

# National Trade in Value Added Statistics: Uses and Applications

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*This article reflects statistics published in December 2021, which have been superseded. See the [“Global Value Chains” webpage](#) for the latest information and data.*

The U.S. Bureau of Economic Analysis (BEA) published prototype [national trade in value added \(TiVA\) statistics](#) for the first time in December 2021 as part of a collaboration with the National Center for Science and Engineering Statistics of the National Science Foundation. These data cover the period 2007 to 2020 and are derived from BEA's supply and use tables (SUTs), along with BEA data on U.S. bilateral trade with Canada, China, Europe, Mexico, and the rest of the world.<sup>1</sup>

BEA has long published information on the gross flows of trade in goods and services as part of the U.S. International Transactions Accounts. However, the increasing importance of global value chains (GVCs)—production processes in which the stages of production are broken into activities and tasks carried out across different countries—has significantly changed the nature and structure of international trade, especially through growing trade in intermediate goods and services. This globalization of production complicates supply chains, as intermediate products (raw materials, for example) are shipped strategically throughout the world as they are transformed step by step into final products sold to end users. Data on gross trade flows continue to answer many important questions about the global economy; however, the growth of GVCs means additional data are necessary for a complete and nuanced understanding of global trade.

TiVA statistics provide additional information on global trade by tracing the value-added contributions of domestic industries and the role of imported content in domestic production.<sup>2</sup> These data are prepared using input-output analytical techniques to estimate the sources of value in goods and services that are produced or consumed domestically.

## What is Trade in Value Added?

BEA's gross trade data provide information on the value of goods and services exported from and imported to the United States by industry and by commodity. These measures of gross trade flows are an important part of the statistical toolkit provided by BEA and are a key component in the calculation of U.S. gross domestic product. TiVA statistics expand on this basic view by detailing the origin of the value added in goods and services crossing international borders. More specifically, the TiVA statistics published by BEA provide a detailed view of the sources of value embedded in U.S. goods and services exports. The data provide unique insights and perspectives on a variety of questions, including the following:

- **How much domestic value is embedded in U.S. exports?** The dollar value of the goods and services exported from the United States can be found in BEA's gross trade data, and that figure works well for answering a variety of important academic and policy questions. However, production of those exported goods and services relies in part on imported inputs. TiVA statistics allow us to decompose the supply chain supporting the production of U.S. exports in a way that identifies not only the total value of exports but also how much of that value was created in the United States.
- **Which domestic industries contribute to the value of U.S. exports?** Gross trade statistics show that certain U.S. industries play a dominant role in the direct export of goods and services. However, many industries contribute indirectly to the production of exports by participating in the supply chains that support those direct exporters. These indirect contributions are obscured in the gross trade flows, but TiVA statistics provide additional insights by showing the sources of value created at each stage of the production process.
- **Where is the value in exported U.S. products created?** A portion of the value in exported goods and services reflects imported content, including imported components incorporated directly into a product as well as imported intermediate inputs incorporated in earlier stages of the supply chain. For example, a U.S. airliner assembled in Washington might incorporate tires manufactured in Ohio and an engine produced in Great Britain, and the tires produced in Ohio might incorporate rubber from China and steel belting from Mexico. TiVA statistics allow us to see the source by country or region for all the imported content in exports, including both direct and indirect imports.

### Upstream and Downstream Analysis

TiVA statistics can be broadly classified as taking either an upstream or downstream perspective on the analysis of U.S. exports. For the upstream perspective, the analysis begins with the final product being exported and proceeds up the supply chain to identify the domestic industries creating value and the countries or regions contributing imported content embedded in these exported products. For the downstream perspective, the analysis begins with an industry's value added and proceeds down the supply chain to identify the different products in which that value is embedded and the countries or regions to which those exports flow.

Depending on the chosen perspective, TiVA statistics can be used to answer different types of questions. From an upstream perspective, the data can answer questions such as "Which industries are most important in the supply chain for auto exports?" or "How dependent is the chemicals manufacturing industry on foreign inputs in the production of exported products?". From a downstream perspective, the data can answer questions such as "How much value does the domestic mining industry contribute to the production of computer and electronic products for export?" or "How much of the value created by the publishing industry is absorbed domestically versus embedded in U.S. exports?".

