

Measuring the US Space Economy

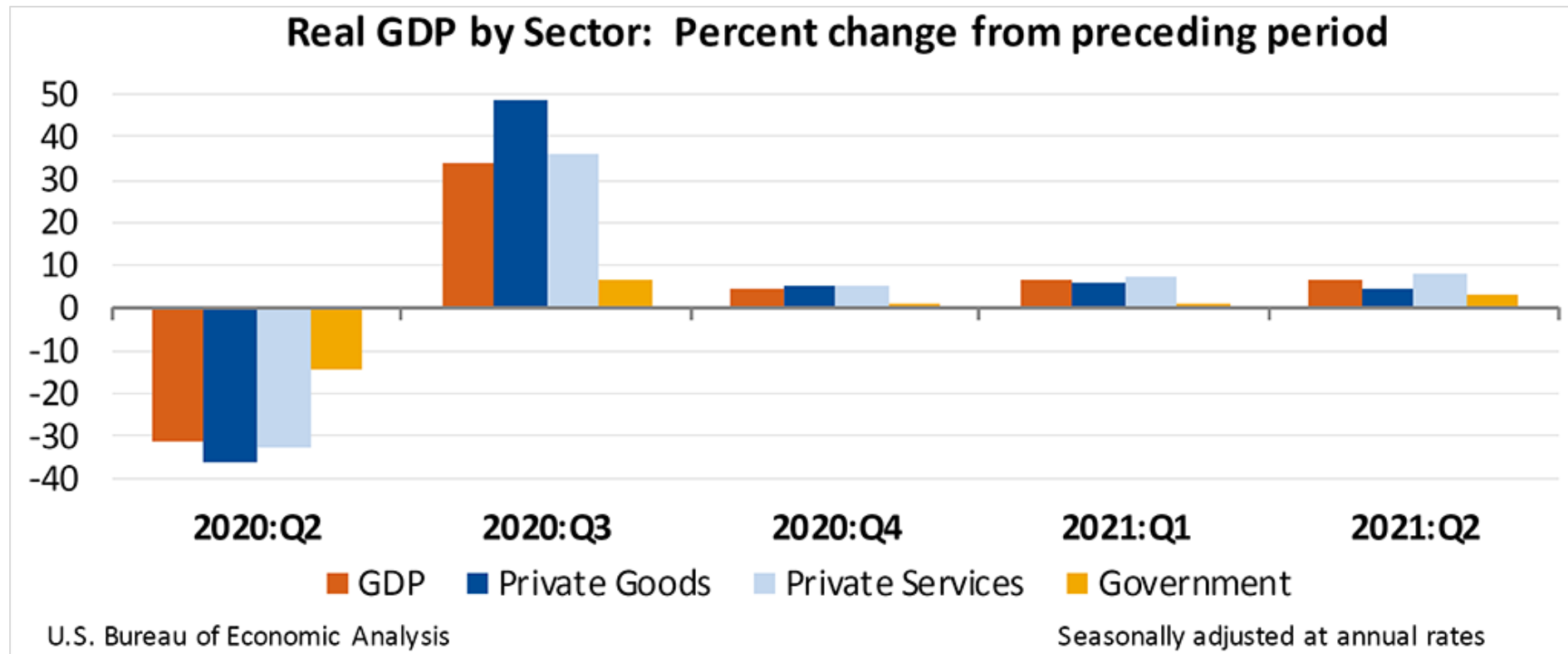
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Gross domestic product (GDP) measures the value of the final goods and services produced in the US



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BEA satellite accounts include: Space Economy, Digital Economy, Outdoor Recreation, Ocean Economy, and more

Overview of Space Economy Methodology

Step 1: Identify space-related commodities (goods and services) within BEA supply-use tables

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Step 3: Use BEA supply-use tables to determine total space-related economic activity by industry

Defining the Space Economy

OECD definition serves as our foundation

“The Space Economy is the full range of activities and the use of resources that create and provide value and benefits to human beings in the course of exploring, understanding, managing and utilising space” (OECD, 2012, *OECD Handbook on Measuring the Space Economy*).

