

SIDEBAR

Geography of Domestic KTI Production

Similar to other science, technology, and innovation indicators, production by U.S. knowledge- and technology-intensive (KTI) industries is concentrated in a few states. The top five states accounted for about half of U.S. KTI value added in 2021 (latest available year at this level of detail): California alone accounted for 25%, followed by Texas (8%), Washington (6%), New York (5%), and Massachusetts (5%) (see Table KTI-A). These top state rankings for the aggregate of all KTI industries have changed little in recent years. This table also shows that, in some states, including California, Washington, New York, and Massachusetts, the KTI value-added share was higher for KTI services than for KTI manufacturing. Nationally, KTI value added accounted for 11.4% of U.S. gross domestic product (GDP) in 2021. As a share of states' GDP, KTI value added was at or above the national figure for several states, topped by Washington (25%), California (20%), Massachusetts (19%), Indiana (17%), and Michigan (14%) (Figure KTI-A).

Table KTI-A

GDP, by state share and value-added output of KTI industries: 2021

(GDP, KTI value added, state share of KTI value added)

State	GDP	Value added			State share of all KTI value added		
		KTI manufacturing	KTI services	All KTI	KTI manufacturing	KTI services	All KTI
United States	23,315,081	1,379,813	1,282,761	2,662,574	51.82	48.18	100.00
California	3,373,241	295,151	380,720	675,871	11.09	14.30	25.38
Texas	2,051,769	131,129	73,249	204,377	4.92	2.75	7.68
Washington	677,490	39,566	131,379	170,945	1.49	4.93	6.42
New York	1,901,297	38,424	86,027	124,451	1.44	3.23	4.67
Massachusetts	641,332	39,402	83,989	123,391	1.48	3.15	4.63
Illinois	945,674	61,385	32,536	93,920	2.31	1.22	3.53
North Carolina	662,121	51,793	30,828	82,621	1.95	1.16	3.10
Michigan	572,206	63,520	18,178	81,698	2.39	0.68	3.07
Pennsylvania	844,497	48,403	31,576	79,979	1.82	1.19	3.00
Ohio	756,617	57,427	17,912	75,340	2.16	0.67	2.83
Florida	1,255,558	33,477	41,129	74,606	1.26	1.54	2.80
New Jersey	682,946	38,885	34,293	73,178	1.46	1.29	2.75
Indiana	412,975	61,717	6,625	68,342	2.32	0.25	2.57
Virginia	604,958	11,747	45,974	57,720	0.44	1.73	2.17
Georgia	691,627	26,041	30,716	56,757	0.98	1.15	2.13
Colorado	436,360	14,457	31,468	45,924	0.54	1.18	1.72
Maryland	443,930	17,130	28,562	45,692	0.64	1.07	1.72
Wisconsin	368,611	27,371	13,274	40,645	1.03	0.50	1.53
Minnesota	412,459	25,935	13,392	39,327	0.97	0.50	1.48
Arizona	420,027	25,087	14,208	39,295	0.94	0.53	1.48
Tennessee	427,126	27,378	9,300	36,678	1.03	0.35	1.38
Missouri	358,572	20,079	13,366	33,445	0.75	0.50	1.26
Connecticut	298,395	24,068	9,026	33,094	0.90	0.34	1.24
Oregon	272,191	19,776	12,731	32,507	0.74	0.48	1.22
South Carolina	269,803	20,859	5,420	26,279	0.78	0.20	0.99
Utah	225,340	10,540	14,448	24,989	0.40	0.54	0.94
Alabama	254,110	17,069	5,882	22,952	0.64	0.22	0.86
Iowa	216,860	18,750	3,397	22,146	0.70	0.13	0.83
Kentucky	237,182	18,310	3,264	21,574	0.69	0.12	0.81
Louisiana	258,571	19,149	2,324	21,473	0.72	0.09	0.81
Kansas	191,381	14,066	4,214	18,280	0.53	0.16	0.69
New Hampshire	99,673	5,790	5,353	11,143	0.22	0.20	0.42
Nebraska	146,285	7,363	3,624	10,987	0.28	0.14	0.41
District of Columbia	153,671	171	10,003	10,174	0.01	0.38	0.38
Oklahoma	215,336	7,594	2,500	10,094	0.29	0.09	0.38
Nevada	194,487	3,418	5,372	8,790	0.13	0.20	0.33
New Mexico	109,583	1,871	6,666	8,537	0.07	0.25	0.32
Arkansas	148,676	5,694	2,356	8,051	0.21	0.09	0.30
Mississippi	127,308	6,025	1,086	7,111	0.23	0.04	0.27
Idaho	96,283	3,498	3,518	7,016	0.13	0.13	0.26
West Virginia	85,434	4,493	982	5,476	0.17	0.04	0.21
Delaware	81,160	3,231	2,040	5,272	0.12	0.08	0.20
Maine	77,963	2,606	1,597	4,202	0.10	0.06	0.16