# Insights on U.S. Participation in Global Value Chains

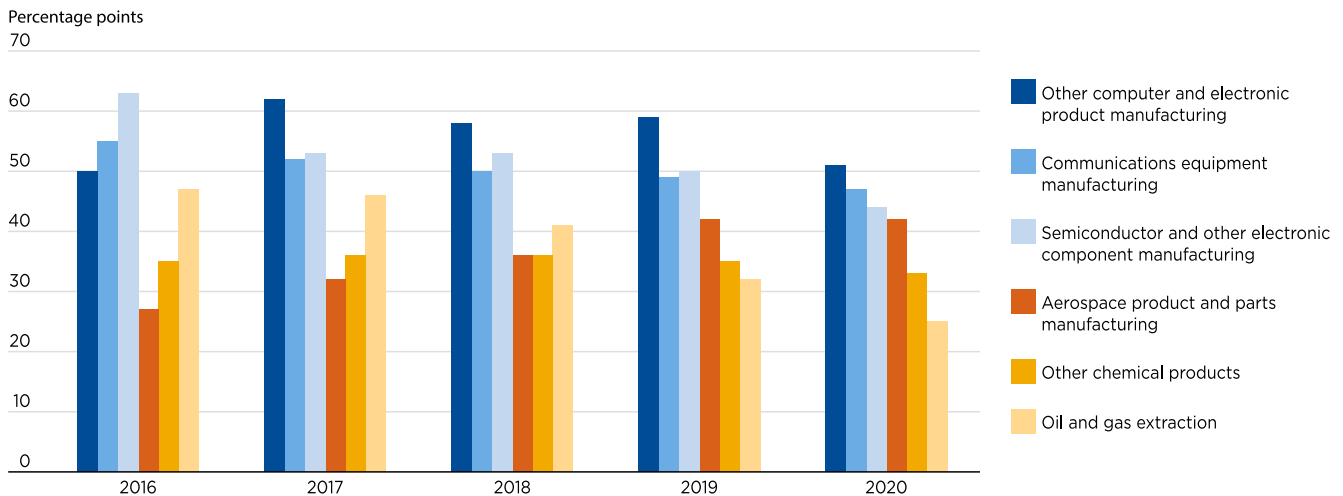
Utilizing TiVA statistics, we can estimate a breakout of the value embedded in U.S. gross exports into domestic value added by industry and foreign content by country or region of origin. These results give a more complete view of international trade and provide a new and powerful analytical tool for understanding GVCs. In each of the subsections that follow, specific examples show how the data can reveal new information and new insights on U.S. participation in global value chains.

## Export orientation

The new statistics provided by BEA can quantify integration of U.S. industries in global markets. For example, the ratio of exported value added to total value added for a given industry provides a measure of “export orientation” that shows how much of an industry’s value added is purchased abroad. Utilizing data on bilateral imports and exports between the United States and major trading partners, the export orientation of an industry can be further disaggregated to show the country or region where U.S. value added exported by each domestic industry is purchased.

For example, the industries with the highest export orientation in 2020 were other computer and electronic product manufacturing, semiconductor and other electronic component manufacturing, aerospace product and parts manufacturing, oil and gas extraction, and other chemical products (chart 1). Other computer and electronic product manufacturing had the highest export orientation in 2020, with 51.0 percent (\$10.9 billion) of the value added from this industry embedded in exports. This value can be further decomposed to show the countries or regions where it was exported. Continuing with the example above, of the \$10.9 billion in exported value added, \$2.0 billion (9.5 percent of total value added) was exported to Canada, \$0.5 billion (2.3 percent) was exported to China, \$2.6 billion (12.1 percent) was exported to Europe, \$1.1 billion (5.1 percent) was exported to Mexico, and the remaining \$4.7 billion (21.9 percent) was exported to the rest of the world (table 1).

**Chart 1. Value-Added Exports as a Share of Gross Value Added, Selected Industries, 2016–2020**



U.S. Bureau of Economic Analysis

**Table 1. Export Orientation of Top-Five Export-Oriented Industries by Purchasing Region, 2007–2020**  
[Percent of industry value added]

