

Behind the Trade: An Inside Look at U.S. Industry Trends

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Abstract

This working paper provides a comprehensive analysis of U.S. merchandise trade and trade-related services from 2022 to 2024, a period marked by significant global economic volatility, supply chain disruptions, and shifting geopolitical dynamics. Drawing on U.S. Census Bureau trade statistics and a wide array of sectoral and international data sources, the working paper dissects overall trends in U.S. imports and exports, with a focus on eight key industry sectors—including six merchandise sectors and two services sectors integral to merchandise trade. The analysis reveals that, despite a modest 0.4 percent average annual increase in the value of U.S. general imports to \$3.3 trillion, U.S. domestic exports declined by 1.0 percent annually to \$1.7 trillion, reversing the strong growth observed in the immediate post-pandemic years. Sectoral narratives highlight divergent drivers: transportation equipment imports surged due to increased imports of motor vehicles, while energy-related product imports and exports contracted sharply due to record domestic production and the impact of the Russian Invasion of Ukraine on global energy flows. The chemicals sector saw a pronounced increase in imports of medicinal chemicals, notably semaglutide-based pharmaceuticals, reflecting both demographic trends and global patent shifts. Agricultural trade was characterized by a historic realignment, with Mexico surpassing China as the largest market for U.S. agricultural exports. The working paper also documents the rise of e-commerce and major maritime disruptions, such as the Black Sea blockade and Red Sea attacks. Finally, the working paper examines trends in U.S. foreign direct investment, underscoring the United States' continued role as both a leading source and destination for global FDI.

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Introduction

This working paper covers the examination that staff at the U.S. International Trade Commission (Commission or USITC) conducted of trends in U.S. merchandise trade and trade-related services from 2022 to 2024 (the research period).¹ In addition to a discussion of overall merchandise trade across sectors, this working paper takes a deeper look into selected U.S. merchandise trade sectors as well as U.S. and global services sectors supporting merchandise trade through eight specialized chapters. Each of the merchandise trade chapters focuses on changes in trade flows during research period; all chapters provide analytical narratives covering in-depth examination of sector-specific topics that affected trade over the period. The working paper also includes a chapter focusing on trends in U.S. inward and outward foreign direct investment (FDI).

- Chapter 1 provides a short review of overall merchandise trade flows during 2022–24, highlighting broader trends that influenced merchandise trade by partner country and sector.
- Chapters 2–9 discuss shifts in eight industry sectors—six merchandise sectors and two services sectors supporting merchandise trade. For the merchandise sectors, each chapter begins with a review of imports and exports within that sector, followed by a series of narratives focusing on specific trends or events driving shifts in trade during 2022–24. Chapters covering services sectors include narratives on the impact and role of services sectors in facilitating merchandise trade.
- Chapter 10 analyzes trends in U.S. FDI. The chapter discusses the importance of and drivers of U.S. inward and outward FDI in the global economy and identifies trends in FDI by sectors. Although these sectors may overlap with those in chapters 2–9, they may differ because of industry classification structure and different levels of aggregation in the FDI data.

The working paper uses U.S. Census Bureau statistics on the values of merchandise imports and exports during 2022–24. These data are then grouped into industry sectors and further divided into digests, which are subcategories within a given sector.² Each Commission digest encompasses various 8-digit subheadings in the *Harmonized Tariff Schedule of the United States* (HTS). These data are used to highlight changes in U.S. imports and exports that occurred in 2022–24, including average annual changes as well as absolute value shifts during the period.³ Additional sources of information include publications and data from domestic and international institutions such as the Federal Reserve System,

¹ Although focused on the U.S. impact, trade-related services chapters discuss services originating in the United States and globally.

² The USITC divides merchandise industries into 12 sectors; 7 of these 12 are covered in this working paper. The 5 that are not covered include 2 broad categories of products not assigned to any of the 10 specific sectors: miscellaneous manufactures and special provisions. The 3 other excluded sectors—electronics, minerals and metals; textiles and apparel; and footwear—are distinct sectors not included in this working paper. Data for the excluded categories are included as “all other sectors” in the trade data presented in this chapter.