Table KTI-A

GDP, by state share and value-added output of KTI industries: 2021

(GDP, KTI value added, state share of KTI value added)

State	GDP	Value added			State share of all KTI value added		
		KTI manufacturing	KTI services	All KTI	KTI manufacturing	KTI services	All KTI
Rhode Island	66,571	2,219	1,888	4,107	0.08	0.07	0.15
North Dakota	63,560	2,183	1,227	3,410	0.08	0.05	0.13
Vermont	37,104	1,686	1,239	2,925	0.06	0.05	0.11
South Dakota	61,685	2,182	661	2,843	0.08	0.02	0.11
Montana	58,700	623	1,217	1,840	0.02	0.05	0.07
Hawaii	91,096	186	1,396	1,582	0.01	0.05	0.06
Wyoming	41,510	823	322	1,145	0.03	0.01	0.04
Alaska	57,349	67	307	374	*	0.01	0.01

* = amount < 0.01.

GDP = gross domestic product; KTI = knowledge and technology intensive.

Note(s):

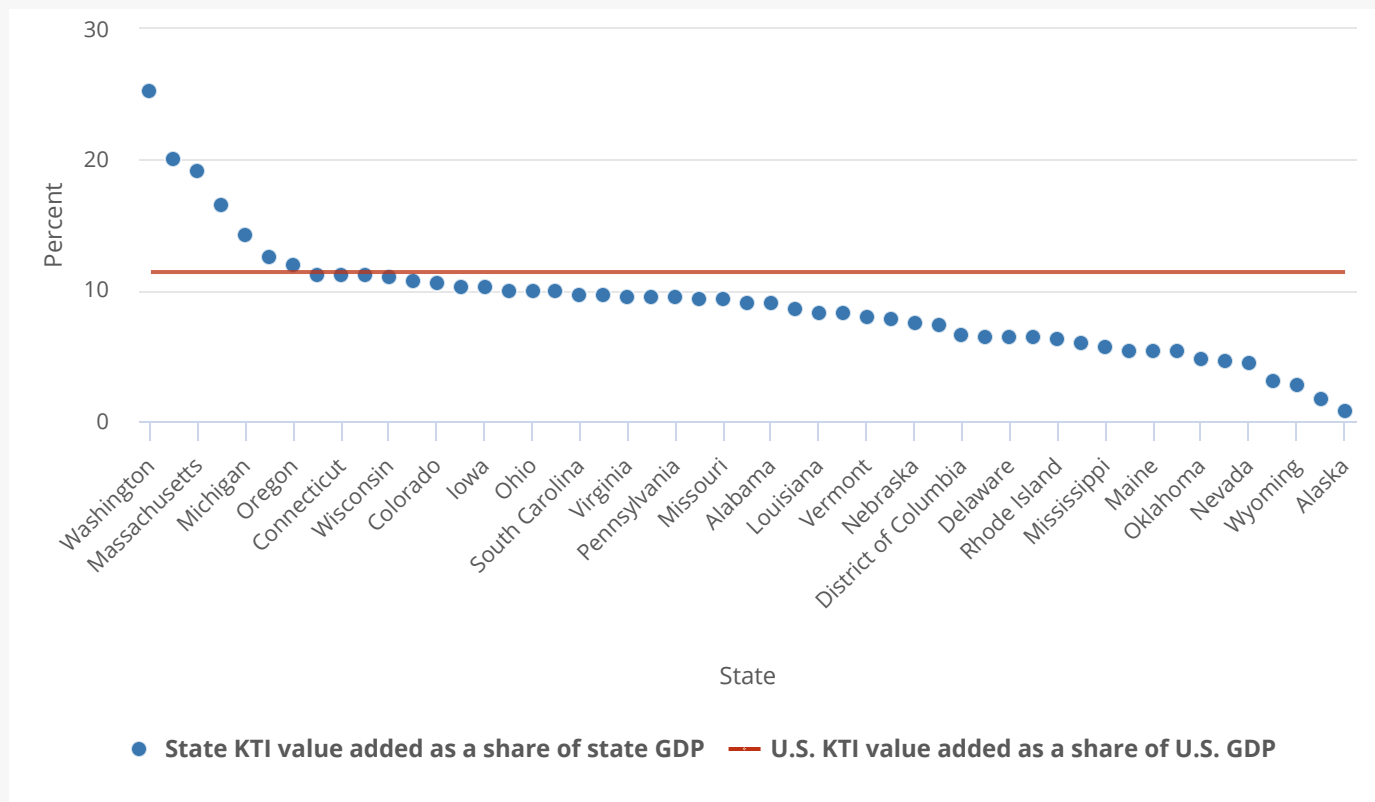
Value added is the value of goods and services (gross output) minus the cost of intermediate inputs (energy, materials, and purchased services). Value added is a measure of an industry's contribution to overall GDP. KTI industries include high R&D intensive and medium-high R&D intensive industries based on a classification by the Organisation for Economic Co-operation and Development. High R&D intensive industries include air and spacecraft and related machinery; pharmaceuticals; computer, electronic, and optical products; scientific R&D; and software publishing. Medium-high R&D intensive industries include motor vehicles, trailers, and semi-trailers; medical and dental instruments; machinery and equipment not elsewhere classified (nec); chemicals and chemical products; electrical equipment; railroad, military vehicles, and transport nec; and information technology and other information services. The underlying industry data are based on the International Standard Industrial Classification, Revision 4. GDP is in millions of current dollars (not adjusted for inflation). Industry detail is based on the 2012 North American Industry Classification System. Calculations are performed on unrounded data.