Producing industry and purchasing region		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Other computer and electronic product manufacturing</b>	<b>Total</b>	<b>29.1</b>	<b>30.6</b>	<b>29.2</b>	<b>40.3</b>	<b>46.8</b>	<b>50.0</b>	<b>50.5</b>	<b>52.3</b>	<b>48.8</b>	<b>49.9</b>	<b>62.3</b>	<b>58.5</b>	<b>58.6</b>	<b>51.0</b>
	Canada	4.5	4.8	4.1	5.5	7.0	7.3	8.2	8.1	7.2	7.7	9.9	9.3	9.8	9.5
	China	1.2	1.2	1.2	2.0	2.1	2.1	2.1	2.4	2.4	2.5	3.2	2.9	2.4	2.3
	Europe	7.4	7.7	7.1	9.1	10.7	12.1	11.9	12.5	11.8	12.7	15.3	14.9	15.5	12.1
	Mexico	3.4	3.8	3.7	5.0	5.5	5.3	6.2	7.0	8.3	7.3	8.3	6.4	5.5	5.1
	Rest of world	12.6	13.1	13.1	18.7	21.5	23.1	22.1	22.3	19.1	19.8	25.6	25.1	25.4	21.9
<b>Semiconductor and other electronic component manufacturing</b>	<b>Total</b>	<b>58.4</b>	<b>60.4</b>	<b>57.6</b>	<b>57.7</b>	<b>56.7</b>	<b>57.9</b>	<b>57.8</b>	<b>59.0</b>	<b>55.2</b>	<b>54.9</b>	<b>52.1</b>	<b>50.0</b>	<b>49.1</b>	<b>46.7</b>
	Canada	5.4	5.1	5.5	5.5	5.7	5.9	5.8	5.5	4.6	4.6	4.5	4.8	4.5	3.8
	China	5.7	6.3	6.5	6.8	5.2	4.6	5.8	6.3	6.4	6.5	6.0	6.3	7.8	9.0
	Europe	9.5	9.8	9.0	8.5	8.1	7.6	7.4	7.5	7.1	7.1	7.5	7.9	7.8	6.9
	Mexico	6.5	6.5	6.5	5.9	5.9	8.2	9.4	9.5	8.7	8.7	7.7	6.9	6.0	5.4
	Rest of world	31.2	32.7	30.0	30.9	31.8	31.8	29.5	30.2	28.4	28.1	26.4	24.2	22.9	21.5
<b>Aerospace product and parts manufacturing</b>	<b>Total</b>	<b>56.1</b>	<b>54.6</b>	<b>57.4</b>	<b>49.4</b>	<b>51.1</b>	<b>52.8</b>	<b>55.9</b>	<b>57.4</b>	<b>57.8</b>	<b>63.5</b>	<b>53.4</b>	<b>53.3</b>	<b>50.1</b>	<b>43.9</b>
	Canada	4.0	4.1	3.2	2.7	2.7	2.5	2.6	2.9	3.1	3.0	2.9	3.1	3.2	3.4
	China	3.5	2.6	3.9	3.7	4.1	4.2	6.2	6.6	7.2	7.4	7.1	7.4	4.1	2.4
	Europe	21.1	21.6	21.8	17.8	18.5	16.7	16.5	17.5	17.2	21.1	18.4	19.5	18.2	17.2
	Mexico	0.9	1.0	0.9	1.0	1.0	1.4	1.8	1.4	1.6	1.5	1.6	1.3	1.5	1.6
	Rest of world	26.6	25.3	27.6	24.2	24.7	28.0	28.9	29.1	28.8	30.5	23.4	22.0	23.2	19.3
<b>Oil and gas extraction</b>	<b>Total</b>	<b>14.6</b>	<b>17.6</b>	<b>16.5</b>	<b>18.6</b>	<b>22.2</b>	<b>23.5</b>	<b>24.3</b>	<b>26.7</b>	<b>24.5</b>	<b>27.0</b>	<b>32.0</b>	<b>36.1</b>	<b>41.7</b>	<b>42.1</b>
	Canada	3.7	4.3	3.9	3.9	4.3	4.3	5.0	6.9	6.5	5.6	5.5	5.5	5.6	4.8
	China	0.7	0.8	0.8	0.9	1.1	1.1	1.1	1.2	1.4	1.6	3.3	2.7	1.5	3.9
	Europe	2.8	3.8	3.3	3.3	4.4	4.5	4.6	4.4	4.0	4.8	5.6	7.1	10.2	11.0
	Mexico	2.1	2.4	2.3	3.1	3.9	4.0	3.7	4.0	3.8	4.6	4.9	5.0	4.7	4.6
	Rest of world	5.2	6.3	6.2	7.4	8.6	9.6	9.8	10.3	8.8	10.4	12.7	15.9	19.7	17.8
<b>Other chemical products</b>	<b>Total</b>	<b>36.3</b>	<b>38.6</b>	<b>35.7</b>	<b>37.7</b>	<b>39.4</b>	<b>38.9</b>	<b>38.3</b>	<b>38.3</b>	<b>36.2</b>	<b>35.2</b>	<b>35.7</b>	<b>35.9</b>	<b>35.4</b>	<b>33.0</b>
	Canada	6.6	6.6	6.1	6.3	6.6	6.8	6.9	7.0	6.3	6.1	6.1	6.0	5.8	5.5
	China	2.2	2.4	3.0	3.1	3.2	3.1	3.1	3.1	2.9	3.0	3.1	2.8	2.5	2.9
	Europe	8.2	8.6	7.4	7.6	7.7	7.3	7.1	7.4	7.2	7.0	7.0	7.0	7.3	6.7
	Mexico	4.8	5.0	4.9	5.0	5.4	5.8	5.8	5.9	5.7	5.6	5.8	5.9	5.6	5.1
	Rest of world	14.5	16.0	14.3	15.7	16.4	15.9	15.4	14.9	14.0	13.5	13.7	14.2	14.2	12.7

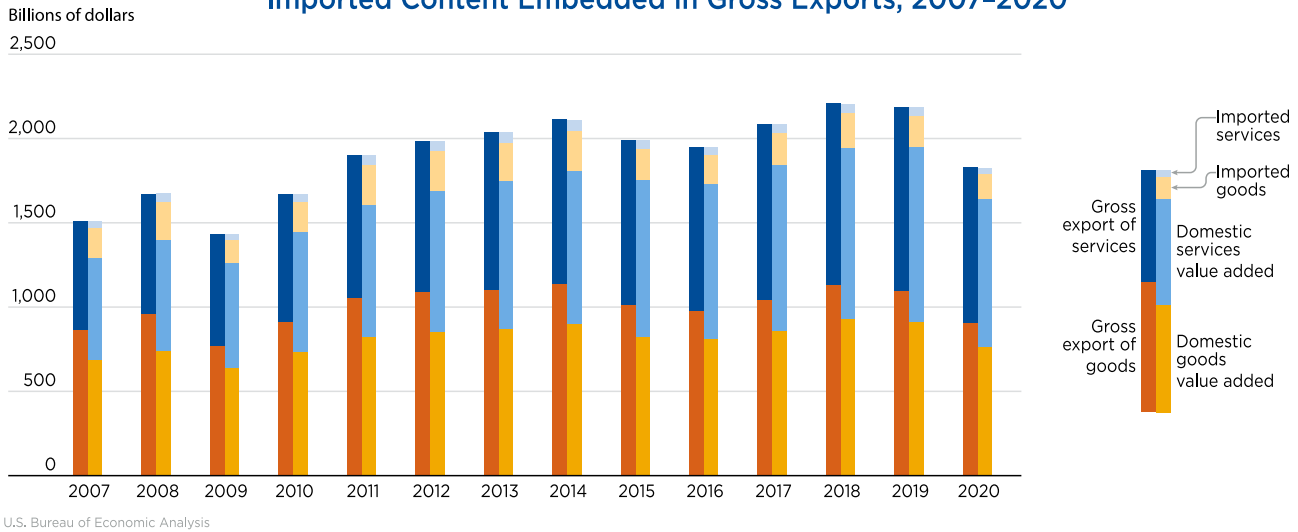
## Gross trade, TiVA, and the supply chain