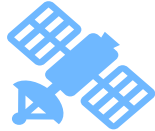





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The space economy consists of space-related goods and services, both public and private. This includes goods and services that:

1. Are used in space, or directly support those used in space
2. Require direct input from space to function, or directly support those that do
3. Are associated with studying space

Source Data to Estimate Space Activity

US Space Economy Components		Primary Data Sources	
Information	Telecommunications, broadcasting, software		Bureau of Labor Statistics (BLS) Occupational Employment Survey (OES); Federal Communications Commission (FCC) Securities and Exchange Commission (SEC); BEA supply-use tables
Manufacturing, Retail trade, and Wholesale trade	Space vehicles; space weapons; satellites; ground equipment; search, detection, navigation, and guidance systems (GPS/PNT equipment)		Economic Census product line data; BEA supply-use tables
Government	Military, civilian, federally funded research and development centers		Public budget documents; National Science Foundation (NSF) Survey of Federal Funds for Research and Development; BEA supply-use tables
Professional and business services	Research and development; engineering and technical services; computer systems design; geophysical surveying and mapping services		BLS OES; NSF Survey of Federal Funds for Research and Development; NSF Business Enterprise Research and Development Survey; BEA supply-use tables
Construction	Space facilities, observatories, planetariums		Census Value of Construction Put in Place (VIP); BEA supply-use tables
Other various services	Launch services, insurance, education, observatories, planetariums		National Center for Education Statistics Integrated Postsecondary Education Data System (IPEDS); Federal Aviation Administration; MITRE; Public documents; BEA supply-use tables

Estimating Space Activity: Satellites

Step 1: Identify relevant commodities within supply-use tables

Commodity Code	Commodity Description
334220	Broadcast and wireless communications equipment

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Step 2: Separate space and non-space economic activity within commodities

Product Code	Product Description	2012 Shipments (\$000s)
33422051	Radio station equipment	2,898,376
3342205104	Space-based (satellite) stations	2,103,391
3342205109	Airborne and marine-based stations	183,027
3342205114	Earth fixed-based systems	131,371
3342205116	Earth mobile-based systems	480,587

Source: US Census, "Manufacturing: Subject Series: Product Summary: Products or Services Statistics: 2012", [EC1231SP1](#)

→ Census manufacturing data serve as the foundation for BEA's supply-use tables. Their product line data provides detailed information about manufacturing products

Estimating Space Activity: Engineering Services



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NAICS 541330 - Engineering Services

Occupation code	Occupation title (click on the occupation title to view an occupational profile)	Group	Employment	Employment RSE	Percent of total employment	Median hourly wage	Mean hourly wage	Annual mean wage	Mean wage RSE
17-2011	Aerospace Engineers	detail	9,940	9.9%	1.03%	\$52.98	\$55.37	\$115,170	2.3%
17-3021	Aerospace Engineering and Operations Technicians	detail	1,920	12.2%	0.20%	\$33.50	\$33.07	\$68,780	2.1%
19-2021	Atmospheric and Space Scientists	detail	80	17.4%	0.01%	\$43.52	\$47.24	\$98,250	4.9%

Source: Bureau of Labor Statistics, 2018 Occupational Employment Survey, https://www.bls.gov/oes/2018/may/naics5_541330.htm

→ Bureau of Labor Statistics data for 2018 indicate 1.03% of employees in the engineering services industry were aerospace engineers

Space Economy Results

	Space Economy, 2018	Percent of US, 2018	Space Average Annual Growth Rate, 2012-2018 (%)
Gross output	\$178 billion	0.49	1.5
Value added	\$109 billion	0.53	2.1
Private employment	356,000	0.30	0.3
Private compensation	\$41 billion	0.46	0.5

Gross output is the market value of goods and services produced by an industry

- Represents revenue or receipts, commodity taxes, other operating income, and inventory change

