SCB SURVEY OF CURRENT BUSINESS

The Journal of the U.S. Bureau of Economic Analysis

New and Revised Statistics for the U.S. Space Economy, 2012–2023

by Patrick Georgi and Chris Surfield | March 31, 2025

The U.S. Bureau of Economic Analysis (BEA) released new and updated U.S. space economy statistics for 2012–2023 on March 31, 2025. These statistics provide estimates of the U.S. space economy's gross domestic product (GDP) and gross output by industry in current and chained (or "real") dollars, as well as by-industry estimates of private employment and compensation.[1] The space economy accounted for $142.5 billion, or 0.5 percent, of total U.S. GDP in 2023. Real GDP grew by 0.6 percent in the space economy, reflecting the second consecutive year of positive real growth. The statistics also show the space economy accounted for $240.9 billion of gross output in 2023 and $57.9 billion of private-sector compensation and supported 373,000 private-sector jobs. The new 2023 statistics and revised 2012–2022 statistics build on previous estimates released in June 2024, by incorporating new source data, most notably the results of BEA's 2023 comprehensive update of the National Economic Accounts (which updated the space economy estimates for 2012–2016) as well as BEA's 2024 annual update of the National Economic Accounts (which updated the estimates for 2017–2022).

This article starts with an overview of the major findings from the updated space economy statistics, followed by a description of the updates made to the previously published estimates for 2012–2022. Next, an overview of the methodology is presented. The article concludes with a review of current and future plans for the statistics, including ideas suggested by data users during BEA's inaugural Space Economy Measurement Workshop held in March 2024.[2]

Results

As shown in table 1, the space economy's current-dollar annual growth in 2023 for GDP and gross output outpaced the average annual current-dollar growth over the 2012–2023 period. However, rising prices had a significant impact on the space economy, especially in recent years. While current-dollar growth in GDP was 6.3 percent in 2023, real growth was only 0.6 percent, primarily reflecting the impact of inflation on current-dollar estimates.

Table 1. Overview of the U.S. Space Economy Statistics

Series	2023 values (millions of dollars)	2023 growth (percent)	2012–2023 average annual growth (percent)
GDP	142,526	6.3	2.4
Real GDP, chained (2017) dollars	115,962	0.6	1.3
Gross output	240,891	2.7	2.3
Real gross output, chained (2017) dollars	202,094	−0.6	1
Private compensation	57,924	5.4	2.5
Private employment, full- and part-time employees	373,000	3.3	−1.3

GDP Gross domestic product

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Gross domestic product

In 2023, real GDP in the space economy grew by 0.6 percent, propelled by growth in all categories of government (7.9 percent), most notably federal national defense (12.7 percent). Both the federal national defense industry and the federal nondefense industry engage heavily in research and development (R&D) activities, which drove these results. While there are many government agencies involved in space activities, the majority are attributable to the federal government, chiefly NASA (National Aeronautics and Space Administration) and the U.S. Space Force. GDP for the government industry represents spending on federal, state, and local government employee compensation plus consumption of fixed capital.[3] Table 2 shows the federal government agencies and federally funded R&D centers with direct space activity that comprise the federal government space estimates.[4]

Table 2. Federal Government Agencies and Federally Funded Research and Development Centers with Direct Space Activity

Category	Agency or center	
Nondefense	U.S. Department of Commerce	National Institute of Standards and Technology
	U.S. Department of Energy	National Oceanic and Atmospheric Administration
	U.S. Department of the Interior	National Science Foundation
	U.S. Department of Transportation	Smithsonian
	NASA (National Aeronautics and Space Administration)	
Defense	U.S. Air Force	Missile Defense Agency
	U.S. Army	U.S. Navy
	Defense Advanced Research Projects Agency	Office of the Secretary of Defense
	Defense Information Systems Agency	Space Development Agency
	Defense Innovation Unit	U.S. Space Force
	Defense Logistics Agency	
Federally funded research and development centers	Aerospace	Los Alamos National Laboratory
	Brookhaven National Laboratory	National Center for Atmospheric Research
	Jet Propulsion Laboratory	National Optical Astronomy Observatory
	Lawrence Livermore National Laboratory	National Radio Astronomy Observatory
	Lincoln Laboratory	National Solar Observatory