Even at a high level of aggregation, the differences between gross trade measures and TiVA measures are apparent. TiVA allows for a decomposition of gross trade by leveraging information on the supply chain and can show how industries not typically associated with foreign trade may contribute indirectly to the production of U.S. exports. This same type of analysis can provide insights into the role of imports in the production of U.S. exports.

For example, services made up 50.4 percent of gross exports in 2020, but services-producing industries accounted for 66.2 percent of the domestic value added embedded in exports. Conversely, goods made up 49.6 percent of gross exports in 2020, while goods-producing industries accounted for only 33.8 percent of the domestic value added embedded in exports (chart 2). These differences highlight the notable but indirect role that services-producing industries play in the production of goods for export.

Similarly, TiVA statistics show the value of imported content embedded in U.S. exports. In 2020, 10.2 percent (\$186.1 billion) of the value in gross exports was tied to imported intermediate inputs as opposed to domestically produced value added. Goods-producing industries accounted for \$145.1 billion of these imports, while services-producing industries accounted for the remaining \$41.0 billion.

**Chart 2. Gross Exports and Domestic Value Added and Imported Content Embedded in Gross Exports, 2007–2020**



## Domestic value added in gross exports

Data on domestic value added in gross exports provide insights into the reach of U.S. production beyond domestic borders. The data can be used to identify the countries or regions to which value-added exports flow from each domestic industry.

For example, total value-added exports by the semiconductor and other electronic component manufacturing industry declined from \$37.5 billion in 2007 to \$33.6 billion in 2020. The drop reflected decreases in U.S. value-added exports to the rest of the world (\$4.6 billion), Europe (\$1.2 billion), Canada (\$0.7 billion), and Mexico (\$0.3 billion) partly offset by an increase in value added exports to China (\$2.8 billion).

## Foreign content of gross exports

By leveraging detailed information on the supply chain of U.S. industries, TiVA statistics can show the foreign content and domestic value embedded in U.S. exports. The incorporation of bilateral trade data further enables us to see the role major U.S. trading partners play in U.S. supply chains and help identify the origins of U.S. economic competitiveness.

For example, 10.2 percent (\$186.1 billion) of the value of U.S. gross exports in 2020 reflected imported content tied to domestic use of imported intermediate inputs. Of that total, \$29.8 billion was imported from Canada, \$14.7 billion from China, \$46.1 billion from Europe, \$23.1 billion from Mexico, and \$72.4 billion from the rest of the world. The percentage of imported content embedded in total U.S. exports remained relatively consistent over the time series, peaking at 16.3 percent in 2008 before reaching a low of 10.2 percent in 2020. However, this relative consistency reflected offsetting changes across industries as specific industries followed different trends over the time period.

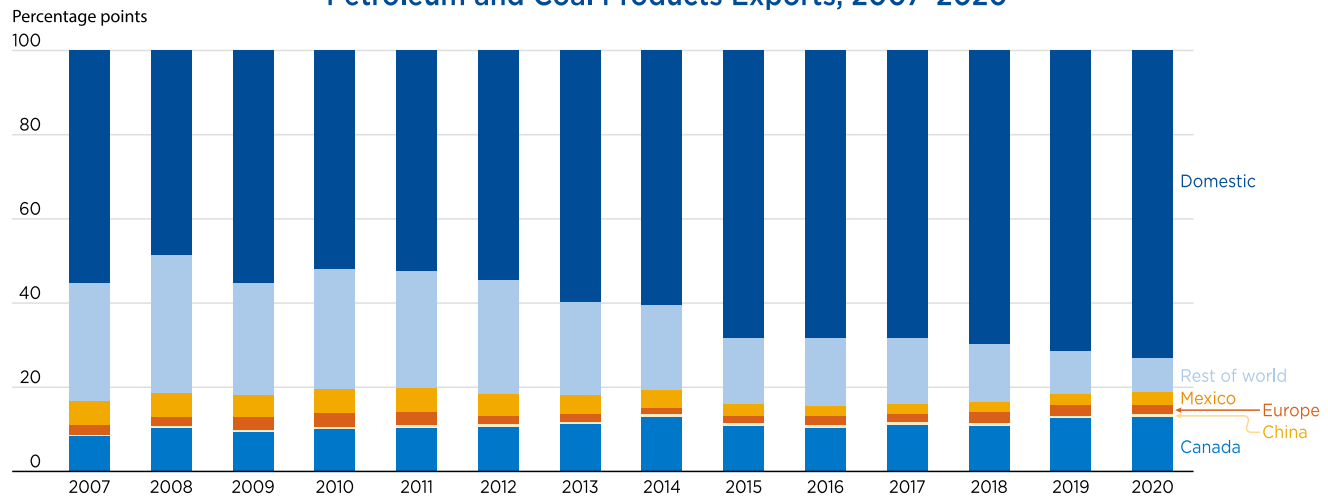
For example, petroleum and coal products manufacturing exports reflected domestic content of only 55.3 percent in 2007. By 2020, this percentage had risen to 73.0 percent (chart 3), although a good portion of this result is likely driven by changing prices (see “[Nominal and Constant-Dollar SUTs](#)”).