Value added (GDP) is the market value an industry adds in production

- Value added = Gross output - Intermediate inputs

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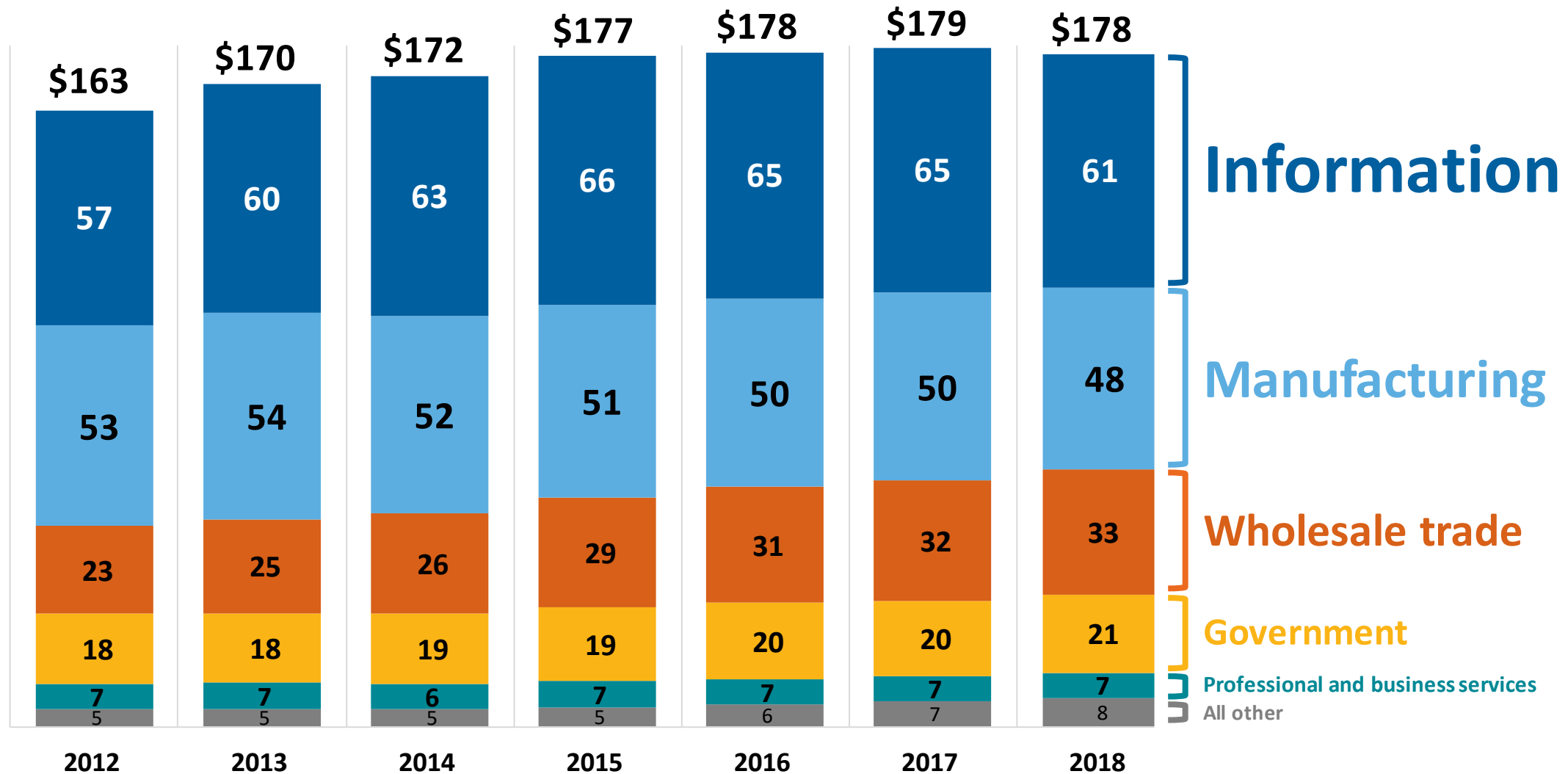
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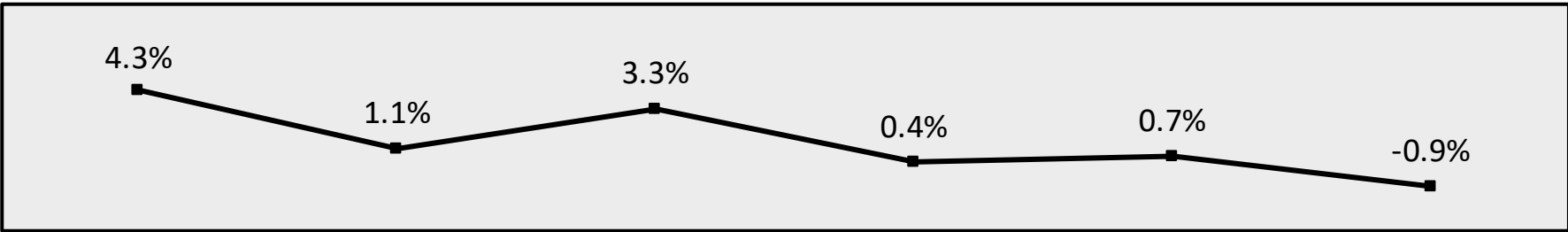
Space Economy Gross Output by Industry, 2012-2018 (billions of current dollars)