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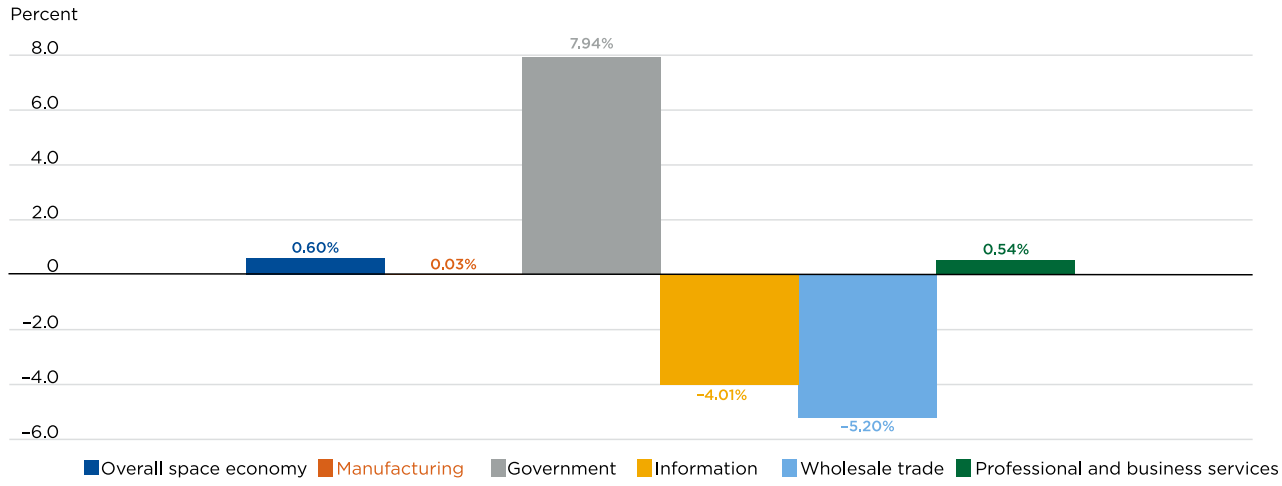
Real GDP growth in the space economy was partly offset by declines in the information (−4.0 percent) and wholesale trade (−5.2 percent) sectors. Within the information sector, declines were driven by the broadcasting and telecommunications industry (−4.6 percent), led by direct-to-home (DTH) satellite television, which has experienced a decline in revenue and subscribers since 2017. This industry also includes satellite internet connections, which, by contrast, have increased over the time series, according to Federal Communications Commission data. The wholesale trade industry's activity in the space economy consists of the margins, or markups, charged by wholesale distributors for space-related items, such as Global Positioning System (GPS) transceivers and antennae. Chart 1 shows the 2023 growth rates of major sectors that contributed to overall space economy real GDP.