The rise in domestic value added embedded in exports of petroleum and coal was matched by an offsetting decrease in imported content. In the case of petroleum and coal products manufacturing, this decrease was tied most notably to decreases in the share of imported content from Europe, Canada, and the rest of the world.

The share of imported content from the rest of world dropped from a peak of 21.7 percent in 2010 to 13.1 percent in 2020; the European share dropped from a peak of 11.7 percent in 2008 to 3.3 percent in 2020; and the Canadian share dropped from a peak of 7.7 percent in 2008 to 3.1 percent in 2020 (table 2).

In contrast to the decrease in imported content for petroleum and coal product manufacturing, pharmaceutical and medicine manufacturing showed an increase from 7.4 percent imported content in 2007 to 22.9 percent in 2020. This increase was primarily driven by imported content from Europe and the rest of the world, with European-imported content rising from 3.0 percent in 2007 to 10.8 percent in 2020 and imported content from the rest of the world rising from 3.1 percent to 8.4 percent during the same period (table 2).

**Chart 3. Shares of Domestic Value Added and Imported Content by Source Region, Petroleum and Coal Products Exports, 2007–2020**



U.S. Bureau of Economic Analysis

### Nominal and Constant-Dollar SUTs

The primary data source underlying BEA's TiVA statistics is BEA's supply and use tables. This dataset is currently available only in nominal terms, which do not adjust for changes in prices over time. As a result, movements in the TiVA statistics reflect a mix of changing quantities and changing prices. It is important to keep this in mind especially in periods of notable price fluctuation. For example, the TiVA statistics show an increase in recent years in the level of domestic value added embedded in U.S. petroleum and natural gas exports, which is likely tied in part to movements in the underlying prices.

Constant-dollar supply and use tables could be used to develop TiVA statistics that remove price effects. Although BEA currently publishes these tables only in current prices, the development of constant-dollar supply and use tables remains a part of BEA's long-term research agenda.

**Table 2. Top-Five Industries by Share of Imported Content Embedded in Exports by Purchasing Region, 2007–2020**

[Percent of industry gross exports]

