



## BEA Briefing

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# Integrated BEA/BLS Industry-Level Production Account and the Sources of U.S. Economic Growth

## New Statistics for 2019 and Updated Statistics for 1987– 2018, Including Extended Capital Detail

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In March 2021, the integrated industry-level production account for the United States was updated to include new statistics for 2019 and revised statistics for 1987–2018. The integrated production account represents an ongoing collaboration between the Industry Economics Directorate of the Bureau of Economic Analysis (BEA) and the Bureau of Labor Statistics (BLS) Productivity Program. The account combines industry-level output and intermediate inputs from BEA's Gross Domestic Product (GDP) by Industry Accounts with capital input and labor data from the BLS Productivity Program to create an internally consistent production account. It contains detailed data on output and inputs in current and constant prices as well as multifactor productivity (MFP) by industry.<sup>2</sup> The foundations of this account are discussed in detail by Fleck and others (2014), with expanded discussion of sources and methods in Garner and others (2018, 2020). With the recent update to the statistics, the underlying data for gross output, intermediate inputs, and value added are now consistent with the results of the 2020 annual update of the Industry Economic Accounts, released on September 30, 2020.<sup>3</sup>

Data on capital and labor inputs have been updated to reflect the MFP estimates released by BLS in November 2020.<sup>4</sup> Updates for the 1987–2014 period reflect revisions to capital and labor input data from BLS, while updates to the account for 2015–2018 reflect revisions to those series as well as revisions from the annual update of BEA's Industry Economic Accounts. In addition, recent cooperative efforts between BEA and BLS have resulted in a new experimental set of capital input estimates that expand the number of asset categories from five to nine. Specifically, the information technology (IT) capital asset was split into communications equipment and computer hardware, while the “other” assets group was divided into instruments and other office equipment;<sup>5</sup> transportation equipment; other equipment;<sup>6</sup> and structures, land,

and inventories. The remaining asset categories are research and development, software, and entertainment originals. These new estimates allow for a more nuanced analysis of the contribution of capital input to economic growth throughout the available time series.

The industry-level results for the period as a whole are presented in table 1. The results reflect dispersion in the sources of growth over the period. For example, the data processing, internet publishing, and other information services industry was the fastest growing industry; output increased 8.64 percent per year on average, primarily as a result of the growth in capital investments and purchases of intermediate inputs. This output growth is consistent with the ongoing shift to domestic cloud computing, and the input data indicates this shift is relatively intensive in capital and intermediate inputs. In contrast, output for the apparel and leather and allied products industry decreased 4.99 percent per year on average over the period, which is in line with increased demand for imported apparel. The industry with the fastest growing MFP over the period was the computer and electronic products sector, reflecting the fast pace of innovation in the production of IT.

**Table 1. Sources of Industry Output Growth 1987–2019**

Industry	Output growth	Capital contribution	Labor contribution	Intermediate contribution	MFP growth
Farms	1.61	0.06	-0.16	0.48	1.23
Forestry, fishing, and related activities	0.06	0.32	0.96	-0.25	-0.97
Oil and gas extraction	2.62	-0.12	-0.16	1.17	1.73
Mining, except oil and gas	0.38	0.32	-0.19	-0.20	0.45
Support activities for mining	4.12	0.12	0.61	0.83	2.56
Utilities	0.74	0.77	0.02	0.20	-0.24
Construction	0.52	0.24	0.62	0.46	-0.81
Wood products	0.31	0.05	-0.15	0.41	-0.01
Nonmetallic mineral products	0.23	0.19	-0.02	-0.15	0.21
Primary metals	0.42	-0.03	-0.27	0.10	0.62
Fabricated metal products	0.89	0.21	0.07	0.62	0.00
Machinery	1.22	0.27	0.00	0.99	-0.04
Computer and electronic products	6.61	0.64	-0.39	0.46	5.90
Electrical equipment, appliances, and components	0.32	0.15	-0.30	0.08	0.38
Motor vehicles, bodies and trailers, and parts	2.67	0.24	0.04	1.95	0.44
Other transportation equipment	1.22	0.26	-0.17	1.14	-0.01
Furniture and related products	0.06	0.15	-0.28	0.22	-0.03
Miscellaneous manufacturing	1.80	0.39	0.19	0.29	0.94
Food and beverage and tobacco products	0.91	0.22	0.11	0.79	-0.21
Textile mills and textile product mills	-2.37	-0.08	-0.77	-1.99	0.47
Apparel and leather and allied products	-4.99	0.00	-1.69	-3.71	0.40
Paper products	-0.42	0.05	-0.27	-0.15	-0.06
Printing and related support activities	-0.56	-0.03	-0.51	-0.60	0.57
Petroleum and coal products	0.91	0.23	-0.05	0.27	0.45
Chemical products	1.09	1.06	0.02	0.56	-0.54
Plastics and rubber products	1.18	0.25	0.05	0.49	0.39
Wholesale trade	3.55	1.05	0.38	1.31	0.80
Retail trade	2.96	0.86	0.33	0.94	0.83
Air transportation	1.58	0.49	0.04	0.08	0.97
Rail transportation	0.92	0.01	-0.90	0.53	1.28
Water transportation	1.87	0.10	0.22	0.92	0.63
Truck transportation	2.80	0.34	0.49	1.80	0.17
Transit and ground passenger transportation	3.14	0.48	1.12	1.29	0.24