Chart 1. Real GDP Growth in the U.S. Space Economy, 2023

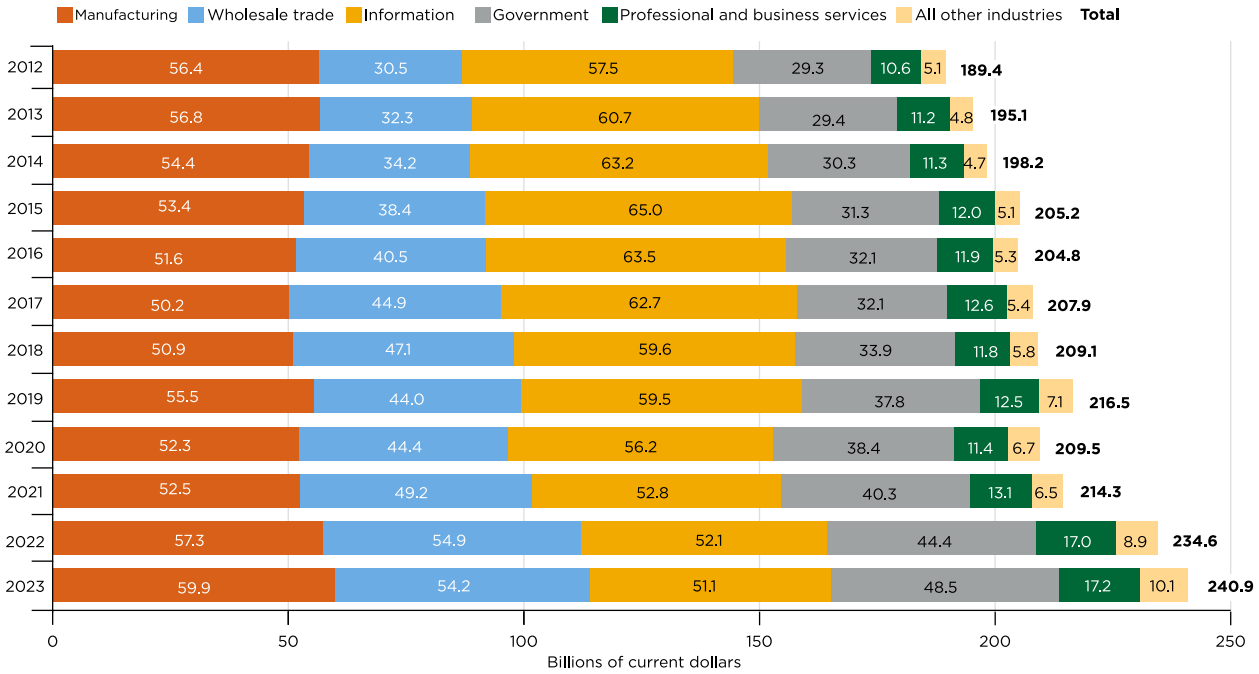


GDP Gross domestic product
U.S. Bureau of Economic Analysis

Gross output

While real gross output in the space economy declined by 0.6 percent in 2023, several sectors did contribute positively, including government (4.7 percent) and manufacturing (2.9 percent). As was the case with real GDP, federal national defense saw strong growth in 2023 (13.4 percent). Manufacturing activity in the space economy includes, among others, the production of space vehicles, such as complete spacecrafts, rockets, and satellites. The wholesale trade (−6.3 percent) and information (−4.7 percent) sectors represent the largest declines in real gross output for the space economy in 2023. Current-dollar output in 2023, however, grew 2.7 percent for the space economy, further highlighting the effects of inflation. Chart 2 illustrates the composition and shifting trends of the space economy's gross output by major sector each year.

Chart 2. Space Economy Gross Output, 2012–2023



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A narrow view

An addendum to the GDP and gross output tables shows the value of the space economy without DTH satellite television, satellite radio, and educational services. This value represents a narrower definition of the space economy, as suggested by data users interested in understanding what the U.S. space economy would look like without the effect of these three components. Over the 2012–2023 period, this definition resulted in higher growth rates than the standard definition for both real GDP and real gross output. In 2023, real GDP increased 2.0 percent using the narrow definition, compared to 0.6 percent using the broad definition. Likewise, growth in real gross output was 0.6 percent in 2023 using the narrow definition, compared to −0.6 percent using the broad definition. These differences primarily reflect the removal of DTH satellite television, which, as stated, has been declining over the period and has an outsized impact on the overall space economy.