Exporting industry and originating sector		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Petroleum and coal products</b>	<b>Total</b>	<b>44.7</b>	<b>51.4</b>	<b>44.7</b>	<b>48.0</b>	<b>47.5</b>	<b>45.3</b>	<b>40.3</b>	<b>39.4</b>	<b>31.5</b>	<b>31.6</b>	<b>31.6</b>	<b>30.1</b>	<b>28.4</b>	<b>27.0</b>
	Canada	7.1	7.7	5.6	6.0	5.7	5.1	4.6	5.2	4.4	4.3	3.8	3.8	3.4	3.1
	China	3.0	2.8	2.4	2.4	2.0	1.7	1.5	1.4	1.4	1.3	1.5	1.2	1.0	1.1
	Europe	7.9	11.7	9.7	8.6	10.3	9.6	8.4	7.1	5.7	5.2	4.3	4.0	3.5	3.3
	Mexico	8.2	8.9	7.4	9.3	9.4	8.6	6.9	6.8	5.9	7.1	7.4	7.7	7.5	6.5
	Rest of world	18.5	20.3	19.6	21.7	20.1	20.4	18.9	19.0	14.1	13.8	14.6	13.4	13.0	13.1
<b>Motor vehicles, bodies and trailers, and parts</b>	<b>Total</b>	<b>27.9</b>	<b>30.0</b>	<b>29.2</b>	<b>29.1</b>	<b>31.4</b>	<b>30.2</b>	<b>30.5</b>	<b>32.0</b>	<b>30.7</b>	<b>29.0</b>	<b>29.3</b>	<b>29.9</b>	<b>29.1</b>	<b>27.0</b>
	Canada	14.9	14.0	13.8	13.5	13.5	13.1	13.0	13.4	11.8	11.2	11.4	13.1	12.6	9.3
	China	0.6	0.7	0.8	1.4	1.8	1.8	2.6	3.2	2.6	2.6	3.2	2.1	1.9	2.0
	Europe	4.1	5.0	3.9	3.1	3.8	3.2	3.3	3.8	4.6	4.9	4.6	3.9	4.4	6.2
	Mexico	3.7	4.3	4.8	4.9	5.2	5.1	5.1	5.3	5.6	5.0	4.8	5.3	4.9	4.2
	Rest of world	4.7	6.0	5.9	6.3	7.1	6.9	6.5	6.3	6.1	5.3	5.3	5.5	5.2	5.3
<b>Pharmaceutical and medicine manufacturing</b>	<b>Total</b>	<b>7.4</b>	<b>8.3</b>	<b>4.4</b>	<b>6.4</b>	<b>7.6</b>	<b>11.4</b>	<b>14.4</b>	<b>12.1</b>	<b>18.8</b>	<b>20.0</b>	<b>20.0</b>	<b>21.4</b>	<b>19.9</b>	<b>22.9</b>
	Canada	1.0	1.2	0.6	0.9	1.2	1.5	1.9	1.1	1.5	1.5	1.4	1.3	1.3	1.6
	China	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.5	0.7	0.8	1.0	1.1	1.1	1.6
	Europe	3.0	3.4	1.7	2.4	2.9	4.6	5.7	5.6	8.9	8.9	9.3	9.7	9.5	10.8
	Mexico	0.2	0.3	0.2	0.2	0.2	0.5	0.5	0.4	0.5	0.4	0.4	0.5	0.4	0.5
	Rest of world	3.1	3.3	1.8	2.7	3.1	4.5	5.9	4.6	7.2	8.3	7.9	8.8	7.7	8.4
<b>Primary metals</b>	<b>Total</b>	<b>26.7</b>	<b>28.3</b>	<b>22.6</b>	<b>26.0</b>	<b>29.7</b>	<b>26.1</b>	<b>25.9</b>	<b>25.4</b>	<b>23.2</b>	<b>21.5</b>	<b>24.3</b>	<b>25.1</b>	<b>23.0</b>	<b>22.6</b>
	Canada	8.0	7.8	5.5	7.0	8.0	7.3	7.2	7.2	6.1	5.6	6.1	5.9	5.0	5.5
	China	1.9	2.3	2.2	2.4	2.2	2.2	1.9	1.8	1.4	1.2	1.3	1.5	1.0	1.3
	Europe	5.1	5.6	4.3	4.8	5.3	4.2	3.9	3.8	3.8	3.5	4.5	4.8	5.0	5.2
	Mexico	4.7	4.7	3.8	4.6	5.7	5.7	6.1	6.4	6.3	5.7	6.6	7.0	6.3	5.2
	Rest of world	7.0	7.9	6.7	7.3	8.5	6.8	6.8	6.2	5.7	5.4	5.8	5.9	5.6	5.5
<b>All other transportation equipment manufacturing</b>	<b>Total</b>	<b>22.3</b>	<b>23.3</b>	<b>19.9</b>	<b>21.0</b>	<b>20.7</b>	<b>21.1</b>	<b>20.0</b>	<b>21.4</b>	<b>20.5</b>	<b>17.3</b>	<b>18.9</b>	<b>19.0</b>	<b>18.2</b>	<b>18.7</b>
	Canada	4.9	5.4	4.0	4.5	4.9	4.2	4.1	4.3	3.7	3.6	4.5	4.0	4.5	4.1
	China	0.4	0.7	0.6	0.7	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.4
	Europe	5.6	6.6	5.2	4.7	4.4	3.5	3.5	3.7	3.4	2.9	3.2	3.4	3.3	2.7
	Mexico	1.7	1.1	0.9	1.2	1.9	1.9	1.8	2.5	2.9	2.2	1.7	2.3	2.4	2.3
	Rest of world	9.7	9.6	9.2	9.9	9.0	11.1	10.2	10.4	10.2	8.4	9.2	9.1	7.8	9.2

## Decomposition of embedded value added by sector of origin

TiVA data can also be used to decompose the value added embedded in a specific industry's exports based on the industry or sector of origin. For example, goods-producing industries had gross exports of \$906.3 billion in 2020, of which 58.4 percent (\$529.5 billion) was created by domestic goods-producing industries; 25.6 percent (\$231.7 billion) was created by domestic services-producing industries; and 16.0 percent was imported content. Each of these contributions can be further disaggregated into individual industries. For example, the contribution of services-producing industries (\$231.7 billion) reflects value added by the finance, insurance, and real estate industry of \$39.3 billion, by professional and business services of \$71.2 billion, by information of \$11.2 billion, and by other services of \$110.0 billion.

The data also show how services value added embedded in goods-producing industry exports has changed over time. For example, the level of value added from services-producing industries embedded in other chemical product manufacturing exports remained relatively constant from 2007 to 2020 at around 11 percent. However, services-producing industries value added embedded in oil and gas extraction exports increased from 0.3 percent in 2007 to 11.0 percent in 2020. Importantly, this captures the increase in the contribution of services-producing industries to both upstream suppliers of the oil and gas extraction industry and to the oil and gas extraction industry itself.

In addition to the general insights outlined in the previous section, these new data can also be used to analyze the impact on the U.S. economy of specific events and policies.