Industry	Output growth	Capital contribution	Labor contribution	Intermediate contribution	MFP growth
Pipeline transportation	0.94	1.30	0.04	-1.66	1.25
Other transportation and support activities	2.71	0.06	1.62	2.10	-1.07
Warehousing and storage	6.64	0.33	1.90	3.05	1.36
Publishing industries, except internet (includes software)	3.62	1.32	0.11	0.61	1.58
Motion picture and sound recording industries	3.18	1.08	0.67	1.65	-0.22
Broadcasting and telecommunications	4.55	2.18	-0.05	1.95	0.47
Data processing, internet publishing, and other information services	8.64	3.68	1.05	3.64	0.27
Federal Reserve banks, credit intermediation, and related activities	1.61	1.81	0.32	0.72	-1.24
Securities, commodity contracts, and investments	6.07	0.16	1.01	3.05	1.85
Insurance carriers and related activities	3.30	1.21	0.48	1.37	0.25
Funds, trusts, and other financial vehicles	2.01	0.21	0.08	2.29	-0.57
Real estate	2.78	1.34	0.07	1.01	0.36
Rental and leasing services and lessors of intangible assets	3.43	3.91	0.20	1.27	-1.96
Legal services	0.92	0.68	0.57	0.78	-1.11
Computer systems design and related services	8.63	0.22	4.16	2.44	1.81
Miscellaneous professional, scientific, and technical services	3.63	0.84	1.38	1.50	-0.08
Management of companies and enterprises	3.00	0.23	1.57	1.91	-0.72
Administrative and support services	4.68	0.77	1.69	2.18	0.04
Waste management and remediation services	2.57	0.32	1.05	1.39	-0.19
Educational services	2.90	0.43	1.42	1.11	-0.07
Ambulatory health care services	3.27	0.27	1.75	1.26	-0.02
Hospitals and nursing and residential care	2.62	0.30	1.13	1.54	-0.35
Social assistance	3.72	0.09	2.53	1.77	-0.66
Performing arts, spectator sports, museums, and related activities	3.72	0.14	1.09	1.44	1.05
Amusements, gambling, and recreation industries	3.30	0.73	0.94	1.66	-0.02
Accommodation	2.15	0.76	0.33	0.96	0.10
Food services and drinking places	2.28	0.17	0.63	1.21	0.26
Other services, except government	1.63	0.32	0.55	1.00	-0.24
Federal	0.71	0.30	-0.13	0.49	0.04
State and local	1.91	0.50	0.59	0.76	0.06

**MFP** Multifactor productivity

Note. Average annual percentage growth. A contribution is a share-weighted growth rate.

In this account, GDP growth and its sources across factors of production are measured from the bottom up, using the direct industry aggregation approach used by Jorgenson and others (2007). In this approach, aggregate value added is the share-weighted growth of industry value-added growth. The contribution of industry capital and labor input growth to aggregate value-added growth is the Domar-weighted input contribution. The major advantage of this approach is that it yields an internally consistent decomposition of aggregate GDP growth to its industry-level sources.<sup>7</sup>

Table 2 presents summary-level sector sources of aggregate value added growth for 1987–2019 and for subperiods that include 1987–1995 (the period before the IT boom), 1995–2000 (the IT boom), 2000–2007 (often referred to as a period of jobless growth (Jorgenson, Ho, and Samuels 2019)), and 2007–2019 (the Great Recession and subsequent recovery). The 2007–2019 period is subdivided into 2007–2009 (the Great Recession) and 2009–2019 (recovery period).