Prices

As with the overall U.S. economy, price increases were apparent in many industries in the space economy since 2021. The wholesale trade industry, in particular, experienced price increases well above the average price increase in the space economy overall. From 2021 to 2023, value-added price indexes for wholesale trade grew by an average of 19.1 percent, compared with 5.3 percent for the overall space economy across the same period. Price increases across the space economy slowed in 2022 (3.6 percent) but saw an acceleration in 2023 (5.7 percent). The increase in prices for wholesale trade in the space economy mirrors the increase in prices for the household appliances and electrical and electronic goods merchant wholesalers industry. As wholesale trade represents a large share of the space economy GDP—19 percent in 2023—large price increases in this industry significantly affect growth in the overall space economy.

Going against the general trend of price increases, manufacturing prices declined over the 2012–2023 period, driven by falling prices in the computer and electronic products industry.[5] This industry includes satellite and ground equipment, GPS equipment, and positioning, navigation, and timing equipment. Value-added price indexes for total manufacturing declined by 3.9 percent, on average, between 2012 and 2023; however, a 2.6 percent increase in 2023 reverses that general trend. The 2023 increase in manufacturing prices was driven by other transportation equipment (5.5 percent) and computer and electronic products (1.0 percent).

Private employment and compensation

Private industries employment for the space economy represented 373,000 full- and part-time employees in 2023, and compensation for these employees totaled $57.9 billion. Employment grew by 10,000 employees in 2022 and by 12,000 employees in 2023, partially reversing the long-term decrease from 2012 to 2021. Compensation in the manufacturing industry was high, relative to other space economy industries, accounting for 41.9 percent of total space economy compensation in 2023 but only 29.2 percent of space economy private employment. Wholesale trade was the second-largest industry in terms of both private employment (22.8 percent) and compensation (18.1 percent) in 2023. The information industry also contributed significantly to private industry employment and compensation, contributing 18.8 percent and 17.7 percent, respectively. For details on government employment in the space economy, see the box "Space-Related Government Employment" at the end of this article.

Revisions

Revisions to 2012–2022 estimates mainly reflect the results of BEA's 2024 annual update of the National Economic Accounts and 2023 comprehensive update of the National Economic Accounts. BEA's national economic statistics are updated annually to incorporate new source data and other improvements, and the statistics undergo a more substantial comprehensive update at approximately 5-year intervals. A key feature of the comprehensive update is the benchmarking of GDP and its components to data from the most recently available Census Bureau quinquennial Economic Census. For this release, the annual update primarily revises previously published space economy data from 2017 to 2022, and the comprehensive update revises data from 2012 to 2016. The 2023 comprehensive update of the national statistics generated sizeable revisions to certain space-related industries, notably wholesale trade and computer and electronic products manufacturing. In both cases, the revisions largely reflected updated business revenue data from the Economic Census. Wholesale trade value-added levels were revised up by $3–$4 billion per year, whereas computer and electronic products manufacturing levels were revised down by $1–$4 billion per year between 2012 and 2016. The 2024 annual update also caused revisions for the space economy estimates, as they are built on data from BEA's comprehensive supply and use tables. For a better understanding of the relationship between these tables, see the "Methodology" section below.

It is important to note the June 2024 release of the space economy statistics updated the reference year for chained-dollar value added and gross output, as well as prices, to 2017. Prior releases used 2012 as the reference year, and as such, comparisons of chained-dollar or price index estimates across these releases are not useful. For this year's update, in particular, this would mean the real-dollar and price index tables for the years 2012–2016 and previously published estimates are not directly comparable.

In addition to revisions stemming from the comprehensive and annual updates, the 2022 values were updated to reflect the incorporation of new R&D spending data from the National Science Foundation (NSF) Business Enterprise Research and Development Survey, the NSF Survey of Federal Funds for Research and Development, data from the Federal Communications Commission on satellite internet usage, and updated

information on federal defense spending on space weapons systems and related investment. The most notable revision caused by these updates was an upward revision of $1.6 billion to the 2022 estimate of value added for the professional and business services industry, which includes R&D.