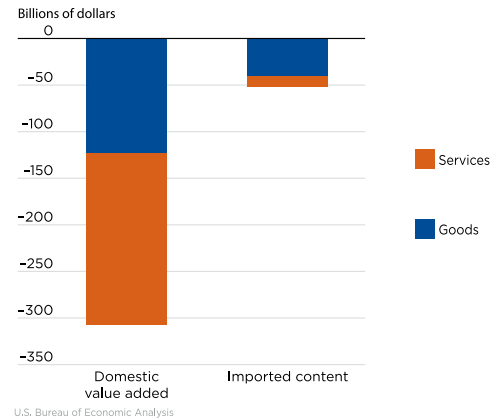
## Impact of COVID-19

These data can provide valuable insights into the impact the COVID-19 pandemic and related shutdowns had on the economy in 2020. From 2019 to 2020, total U.S. gross exports decreased by 16.4 percent (\$358.5 billion). However, domestic value added embedded in exports decreased by only 15.8 percent (307.0 billion), while imported content embedded in exports decreased by 21.7 percent (\$51.6 billion). As a result, the share of domestic content in U.S. exports rose during this period. While the decrease in domestic value added was driven primarily by services-producing industries, the decrease in imported content was largely driven by goods-producing industries (chart 4).

These impacts can also be examined at a more detailed level to identify the specific industries driving the result. For example, the largest contributor to the 2020 decrease in domestic value added embedded in exports was the air transportation industry, which accounted for \$53.1 billion of the overall decrease. Although air transportation was the largest contributor to the decrease, other industries also contributed significantly, including aerospace products and parts manufacturing (down \$34.7 billion); food services and drinking places (down \$31.5 billion); performing arts, spectator sports, museums, and related activities (down \$30.3 billion); and accommodation (down \$29.5 billion). In aggregate, services-producing industries accounted for a decrease of \$183.4 billion, while goods-producing industries accounted for the remaining decrease of \$123.1 billion.

The largest contributor to the decrease in imported content embedded in exports was aerospace product and parts manufacturing, which accounted for \$11.1 billion of the overall decrease. This was followed by decreases in petroleum and coal products (\$9.2 billion); motor vehicles, bodies and trailers, and parts (\$9.0 billion); air transportation (\$6.5 billion); and machinery manufacturing (\$2.2 billion). In total, goods-producing industries accounted for \$40.1 billion of the total decrease in imported content, while services-producing industries accounted for the remaining \$11.5 billion (chart 4).

**Chart 4. Change in Domestic Value Added and Imported Content in Gross Exports by Source Sector, 2019–2020**



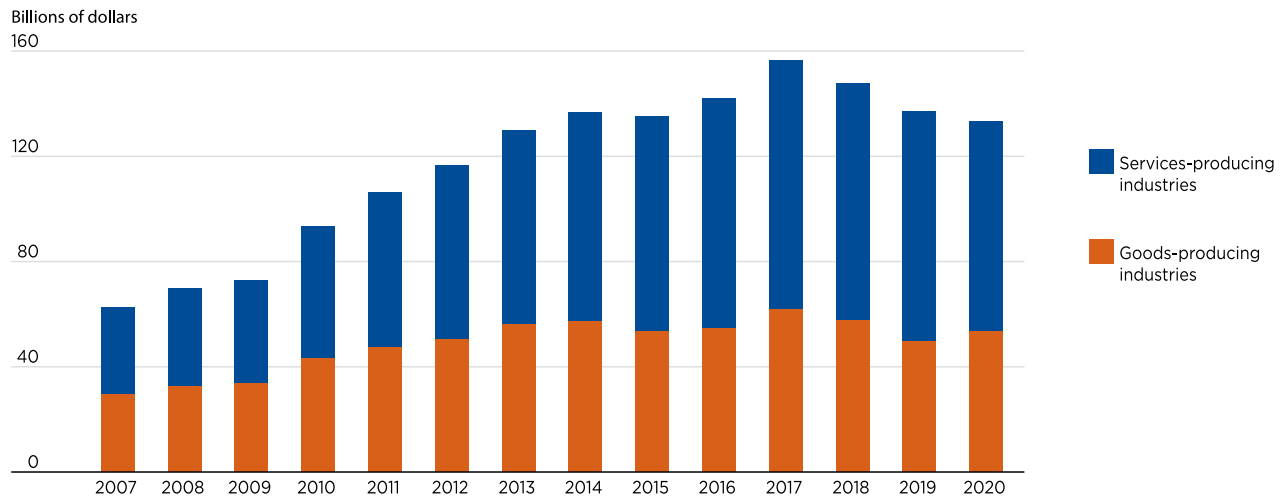


## TiVA with China

China continues to be one of the most important trading partners for the United States, accounting for 8.8 percent of U.S. gross exports and supplying 18.5 percent of U.S. gross imports in 2020. The trade relationship between the United States and China has shifted in notable ways over time due to changing economic conditions and changes in policy, including changes in tariff rates implemented by both countries beginning in 2018 as well as the impact of the COVID-19 pandemic in 2020. TiVA statistics provide one mechanism for analyzing the impacts of these changes. Domestic value added embedded in U.S. exports to China increased steadily between 2007 and 2017 but fell beginning in 2018 and continuing through 2020, although a slight upturn in domestic value-added exports by goods-producing industries in 2020 partly offset some of the decline (chart 5).