³ All merchandise trade data in this working paper are general imports and domestic exports, except for trade balance data presented in chapter 1, which use total exports.

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the International Monetary Fund, the U.S. Energy Information Administration, and many more sector-specific institutions and resources.

Chapter 1:

U.S. Trade by Industry Sectors and Selected Trading Partners

The value of U.S. general imports increased by \$26.7 billion (0.4 percent average annual growth rate) to \$3.3 trillion during 2022–24 (research period), following two years of significant import growth in 2021 and 2022 (table 1.1).⁴ U.S. domestic exports decreased by \$35.6 billion (–1.0 percent average annual change) to \$1.7 trillion during the period, also following consecutive years of rising exports in 2021 and 2022 (table 1.3).⁵ In overall terms, the shift in trade during 2022–24 was particularly influenced by supply chain disruptions caused by merchandise shortages, geopolitical events, and related shipping disruptions, as well as a winding down of historically high inflation that began to subside in late 2022.⁶ These factors played a key role in overall changes in U.S. imports and exports, but shifts in individual sectors can have a variety of unique drivers.⁷ For example, U.S. energy product imports and exports were influenced by a large increase in domestic energy production and consumption. Additionally, the transportation equipment sector was influenced by growth in consumer demand for motor vehicles,

⁴ General imports increased by 327.7 billion and 314.9 billion in 2021 and 2022, respectively. Percentage changes included in trade data tables 1.1–1.4 are the average annual change during 2022–24 and not a simple percentage change in 2024 relative to 2022. The average annual change is presented in the form of compound annual growth rates (CAGRs) and is referred to as average change or average annual change in this working paper. The CAGR is a measure used to determine the average annual growth rate of trade values over a specified period longer than one year. Unlike a simple average growth rate, which can be skewed by volatility, the CAGR provides a smoothed average annual growth rate that assumes a constant rate of change over the specified period. It is calculated by taking the ending value over the beginning value within a specified period, 2022–24 in this working paper, and taking the n th root of this value, where n is the number of years in the specified period. USITC DataWeb/Census, accessed November 30, 2025.

⁵ Domestic exports increased by \$53.5 billion and \$29.3 billion in 2021 and 2022, respectively. The U.S. International Trade Commission (Commission or USITC) maintains and publishes the *Harmonized Tariff Schedule of the United States* (HTS), which sets out the tariff rates and statistical categories for all merchandise imported into the United States. The U.S. Census Bureau (Census) collects and compiles export statistics of approximately 8,000 commodity classifications (10-digit classification codes) in *Schedule B: Statistical Classification of Domestic and Foreign Commodities Exported from the United States*. *Schedule B* classification codes are concorded to HTS 10-digit statistical reporting numbers derived from Commission estimates; therefore, the classification codes for exports are presented using HTS 8-digit subheadings for imports. For a complete list of HTS subheadings classified in a particular sector or digest, see this [data table](#). USITC DataWeb/Census, accessed November 30, 2025.

⁶ Ball, Leigh, and Mishra, “The Rise and Retreat of US Inflation,” CEPR. June 19, 2025, Gordon and Clark, “The Impacts of Supply Chain Disruptions on Inflation,” May 10, 2023; CRS, “The Economic Impact of Russia Sanctions,” February 20, 2025; Elshazly, “Suez Canal and Red Sea Disruption,” October 23–24, 2024; Siripurapu, “What Happened to Supply Chains in 2021,” accessed September 9, 2025.