Methodology

In BEA's statistics, the space economy consists of space-related goods and services that are used or made in space, or directly support those used or made in space;[6] require direct input from space to function, or directly support those that do; and are associated with studying space. A brief overview of the methodology used to develop the space economy statistics is provided below; for more information, see "Preliminary Estimates of the U.S. Space Economy, 2012–2018" in the December 2020 *Survey of Current Business.*

As noted, the space economy statistics are derived from BEA's comprehensive supply and use tables (SUTs) and National Income and Product Accounts (NIPAs), which provide insight into the internal workings of the U.S. economy and detail the contribution of specific industries and products to GDP. The SUTs measure the flows of goods and services purchased by each industry, the incomes earned from production in each industry, and the distribution of sales for each product. The NIPA data present the value and composition of U.S. GDP, the types of incomes generated in its production, and its associated employment. The Economic Census is the primary data source for the SUTs. Other data sources include the U.S. Departments of Agriculture, Education, and Energy, plus private organizations.[7] The goal of the space economy statistics is to highlight the space-related production and spending that are already present in the SUTs and NIPAs.

The goods and services included in the space economy statistics are chosen from BEA's comprehensive list of nearly 5,000 categories of goods and services that constitute the SUTs. In practice, the space economy statistics represent a rearrangement of existing data to group and highlight spending and production directly attributable to the space economy. For example, the space economy statistics show the production of space-related educational services, such as astrophysics and astronautical engineering, while the SUTs show the production of all educational services, regardless of the subject. Likewise, construction spending on space activities, such as construction of space ports and observatories, is already embedded in the SUTs; the space economy statistics simply highlight that production.

The space products (goods and services) that comprise the space economy were identified using past research and input from subject matter experts. Notable sources include the Organisation for Economic Co-operation and Development (OECD) *Handbook on Measuring the Space Economy*, a U.S. Bureau of Industry and Security assessment describing the U.S. space industry supply chain, reports from the private sector (including the Satellite Industry Association and the Space Foundation), input from U.S. and international space agencies (including NASA, the Canadian Space Agency, and the Australian Space Agency), BEA industry analyst input, and industry expert feedback.

Many product categories within the SUTs comingle products that constitute both space and nonspace economic activity. For example, the SUTs contain a single category for internet services, so the share of internet services provided by satellites must be estimated. In these cases, external data sources are used to isolate the space activity. Table 3 lists the primary data sources used to estimate space activity within comingled products. In most cases, revenue or spending data are used as indicators; where revenue or spending data are unavailable, space-related employment and wage information are often used.

Table 3. U.S. Space Economy Industries, Products, and Data Sources Used to Supplement the Supply and Use Tables

Industries	Space products	Supplementary data sources
Manufacturing, wholesale trade, and retail trade	Space vehicles; space weapons; satellites; ground equipment; search, detection, navigation, and guidance systems (GPS/PNT equipment)	U.S. Census Bureau (Census) Economic Census product line data; government budget documents
Information	Telecommunications; broadcasting; software	U.S. Bureau of Labor Statistics (BLS) Occupational Employment and Wage Statistics (OEWS) Survey; Federal Communications Commission; U.S. Securities and Exchange Commission
Government	Military; civilian; federally funded research and development centers services	Public budget documents; National Science Foundation (NSF) Survey of Federal Funds for Research and Development
Professional and business services	Research and development; engineering and technical services; computer systems design; geophysical surveying and mapping services	BLS OEWS; NSF Survey of Federal Funds for Research and Development; NSF Business Enterprise Research and Development Survey
Construction	Space facilities; observatories; planetariums; satellite dish installation	Census Value of Construction Put in Place Survey
Other various services	Launch services; insurance; education; observatories; planetariums	AXA XL; National Center for Education Statistics Integrated Postsecondary Education Data System; public documents

GPS Global Positioning System

PNT Positioning, navigation, and timing

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Macroeconomic statistics like GDP, compensation, and employment are typically published by industry and not by product. Although products can be produced by multiple industries, most products are made by a primary industry.[8] For example, most guided missile and space vehicle equipment is made by the guided missile and space vehicle manufacturing industry, but guided missile and space vehicle equipment can also be made by the aircraft manufacturing industry. Space economy gross output by industry represents the share of each product's space-related gross output produced by each industry. By choosing individual products, production is captured from all relevant industries.