These changes can be further analyzed by decomposing the domestic value added embedded in U.S. exports to China in order to identify which exporting industries contributed most to the decrease. For example, U.S. value-added exports to China decreased by \$8.8 billion in 2018, which was more than accounted for by decreases in farms (down \$7.5 billion) and motor vehicles, bodies and trailers, and parts manufacturing (down \$3.0 billion). In 2019, value-added exports fell by \$10.6 billion, largely driven by decreases in aerospace products and parts manufacturing (down \$5.4 billion) and oil and gas extraction (down \$3.1 billion). In 2020, value-added exports fell by \$3.5 billion, reflecting decreases in food services and drinking places; performing arts, spectator sports, museums, and related activities; and accommodations. These decreases were largely offset by an increase in farms of \$7.4 billion.

**Chart 5. Domestic Value Added Embedded in U.S. Exports to China, 2007–2020**



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## Conclusion and Future Developments

As illustrated above, national TiVA statistics provide a wide array of insights into bilateral trade relationships. From identifying the role of imports in domestic production to tracking the flow of domestic value added and foreign content in U.S. exports to other countries and regions, BEA's TiVA statistics provide a unique perspective on global supply chains.

In the coming weeks, BEA will publish a revised set of national TiVA statistics for 2007 to 2020 and new data for 2021. The revised data will expand the number of available industries from 81 to 138, providing greater detail on the distribution of value added across industries. In addition to expanded industry detail, the data will also include new regional breakouts, adding new data on trade with Japan and Rest of Asia and Pacific and increasing the number of regions from five to seven.

Looking beyond the next data release, BEA will continue to research the possibility of additional extensions to these accounts, including the addition of new regions, further expanding the number of available industries, and breaking out total value added into its primary subcomponents of gross operating surplus, compensation, and taxes on production and imports less subsidies.

## Appendix: Data Availability from 2007–2020

### Main tables—select TiVA and related statistics

- **Gross Output and Value Added by Industry**—levels in millions for both gross output and value added by producing industry and value added by producing industry as a percentage of share of total industry gross output.
- **Gross Exports by Exporting Industry and Purchasing Region**—by exporting industry: levels in millions of gross exports by exporting industry for all countries and the five regions and regional percentage share of U.S. gross exports.
- **Value-Added Exports by Producing Industry and Purchasing Region**—by producing industry: levels in millions of value added by industry and value added by industry in gross exports; percentage share of valued added by industry in gross exports (export orientation) for all countries and the five regions.
- **Domestic Value Added and Imported Content in Gross Exports by Exporting Industry**—by exporting industry: levels in millions of gross exports, domestic value-added content of gross exports, and imported content of gross exports; percentage share of domestic value added of gross exports and imported content of gross exports.
- **Decomposition of Domestic Value Added by Source Sector and Purchasing Region**—by producing sector and purchasing region: levels in millions of domestic value-added content in U.S. gross exports; percentage share of producing sector's domestic value added, totals and by major sector.
- **Decomposition of Domestic Value Added by Exporting Industry and Source Sector**—all countries, by exporting industry: levels in millions of domestic value-added content of gross exports—all industry and select sectors; select sectors' percentage share of domestic value added content of gross exports.
- **Decomposition of Domestic Value Added by Exporting Industry and Source Sector**—regional data, by exporting industry: levels in millions of domestic value-added content of gross exports—all industry and select sectors; select sectors' percentage share of domestic value-added content of gross exports.
- **Decomposition of Imported Content by Importing Sector and Purchasing Region**—by producing sector and purchasing region: levels in millions of imported content in U.S. gross exports; percentage share of producing sector's imported content, totals and by major sector.

- **Decomposition of Imported Content by Exporting Industry and Importing Sector**—all countries, by exporting industry: levels in millions of imported content of gross exports—all industry and select sectors; select sectors' percentage share of imported content of gross exports.
- **Decomposition of Imported Content by Exporting Industry and Importing Sector**—regional data, by exporting industry: levels in millions of imported content of gross exports—all industry and select sectors; select sectors' percentage share of imported content of gross exports.

## Supporting tables—input datasets used to create TiVA statistics

- [Export vectors](#)
- [Import matrices](#)
  - [Import matrices for all regions](#)
  - [Import matrices for Canada](#)
  - [Import matrices for China](#)
  - [Import matrices for Europe](#)
  - [Import matrices for Mexico](#)
  - [Import matrices for the rest of the world](#)
- [Make tables](#)
- [Use tables](#)

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### Footnotes

1. For a more detailed discussion of the methodology used to prepare these data, see “[Technical Document: Methodology for Preparing Single-Country Trade in Value Added \(TiVA\) Statistics](#)” on the BEA website.
2. The national TiVA model used to prepare these results is based on SUTs for the United States but does not incorporate such tables from other countries or regions. In this framework, the data can be used to identify the magnitude of imported content and the immediate source of that content, but it is not possible to determine how much of that content may reflect domestic value added that was previously exported and is now returning to the United States as an embedded component of imports.



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