Smaller industry groups in grey include: construction; retail trade; educational services; utilities; transportation and warehousing; agriculture, forestry, fishing, and mining; finance, insurance, real estate, rental, and leasing; health care and social assistance; other services, except government; arts, entertainment, recreation, accommodation, and food services.

Space Economy Gross Output Growth, 2012-2018

Annual growth in
the US Space
Economy



Contributions to
growth
(percentage points)

- Information
- Manufacturing
- Wholesale Trade

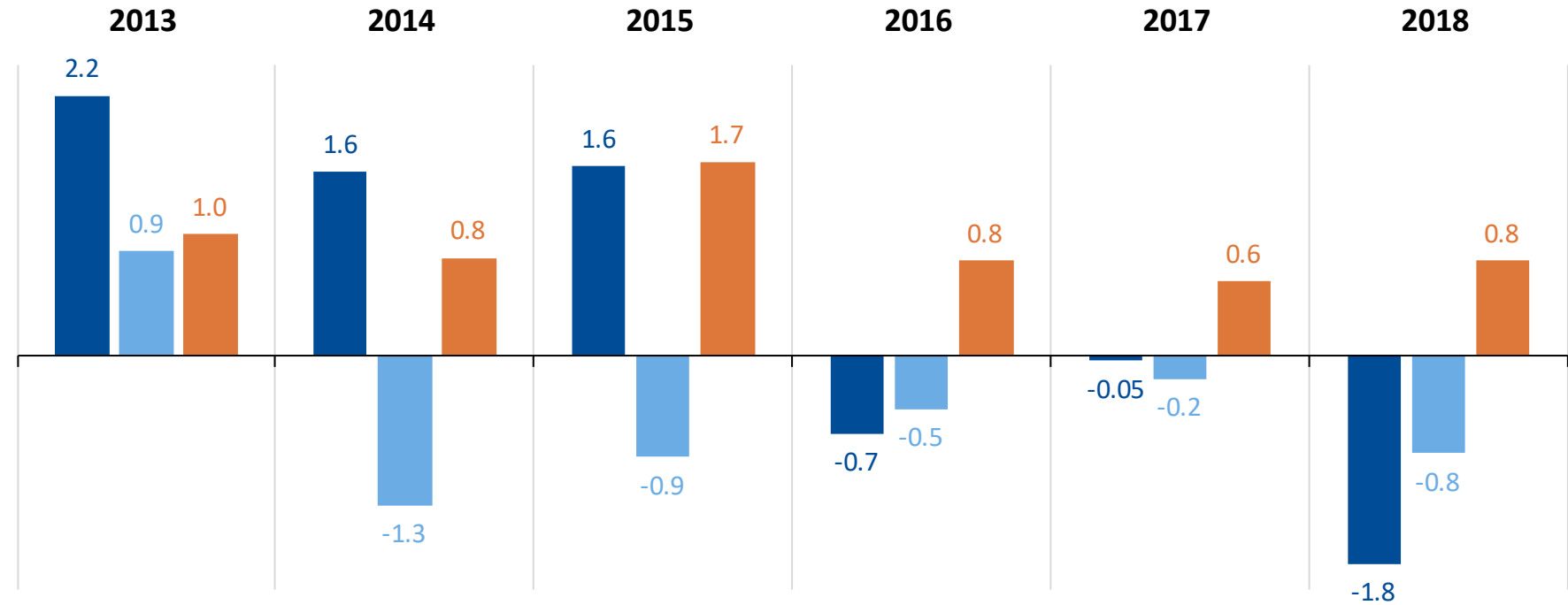


Table 1. U.S. Space Economy Gross Output by Industry

[Millions of current dollars]

Line		2012	2013	2014	2015	2016	2017	2018
1	Space Economy ¹	162,746	169,742	171,655	177,299	177,944	179,222	177,535
2	Agriculture, forestry, fishing, hunting, mining, and utilities	12	10	9	24	23	18	10
3	Construction	364	329	509	606	643	938	576
4	Manufacturing	52,975	54,435	52,253	50,757	49,951	49,602	48,093
	Of which:							
5	Computer and electronic products ²	31,689	31,860	28,912	28,878	28,377	29,338	28,308
6	Other transportation equipment ³	17,522	18,233	19,274	19,447	18,938	17,711	17,355
7	Wholesale trade	23,171	24,866	26,293	29,139	30,578	31,707	33,163
8	Retail trade	293	477	627	806	1,368	1,901	2,562
9	Transportation and warehousing	1,660	1,508	1,350	1,295	1,282	1,305	1,577