GDP by industry for the space economy is derived from the relationship between the industry output for space activities and total industry output. Specifically, for each industry, the ratio of intermediate consumption to industry output for space activities is assumed to be the same as the ratio of total industry intermediate consumption to total industry output. Likewise, measures of private-sector compensation and employment are derived by taking the ratio of an industry's space related output to total output and applying it to the measures total compensation and employment for that industry.

Examining the product-level statistics for individual industries illustrates the "secondary production" of space-related goods and services by many industries that are not typically considered to be space industries. For example, the detailed industry tables show that two mining industries, oil and gas extraction and support activities for mining, contributed $2–$10 million to space economy GDP each year between 2017 and 2023. In this case, the space product is R&D performed by companies in the mining industry with applications for the space economy (as opposed to mining performed in space). Thus, having the full industry detail for all space economy statistics allows a more nuanced and comprehensive view of space-related production in the economy.

Current and Future Plans

The comprehensive update of BEA's industry statistics occurred in two phases. The first phase covered the years 2017–2022, and the second phase covered years 2016 and earlier. The release of space economy statistics described in this article covers both phases of the comprehensive update, with updated data for 2012–2022 as well as new estimates for 2023, marking the longest time series to date for BEA's space economy data.

In March 2024, BEA held a first-of-its-kind workshop that brought together dozens of experts from across various U.S. government agencies, private industry, academia, and international organizations for in-depth deliberations and discussion on the measurement of the space economy. This included experts from OECD, NASA, the U.S. Space Force, the Canadian Space Agency, the National Space Council, and many private-industry organizations. Two main takeaways from that workshop were that users want more timely space economy estimates, and they want state-level estimates. To address these concerns, this release accelerates publication of the space economy estimates by 3 months, and BEA continues to evaluate the requirements of producing state-level estimates. BEA will continue to actively engage with data users and incorporate their feedback into future releases.

Please visit BEA's space economy page for other information about the space economy, including datasets, research articles, webinars, and infographics.

Space-Related Government Employment

Private industry employment and compensation for the space economy is derived from the relationship between an industry's gross output attributable to space activities and an industry's total gross output. Specifically, the ratio of an industry's space economy output to total output is applied to each industry's employment and compensation to calculate those estimates. This relational method is suitable because BEA's SUTs and industry data contain very detailed information on goods and services produced by private industries. However, BEA's industry data do not have detailed employment and compensation data on the myriads of space-related government services provided by government agencies. As a result, the method used to estimate private employment and compensation is not suitable for estimating space-related government employment and compensation, and an alternative methodology was implemented to produce government estimates.

Using publicly available government budget documents and datasets, a set of prototype estimates is constructed and included with this updated release for the broader space economy. For a more detailed explanation of the methodology, challenges, and limitations of this alternative method of estimating space related government employment, please see the *Survey* article "New and Revised Statistics for the U.S. Space Economy, 2012–2021," specifically the "Measuring Space-Related Government Employment" section.

Table I shows government employment statistics, which have been updated to include 2023. Total available nondefense government employment increased from 19,017 employees in 2017 to 19,686 employees in 2023, with an average annual growth rate of 0.6 percent. The largest agency with available space-related employment data was NASA, where employment increased from 15,728 employees in 2017 to 16,115 employees in 2023. The National Oceanic and Atmospheric Administration had the second-largest nondefense workforce in 2023, with 2,080 employees identified as working on space-related activities. Not shown in the table are space-related defense employment figures, including the 13,314 employees in the U.S. Space Force in 2023 (Space Force personnel figures were first broken out from total U.S. Air Force figures in 2021).