Source(s):

Bureau of Economic Analysis (BEA), Gross Domestic Product by State (<https://www.bea.gov/data/gdp/gdp-state>), and BEA special tabulations, accessed July 2023.

Science and Engineering Indicators

Figure KTI-A

KTI value added as a share of U.S. and state GDP: 2021

GDP = gross domestic product; KTI = knowledge and technology intensive.

Note(s):

Value added is the value of goods and services (gross output) minus the cost of intermediate inputs (energy, materials, and purchased services). Value added is a measure of an industry's contribution to overall GDP. KTI industries include high R&D intensive and medium-high R&D intensive industries based on a classification by the Organisation for Economic Co-operation and Development. High R&D intensive industries include air and spacecraft and related machinery; pharmaceuticals; computer, electronic, and optical products; scientific R&D; and software publishing. Medium-high R&D intensive industries include motor vehicles, trailers, and semi-trailers; medical and dental instruments; machinery and equipment not elsewhere classified (nec); chemicals and chemical products; electrical equipment; railroad, military vehicles, and transport nec; and information technology and other information services. The underlying industry data are based on the International Standard Industrial Classification, Revision 4. GDP is in millions of current dollars (not adjusted for inflation). Industry detail is based on the 2012 North American Industry Classification System. Calculations are performed on unrounded data.

Source(s):