10	Information	56,842	60,463	63,135	65,921	64,731	64,650	61,446
	Of which:							
11	Wired telecommunications carriers ⁴	40,123	42,982	45,167	46,681	44,588	43,894	39,762
12	Satellite telecommunications	6,661	6,763	6,569	6,817	7,076	6,842	6,975
13	Finance, insurance, real estate, rental, and leasing	37	72	92	124	135	248	199
14	Professional and business services	6,774	6,987	6,396	6,804	6,711	6,647	6,671
15	Educational services	2,058	2,046	2,047	2,133	2,112	2,065	2,427
16	Health care and social assistance	94	100	88	101	113	110	142
17	Arts, entertainment, recreation, accommodation, food services and other services	117	124	129	124	127	141	142
18	Government ⁵	18,350	18,327	18,727	19,469	20,172	19,890	20,525
19	Federal	15,792	15,903	16,338	17,014	17,746	17,550	17,809
20	State and local	2,559	2,424	2,389	2,454	2,427	2,340	2,717
	Addenda:							
21	Private industries	144,395	151,415	152,928	157,831	157,773	159,332	157,009
22	Space Economy excluding satellite television, satellite radio, and educational services ⁶	117,958	121,945	121,432	125,183	127,253	128,416	130,362

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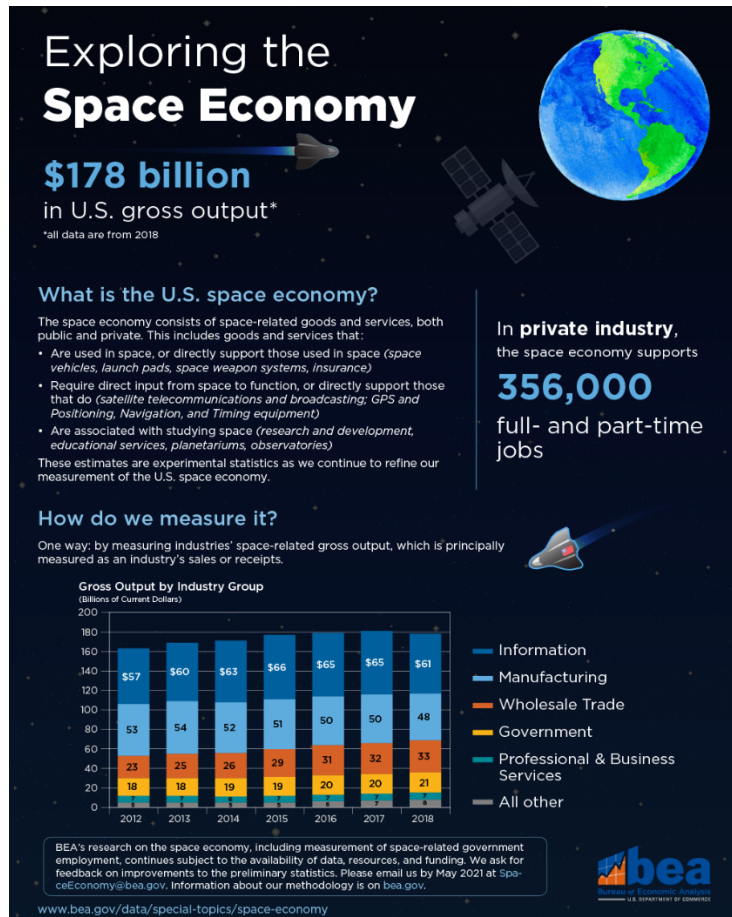
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Data are in current dollars, meaning they are not adjusted for inflation