**Table 2. Contributions to Aggregate Value-Added Growth**

Component	1987–2019	1987–1995	1995–2000	2000–2007	2007–2019	2007–2009	2009–2019
<b>Capital input</b>							
Aggregate	1.22	1.24	1.86	1.38	0.86	0.78	0.87
Agriculture, forestry, fishing, hunting, and mining	0.01	0.00	0.00	0.00	0.02	0.01	0.02
Transportation, warehousing, utilities	0.04	0.04	0.05	0.03	0.05	0.04	0.05
Construction	0.02	0.01	0.05	0.05	0.00	–0.02	0.01
Manufacturing	0.14	0.17	0.26	0.08	0.10	0.13	0.10
Trade	0.17	0.16	0.30	0.21	0.10	–0.02	0.12
Information	0.17	0.13	0.21	0.15	0.19	0.15	0.20
Finance, insurance, real estate, rental and leasing	0.40	0.48	0.68	0.51	0.18	0.15	0.18
Other services	0.17	0.15	0.23	0.20	0.14	0.19	0.13
Government	0.10	0.11	0.08	0.14	0.08	0.15	0.07
<b>Labor input</b>							
Aggregate	0.77	1.11	1.32	0.43	0.51	–1.32	0.88
Agriculture, forestry, fishing, hunting, mining	0.00	–0.01	–0.01	0.02	0.01	–0.03	0.01
Transportation, warehousing, utilities	0.04	0.07	0.04	–0.01	0.04	–0.08	0.06
Construction	0.05	0.04	0.16	0.06	0.00	–0.41	0.08
Manufacturing	–0.03	0.07	0.03	–0.21	–0.01	–0.41	0.07
Trade	0.07	0.13	0.12	0.04	0.01	–0.20	0.06
Information	0.01	0.04	0.11	–0.05	0.00	–0.08	0.01
Finance, insurance, real estate, and rental and leasing	0.07	0.07	0.16	0.08	0.04	–0.15	0.08
Other services	0.48	0.60	0.60	0.39	0.39	–0.08	0.49
Government	0.08	0.09	0.10	0.10	0.05	0.12	0.03
<b>MFP</b>							
Aggregate	0.45	0.29	1.08	0.61	0.19	–0.85	0.40
Agriculture, forestry, fishing, hunting, mining	0.07	0.06	0.07	0.06	0.08	0.19	0.06
Transportation, warehousing, and utilities	0.01	0.04	0.02	–0.01	–0.01	–0.06	0.00
Construction	–0.07	–0.03	–0.07	–0.15	–0.05	–0.10	–0.04
Manufacturing	0.24	0.21	0.55	0.49	–0.03	–0.40	0.05
Trade	0.15	0.24	0.48	0.07	–0.01	–0.37	0.06
Information	0.05	0.00	–0.10	0.22	0.05	0.02	0.06
Finance, insurance, real estate, rental and leasing	0.01	–0.07	0.01	–0.05	0.10	0.09	0.10
Other services	–0.02	–0.15	0.10	–0.07	0.06	–0.10	0.10
Government	0.01	0.00	0.03	0.04	–0.01	–0.12	0.01
Aggregate value-added growth	2.44	2.64	4.26	2.42	1.57	–1.40	2.16

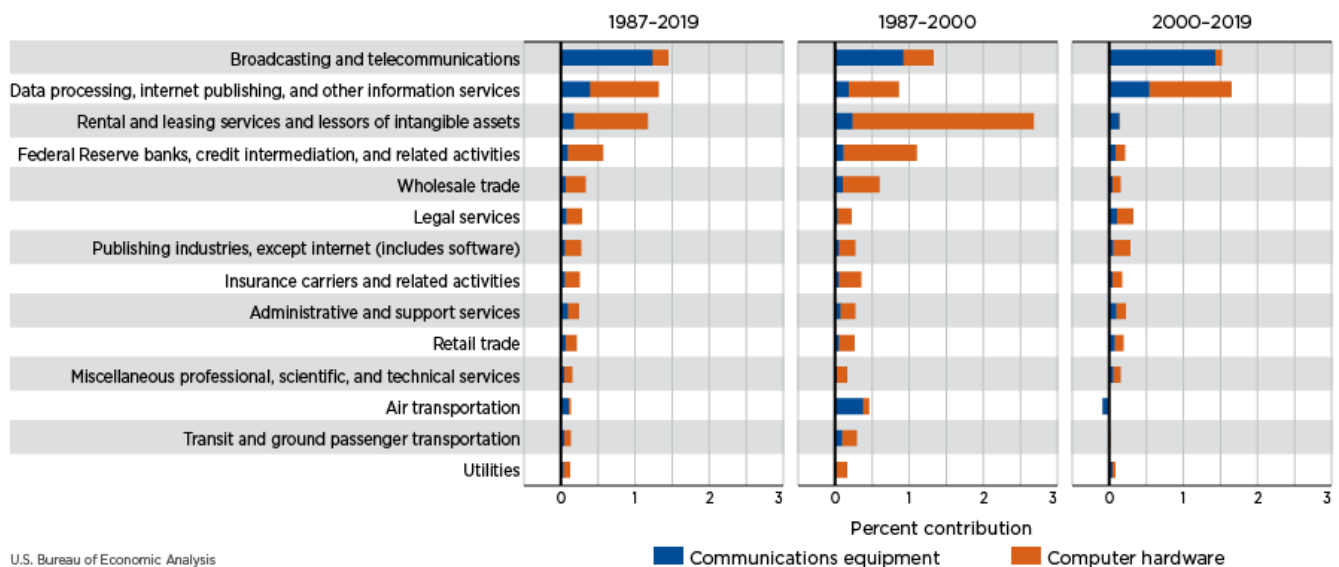
**MFP** Multifactor productivity

Note. Average annual percentages. A contribution is a share-weighted growth rate. Government includes government enterprise.