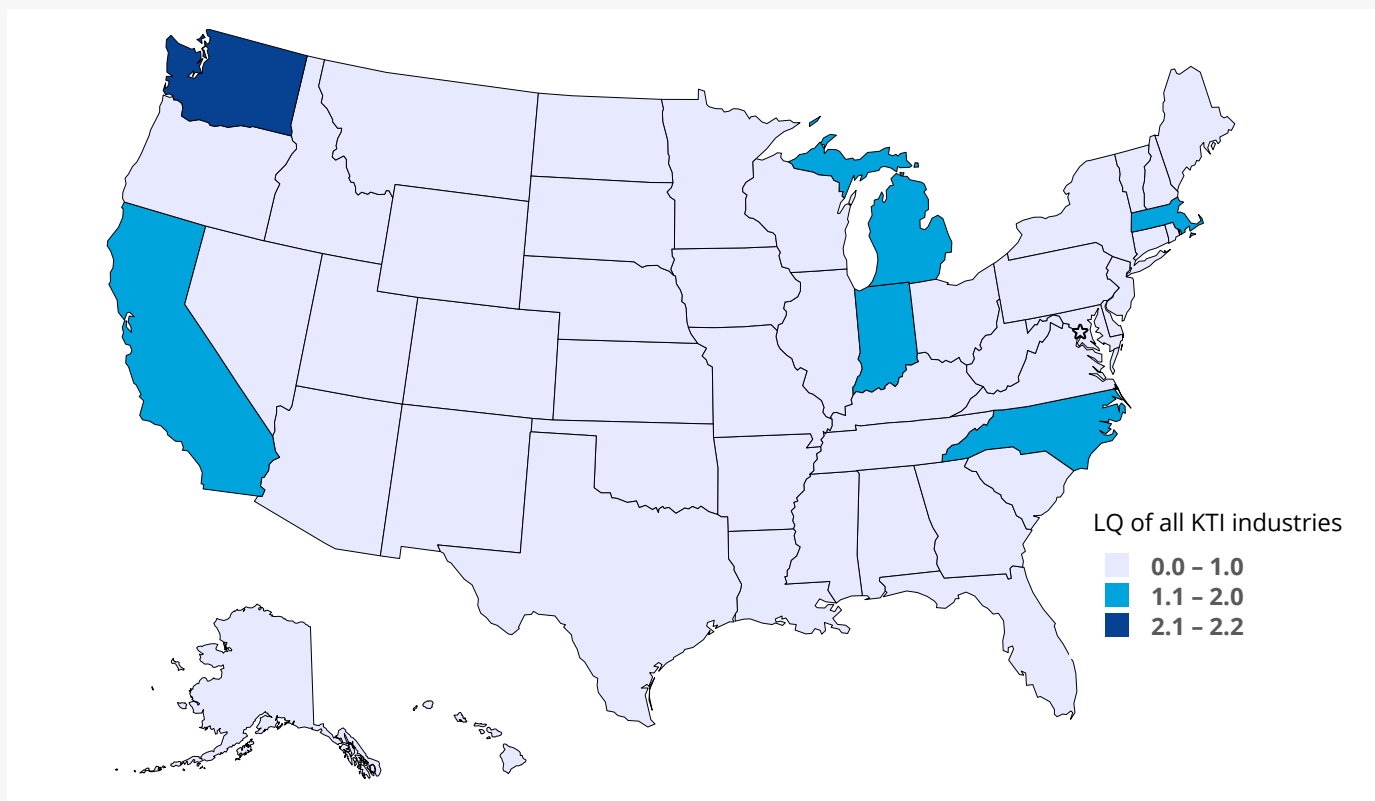
Bureau of Economic Analysis (BEA), Gross Domestic Product by State (<https://www.bea.gov/data/gdp/gdp-state>), and BEA special tabulations, accessed July 2023.

Science and Engineering Indicators

Another way to examine concentration or geographic specialization for a given industry is the location quotient (LQ). This ratio indicator compares the industry's value-added share in state GDP with the corresponding industry share in national GDP (Crawley, Beynon, and Munday 2013). An industry LQ ratio above 1.0 for a given state means that the state has a higher concentration of value added in that industry compared with the overall national economy. The last two sidebar figures show the distribution of the LQ ratio across states for the aggregate of all KTI value added (Figure KTI-B) and for two industries (Figure KTI-C). Washington, California, and Massachusetts had the largest overall KTI value added based on this measure (Figure KTI-B). For information technology (IT) and other information services, the largest U.S. KTI industry by value added, California, Washington, and Virginia were the top locations. For California, the state value-added-to-GDP ratio for this industry was more than twice the national average, with an LQ ratio of 2.2 (Figure KTI-C, Panel 1). The IT and other information services industry includes companies offering computer