- Growth rates reflect changes in price and quantity

Additional Release Materials

Infographic



Smaller graphics for social media



Exploring the Space Economy

\$178 billion in U.S. gross output*

*all data are from 2018

What is the U.S. space economy?

The space economy consists of space-related goods and services, both public and private. This includes goods and services that:


- Are used in space, or directly support those used in space (space vehicles, launch pads, space weapon systems, insurance)
- Require direct input from space to function, or directly support those that do (satellite telecommunications and broadcasting; GPS and Positioning, Navigation, and Timing equipment)
- Are associated with studying space (research and development, educational services, planetariums, observatories)

These estimates are experimental statistics as we continue to refine our measurement of the U.S. space economy.

In private industry, the space economy supports

356,000
full- and part-time jobs

Methodology paper



Chronicling 100 Years of the U.S. Economy

December 2020 Volume 100, Number 12

Preliminary Estimates of the U.S. Space Economy, 2012–2018

By Tina Highfill, Annabel Jouard, and Connor Franks

Background

Economic activity related to space exploration in the United States dates to the early 1800s with the construction of America's first observatories (MacDonald 2017). Despite the long history of space economic activity in the United States and dominance of U.S. space spending relative to the rest of the world (Organisation for Economic Co-operation and Development (OECD) 2012), there is a lack of consistent and comprehensive economic data about the U.S. space economy. To address this, the Bureau of Economic Analysis (BEA) developed preliminary estimates of the U.S. space economy as part of a Space Economy Satellite Account (SESA). The SESA represents a collaborative effort to measure space activity within the U.S. economy. These experimental estimates shed light on the contribution of space-related goods and services to the U.S. economy using a framework consistent with how the overall U.S. economy is measured. Specifically, the SESA provides an estimate of the space economy's contribution to current-dollar gross domestic product (GDP) and illustrates the contributions of individual industries to the space economy. In addition to GDP, the SESA also provides gross output estimates and private sector compensation and employment estimates for the space economy.

The newly released statistics show in 2018, the U.S. space economy accounted for \$177.5 billion of gross output, 0.5 percent (\$108.9 billion) of current-dollar GDP, \$41.2 billion of private industry compensation, and supported more than 356,000 private sector jobs (tables 1–4). Relative to the overall U.S. economy over the 2012–2018 study period, the space economy experienced slower growth in all four sets of statistics (table 5). Relatively slow growth over the period was driven mainly by the information and manufacturing sectors (chart 1). Strong growth in the wholesale trade sector over the period partially offset declines in information and manufacturing output. The following section highlights additional significant findings from the preliminary set of space economy estimates. The rest of the article provides an overview of satellite accounts, including an explanation of the data and methodology used to develop the

Next Steps and Future Research



Collaborations with US and international space and statistical agencies

Contact: Tina Highfill at Tina.Highfill@bea.gov or SpaceEconomy@bea.gov

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Expect to revise and update estimates in 2021 using input from BEA staff and external experts

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Possible expansions include

- Adding additional years
- Inflation-adjusted gross output and GDP
- Government employees and compensation