⁷ See chapters 2–7 for extended discussions of the factors influencing trade in specific sectors during 2022–24.

evidenced by an increase in U.S. light vehicle sales of 15.0 percent during 2022–24, from 14 million units to 16 million units.⁸

U.S. Imports by Merchandise Sector

The value of U.S. imports rose for half of the U.S. manufacturing sectors included in this working paper, and imports declined for the remaining sectors ([table 1.1](#)). Transportation equipment had the largest increase, by value, rising by \$97.0 billion to \$595.0 billion, followed by the chemicals sector, which rose by \$25.1 billion from 2022 to 2024. These gains were countered by a large decline in imports, by value, in the energy-related products sector, down \$66.1 billion.

The increase in transportation equipment imports was largely due to a significant rise in imports of motor vehicles and an increase in U.S. light vehicle sales in 2022–24, corresponding with an increase in U.S. light vehicle sales in 2022–24.⁹ The increased imports in the chemicals and related products sector were mostly driven by sharply increasing demand for medicinal chemicals, including those used in weight-loss and diabetes medications, such as Ozempic and Wegovy.¹⁰

The decline in value of energy-related product imports coincided with an increase in domestic energy independence, evidenced by record levels of domestic production of crude petroleum.¹¹ The decline was further influenced by the Russian invasion of Ukraine, with most U.S. energy-related product digests imported from Russia falling to near zero levels.¹²

⁸ Omdia, “U.S. Light Vehicle Sales, December 2024,” January 3, 2025; “North American Vehicle Production, March 2025,” accessed August 1, 2025; Energy, EIA, “In 2024, the United States Produced More Energy,” accessed September 9, 2025.

⁹ Omdia, “U.S. Light Vehicle Sales, December 2024,” January 3, 2025; Omdia, “U.S. Light Vehicle Sales, December 2023,” January 3, 2024.

¹⁰ USITC DataWeb/Census, HTS subheading 2937.19.00, accessed July 31, 2025.

¹¹ EIA, “More Productive Wells Spur U.S. Crude Oil Production Higher,” March 5, 2024.

¹² USITC DataWeb/Census, Russia, Digests EP001-EP006, accessed July 31, 2025. The one energy-related product digest in which the United States continued to import over the full period was the nuclear materials digest.

Table 1.1: U.S. general imports by merchandise sector, 2022–24

In billions of dollars and percentages.

Sector	2022 (billion \$)	2023 (billion \$)	2024 (billion \$)	Absolute change, 2022– 24 (billion \$)	Average change, 2022–24 (%)
Agricultural products	222.3	215.6	233.0	10.8	2.4
Chemicals and related products	441.4	420.3	466.5	25.1	2.8
Energy-related products	315.9	258.4	249.8	-66.1	-11.1
Forest products	66.9	51.3	54.6	-12.3	-9.7
Machinery	279.9	279.8	297.0	17.1	3.0
Transportation equipment	498.0	575.8	595.0	97.0	9.3
All other sectors	1,415.4	1,275.6	1,370.6	-44.9	2.8
Total	3,239.7	3,076.8	3,266.4	26.7	0.4

Source: USITC DataWeb/Census, accessed June 30, 2025.

Notes: Average change is calculated using the compound annual growth rate formula. The all other sectors category includes electronics, minerals and metals; textiles and apparel; and footwear, miscellaneous manufactures, and special provisions.

U.S. Imports from Major Trading Partners

The largest sources of imports in 2024 were Mexico, China, and Canada. Of these sources, only imports from Mexico increased in value from 2022 through 2024, up \$53.5 billion (5.8 percent on average annually) with imports from China declining by \$97.5 billion and Canada declining by \$25.5 billion ([table 1.2](#)). In addition to Mexico, imports from the remaining countries in the top 10 all grew in value relative to 2022.¹³ Increased imports from Mexico were most concentrated in the transportation equipment, machinery, and agricultural product sectors because demand for products like motor vehicles, electrical transformers, and fresh, chilled, or frozen vegetables drove up the value of imports from Mexico.¹⁴ Of the sectors covered in this working paper, the product categories with the biggest declines from China were medicinal chemicals used in the pharmaceutical industry.¹⁵

Table 1.2: U.S. general imports by import source, 2022–24

In billions of dollars and percentages.