programming services, including systems that integrate computer hardware, software, and communication technologies, and data processing and hosting activities. For the second industry, manufacturing of computer, electronic, and optical products, which includes semiconductors or computer chips, Oregon, California, and Arizona were at the top based on this indicator, followed by several New England states (Figure KTI-C, Panel 2). From 2020 to 2022, U.S. and foreign multinational enterprises announced over \$200 billion in private investments to expand U.S. semiconductor manufacturing capacity in 16 states, including Arizona, Texas, Idaho, Ohio, and New York (CRS 2023b). For related material on the 2022 U.S. Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act and a global perspective on the geography of semiconductor production and supply chains, see the discussion later in this report.

Figure KTI-B

Specialization in production for all KTI industries, by state: 2021

KTI = knowledge and technology intensive; LQ = location quotient.

Note(s):

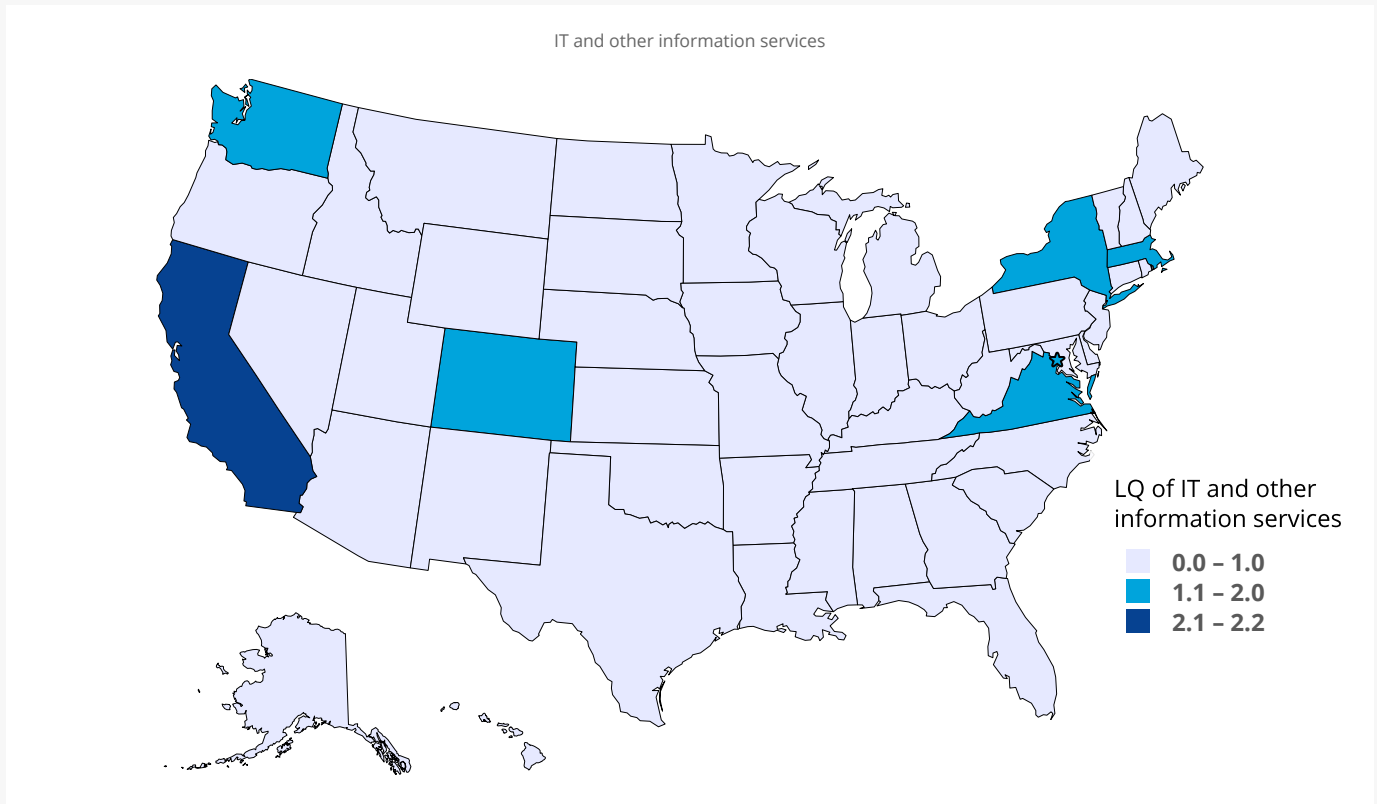
LQ is the ratio of the industry's share of a state's gross domestic product (GDP) to the corresponding industry's share of national GDP. Industry detail is based on the 2012 North American Industry Classification System crosswalked with the International Standard Industrial Classification, Revision 4.