For 1987–2019, aggregate value added increased 2.44 percent per year on average.<sup>8</sup> Increases in capital input accounted for 1.22 percentage points, growth in labor input accounted for 0.77 percentage point, and increases in MFP accounted for 0.45 percentage point of aggregate growth. By sector, the largest contributor to the aggregate capital input contribution was finance, insurance, real estate, and rental and leasing, which includes owner-occupied housing. The largest contributor to the aggregate labor input contribution was labor input growth in the other services sector. Growth in aggregate MFP was concentrated in the manufacturing and trade sectors.

The contributions to the sources of growth shown in table 2 can also be used to assess the origins of the slow recovery since the Great Recession. A lower contribution of capital input accounted for most of the relatively slow recovery over the 2009–2019 period. This was mostly due to a lower capital input contribution in the finance, insurance, real estate, and rental and leasing sector, reflecting the slowdown in housing related to the financial crisis. A slowdown in the growth of labor input accounted for the next largest share of the relatively weak recovery. Labor input growth in the other services, trade, and government sectors had the largest role in the relatively slow growth in labor input. Finally, MFP growth was slightly faster in the 2009–2019 period than in the 1987–1995 period. This was due to relatively faster MFP growth in other services and in finance, insurance, real estate, and rental and leasing, which more than offset relatively slower MFP growth in the manufacturing and trade sectors. It is important to note that this comparison is relative to the earlier (1987–1995) period and does not necessarily imply that MFP growth was weak in these sectors. It only signals that MFP growth was slower in the 2009–2019 period than in the 1987–1995 period for the manufacturing and trade sectors. For example, the trade sector accounted for nearly one-quarter of the aggregate MFP growth over the 2009–2019 period. However, this was less than its contribution over the 1987–1995 period.

**Chart 1. Average Contribution of IT Equipment Assets to Industry Output Growth**



U.S. Bureau of Economic Analysis

The new experimental capital detail released with the updated estimates for this account can be used to explore the sources of industry output growth at a more granular level. As an example, chart 1 shows the contributions of communications equipment and computer hardware assets to industry output growth for 1987–2019 as well as for subperiods 1987–2000 and 2000–2019. The broadcasting and telecommunications industry showed the largest combined contribution of IT equipment assets over the entire time series, at 1.45 percentage points out of the average annual growth of 4.55 percent. A large majority of this contribution, 1.22 percentage points, is accounted for by communications equipment. This compares with the data processing, internet publishing, and other information services industry, in which 0.93 percentage point of the 1.33 percentage points average contribution came from computer hardware. Chart 1 shows that in the case of both industries, the size of the contribution from IT assets increased during 2000–2019 compared with 1987–2000, and the share of the contribution coming from communications equipment also increased. In most other industries, the size of the contribution from IT assets declined during 2000–2019 compared with the earlier period. In particular, within the air transportation industry, this contribution turned negative during the more recent period due to a decline in capital services from communication equipment. These and other such analyses are possible using the full integrated set of account tables, which contain annual data for 63 industries and are available on [BEA's website](#).

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1. Garner and Russell are with the Bureau of Labor Statistics Office on Productivity and Technology. Harper and Samuels are with the Bureau of Economic Analysis National Economic Accounts.
  2. The industry-level production account and integrated MFP measures presented in this article reflect output consistent with GDP for the total economy but differ in concepts and coverage from the official U.S. MFP measures from BLS, which are available on the [BLS website](#).
  3. See “[The 2020 Annual Update of the Industry Economic Accounts, Revised Statistics for 2015–2019 and the First Quarter of 2020](#),” *Survey of Current Business* 100 (October 2020).
  4. See the release on the [BLS website](#).
  5. Instruments and other office equipment consists of office and accounting machinery, photocopying equipment, medical equipment, electromedical instruments, and other nonmedical instruments.
  6. Other equipment consists mainly of industrial machinery, construction and agricultural machinery, furniture, electrical equipment, and other nonresidential equipment.
  7. Each industry's Domar weight is the ratio of the industry's current-dollar gross output to aggregate current-dollar value added. The industry's contribution to aggregate MFP growth is the industry's MFP growth multiplied by its Domar weight. The contribution of industry intermediate input use drops out in the calculation of aggregate value added and its decomposition.
  8. Contributions are calculated using a Törnqvist index calculation. The growth rates presented in this account are natural log growth rates rather than percent changes.

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