a different country. This includes money spent on accommodations, food, transportation, entertainment, and other services during their stay in the foreign country.

Gross Domestic Product

Gross domestic product (GDP) is a measure of overall economic production during a given time frame. It represents the current dollar value of all final goods and services produced within a country during a specified period, such as a year or quarter. These goods and services include consumption, investment, government expenditures and net exports. GDP also can be viewed as the sum or aggregate of value added over each stage of production through the entire economy. The Bureau of Economic Analysis (BEA) publishes annual and quarterly measures of GDP.

Gross Output

For an industry, gross output is the dollar value of goods or services produced by the industry and made available for use outside that industry during a specified time period.[15] It is measured as total sales or receipts, plus other operating income, commodity taxes (sales and excise taxes) and changes in inventories; or, equivalently, as value added, plus goods and services purchased for use in production. For an entire nation, total gross output is equal to total intermediate inputs plus GDP, and thus exceeds GDP. The BEA publishes annual national and industry-level estimates of gross output.

Multipliers

Multipliers measure the impact of a particular category of spending on the rest of the economy, specifically on output, earnings, and employment. The BEA publishes industry-level multiplier estimates.

Output

Output is the current dollar production of goods or services by a production unit and is measured by total sales or receipts of that unit, plus other operating income, commodity taxes (sales and excise taxes) and changes in inventories.

Primary Impact

This is a term used to categorize the dollar amounts that flow through the civil aviation industry. Primary impact refers to the first round of expenditures within each segment that are collected from government and private sources. Primary output is adjusted by RIMS II multipliers to derive secondary impacts.

Seasonal Adjustment

Many aviation-related time series data display seasonal patterns. For example, travel tends to pick up during the summer and the end-of-year holiday season, and slow down at other times of the year. Seasonal adjustment is a statistical process that removes such patterns to reveal underlying trends. In other words, seasonal adjustment removes the effects of recurring seasonal influences from time series. This process "quantifies seasonal patterns and then factors them out of the series to permit analysis of non-seasonal" trends in the data.[16]

Secondary Impact

This is a term used to categorize the dollar amounts that flow through the civil aviation industry. Secondary impacts result from follow-on spending down the supply chain after the initial round or primary impact. This includes payments- to suppliers, and suppliers of suppliers, as well as spending by employees of those businesses. Secondary impacts therefore capture both interindustry and household spending that derive from activity in the respective sectors.

Total Economic Activity

Total economic activity is a term used interchangeably with gross output.

Total Impact

Total impact is the sum of primary and secondary impacts.

Value Added

Value added refers to the current dollar contribution to production by an individual producer, industry or segment during a specified time period. It is measured as the difference between gross output and goods and services purchased for use in production. (These purchased goods and services are also called input purchases or intermediate inputs.) Measures of value added consist of employee compensation, production-related taxes, imports less subsidies, and gross operating surplus. Value added can be summed or aggregated across individual producers over an entire sector, industry or nation; at the national level, total value added equals GDP. The BEA publishes national- and selected sector-level annual and quarterly measures of value added, as well as selected annual industry measures.

NOTES

[1] Data sources include: Bureau of Transportation Statistics T-100 Segment data for scheduled passengers and freight; FAA impact report estimates for visitor expenditures.

[2] U.S. Bureau of Economic Analysis, www.bea.gov/data/gdp, and Bureau of Labor Statistics, U.S. Department of Labor, Current Employment Statistics, www.bls.gov/ces/data/

[3] U.S. Department of Transportation, Federal Aviation Administration, 2022. The Economic Impact of Civil Aviation on the U.S. Economy. August 2022: www.faa.gov/sites/faa.gov/files/2022-08/2022-APL-038%202022_economic%20impact_report.pdf

[4] The segments include aircraft manufacturing, NAICS code 336411; scenic and sightseeing transportation and support activities for transportation, NAICS code 48A000; and accommodation, NAICS code 721000.

[5] The segments include aircraft engine and engine parts manufacturing, NAICS code 336412, and travel arrangement and reservation services, NAICS code 561500.

[6] Air transportation has the NAICS code 481000.

[7] Industry segment is couriers and messengers with NAICS code 492000.

[8] Remaining segments include other aircraft parts and auxiliary equipment manufacturing, NIACS code 336413, and scientific research and development services, NIACS code 541700.

[9] The multipliers typically change over time thereby affecting these secondary impacts as compared to earlier years. For example, 2022 jobs multipliers were generally lower than those for 2020, resulting in lower estimates for total jobs.

[10] "Output" includes the sum of all intermediate goods and services used in production, plus value added by the industry itself. This distinguishes output from gross domestic product, which only counts value added.

[11] The multipliers typically change over time thereby affecting these secondary impacts as compared to earlier years. For example, 2022 jobs multipliers were gFor 2018 estimates, see U.S. Department of Transportation, Federal Aviation Administration. The Economic Impact of U.S. Civil Aviation in 2020. August 2022. www.faa.gov/sites/faa.gov/files/2022-08/2022-APL-038%202022_economic%20impact_report.pdf

[12] Ibid

[13] ACI Europe, The Social and Economic Impact of Airports in Europe, 2004, p. 5.

[14] Bureau of Labor Statistics, U.S. Department of Labor, Chapter 2. Employment, Hours, and Earnings from the Establishment Survey. In Handbook of Methods, (accessed October 1, 2020) www.bls.gov/opub/hom/pdf/ces-20110307.pdf

[15] Organization for Economic Co-operation and Development, "Glossary of Statistical Terms," 2002

[16] Bureau of Labor Statistics, U.S. Department of Labor, Fact Sheet on Seasonal Adjustment in the CPI, (accessed October 1, 2020) wwww.bls.gov/cpi/seasonal-adjustment/questions-and-answers.htm

ACKNOWLEDGMENTS

The Forecast and Performance Analysis Division is very grateful for the helpful comments and guidance from:

Chris Atkin, FAA

Eduardo De Paz-Barahona, FAA

Richard Champley, International Trade Administration

Jonathan Corning, FAA

W. Gavin Ekins, FAA

Rafael Gabriel, International Trade Administration

Gotina Epps, FAA

Randal Matsunaga, FAA

Office of Aviation Analysis, DOT

Kristin Stadum, FAA

Sherley Taliaferro, FAA

Jared Teeter, FAA

Darren Timothy, OST

Solange Walker, FAA

For more information, please send inquiries to:

Roger Schaufele, Manager
Forecast and Performance Analysis Division, Office of Aviation Policy and Plans
roger.schaufele@faa.gov

Or visit:

www.faa.gov/economic-impact

U.S. Department of Transportation
Federal Aviation Administration

Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591
www.faa.gov

2024-APL-044