Source(s):

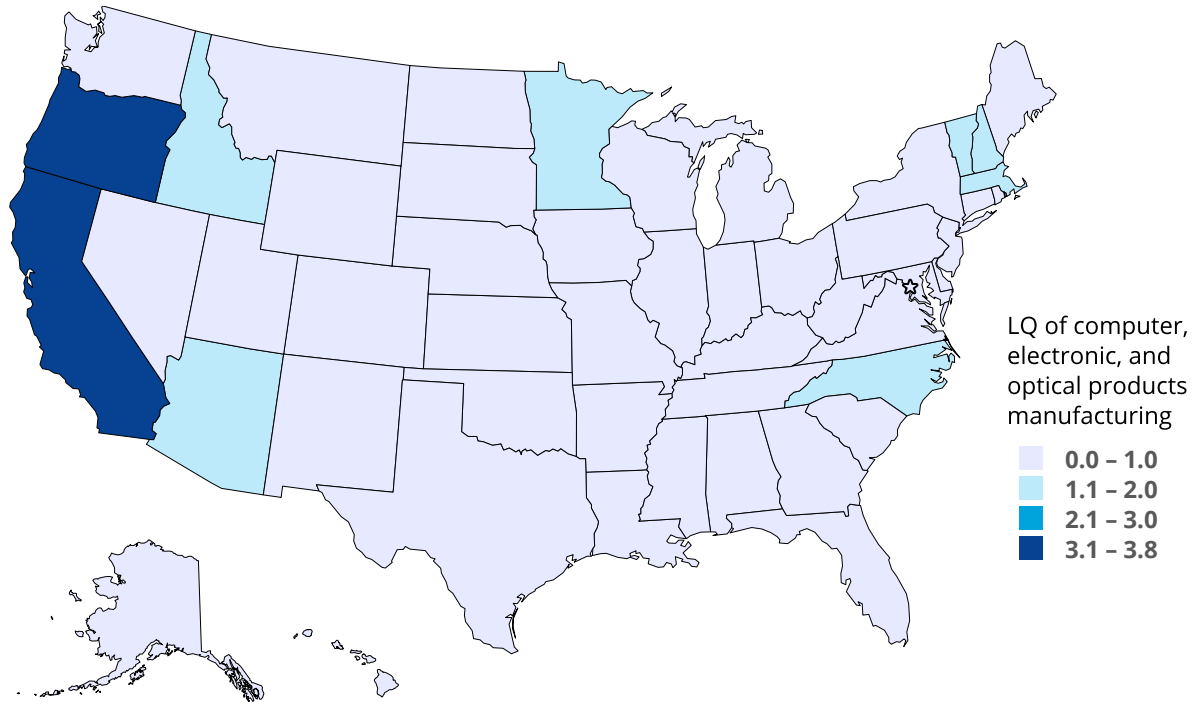
Bureau of Economic Analysis (BEA), Gross Domestic Product by State (<https://www.bea.gov/data/gdp/gdp-state>), and BEA special tabulations, accessed July 2023.

Figure KTI-C

Specialization in production for two selected industries, by state: 2021



Computer, electronic, and optical products manufacturing



IT = information technology; LQ = location quotient.

Note(s):

LQ is the ratio of the industry's share of a state's gross domestic product (GDP) to the corresponding industry's share of national GDP. Industry detail is based on the 2012 North American Industry Classification System crosswalked with the International Standard Industrial Classification, Revision 4.

Source(s):

Bureau of Economic Analysis (BEA), Gross Domestic Product by State (<https://www.bea.gov/data/gdp/gdp-state>), and BEA special tabulations, accessed July 2023.