Table I. Experimental Estimates of Available Space-Related Nondefense Government Employment

	2017	2018	2019	2020	2021	2022	2023
Nondefense federal, state, and local space total[1]	19,017	18,998	19,087	19,269	19,284	19,735	19,686
Nondefense federal space total	17,951	17,871	17,877	18,074	18,065	18,478	18,857
U.S. Department of the Interior–U.S. Geological Survey (National Land Imaging Program/Land Remote Sensing (Landsat and operations))	148	180	132	135	169	177	166
Federal Aviation Administration–Office of Commercial Space Transportation	98	97	97	91	104	117	124
NASA space total (excludes aeronautical employment)	15,728	15,455	15,654	15,871	15,762	16,128	16,115
NOAA space total	1,977	2,139	1,994	1,977	2,030	2,056	2,080
National Environmental Satellite, Data, and Information Service	742	851	752	727	784	794	822
National Ocean Service (navigation, observations, and positioning)	547	549	563	568	579	572	571
National Weather Service (observations)	688	739	679	682	667	690	687
State and local space total	1,066	1,127	1,210	1,195	1,219	1,257	1,201
Oklahoma Space Industry Development Authority	7	6	6	6	6	7	6
Estimated state universities' space-related faculty	1,059	1,121	1,204	1,189	1,213	1,250	1,195

NASA National Aeronautics and Space Administration

NOAA National Oceanic and Atmospheric Administration

1. Missing from this list are state and local spaceports and administration (aside from Oklahoma) and National Science Foundation R&D centers and observatories.

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Acknowledgments

We wish to thank the following BEA employees for their assistance in preparing this article: Peter Beall, Marissa Crawford, David Curtis, Peter Fisk, Connor Franks, Danielle Helta, Tina Highfill, Tom Howells, Billy Jolliff, Pam Kelly, Colby Johnson, Lisa Mataloni, Kristina Maze, Brian McCue, Stephanie McCulla, Ted Morgan, Andy Pinard, Dorian Turner, and Dave Wasshausen.

1. GDP, or value added, by industry represents the market value an industry adds to production, or the industry's gross output less the cost of its intermediate inputs. Gross output represents the market value of the goods and services produced by an industry and is similar in concept to revenue. Real estimates reflect quantities produced and exclude the effects of inflation.
2. For more information, see Tina Highfill, "Current space economy statistics and priorities for the future" (presented at the Space Economy Measurement Workshop, Washington, DC, March 12, 2024).
3. For more details, see Tina Highfill, Annabel Jouard, and Connor Franks, "Revisions Summary" in *Updated and Revised Estimates of the U.S. Space Economy, 2012–2019*, report (Washington, DC: BEA, January 2022).
4. Classified government services performed by national intelligence personnel are currently excluded from the government industry statistics due to a lack of source data. Government spending on purchases from the private sector shows up as production within the industry that produced the good or service. For example, if the U.S. Space Force purchases a satellite from a private company, that purchase is accounted for in the computer and electronic products industry within the manufacturing sector.
5. For more details, see Tina Highfill and Matthew Weinzierl, "Real growth in space manufacturing output substantially exceeds growth in the overall space economy," *Acta Astronautica* 219 (June 2024): 236–242.
6. This release reflects an update to BEA's core definition of the space economy to highlight the distinction that goods and services produced in space (e.g., research done on the International Space Station) have been and will continue to be captured in the data.
7. For more details on source data and methodology, see U.S. Bureau of Economic Analysis, *Concepts and Methods of the U.S. Input-Output Accounts*," (Washington, DC: BEA, 2009).
8. BEA organizes industry statistics using the North American Industry Classification System, a classification system developed jointly by the United States, Canada, and Mexico to provide improved comparability in industrial statistics across North America.

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