Import source	2022 (billion \$)	2023 (billion \$)	2024 (billion \$)	Absolute change, 2022–24 (billion \$)	Average change, 2022– 24 (%)
Mexico	452.0	472.9	505.5	53.5	5.8
China	536.3	427.2	438.7	-97.5	-9.5
Canada	437.4	418.0	411.9	-25.5	-3.0
Germany	146.6	159.2	160.4	13.8	4.6
Japan	148.0	147.2	148.4	0.4	0.1
Vietnam	127.4	114.4	136.5	9.1	3.5
South Korea	115.3	116.3	131.6	16.3	6.8
Taiwan	91.7	87.8	116.3	24.5	12.6

¹³ USITC DataWeb/Census, accessed July 31, 2025. UNCTAD, “Import Diversification and Trade Diversion,” December 5, 2024.

¹⁴ USITC DataWeb/Census, Digests TE009, MT024, and AG018, Mexico, accessed July 31, 2025.

¹⁵ USITC DataWeb/Census, digest CH019, China, accessed August 1, 2025.

Import source	2022 (billion \$)	2023 (billion \$)	2024 (billion \$)	Absolute change, 2022–24 (billion \$)	Average change, 2022–24 (%)
Ireland	82.6	82.4	103.3	20.6	11.8
India	85.5	83.6	87.3	1.8	1.1
All other sources	1,016.8	967.8	1,026.6	9.8	0.5
Total	3,239.7	3,076.8	3,266.4	26.7	0.4

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

U.S. Exports by Merchandise Sector

Exports from the U.S. increased for one merchandise sector and declined for five merchandise sectors included in this working paper. The merchandise sector with the largest increase in value was transportation equipment, up \$41.5 billion to \$316.4 billion (7.3 percent). The decline in exports from the remaining five sectors drove the shift in overall exports value into the negative (table 1.3). The decline in value was most pronounced for energy-related products, down \$62.6 billion (–8.4 percent), and agricultural products, down \$19.5 billion (–5.1 percent).

Transportation equipment was the only covered sector with an increase in exports during 2022–24. Although rising imports were attributable to increased imports of motor vehicles and parts, the increase in exports was primarily driven by rising shipments of aircraft, spacecraft, and related equipment. These products alone increased by \$24.9 billion from 2022 to 2024, 60.0 percent of the overall increase within the transportation equipment sector.¹⁶

For energy-related products, the United States both reduced exports—in particular, cut shipments of crude petroleum to Canada, Mexico, and Russia—and reduced imports as a result of greater domestic energy production. The decline in both exports and imports is indicative of an overall decrease in supply and demand for U.S. trade in energy-related¹⁷

Table 1.3: U.S. domestic exports by merchandise sector, 2022–24

In billions of dollars and percentages.

Sector	2022 (billion \$)	2023 (billion \$)	2024 (billion \$)	Absolute change, 2022–24 (billion \$)	Average change, 2022–24 (%)
Agricultural products	197.7	176.1	178.1	–19.5	–5.1
Chemicals and related products	293.7	281.9	283.4	–10.3	–1.8
Energy-related products	389.3	331.1	326.8	–62.6	–8.4
Forest products	41.3	36.3	36.3	–4.9	–6.2
Machinery	134.8	134.9	132.0	–2.8	–1.0

¹⁶ USITC DataWeb/Census, domestic exports, digest TE001, accessed August 1, 2025.

¹⁷ USITC DataWeb/Census, domestic exports, digests EP004, Canada, Mexico, Russia, accessed August 1, 2025. EIA, “More Productive Wells Spur U.S. Crude Oil Production Higher,” March 5, 2024.

Sector	2022 (billion \$)	2023 (billion \$)	2024 (billion \$)	Absolute change, 2022– 24 (billion \$)	Average change, 2022–24 (%)
Transportation equipment	274.9	312.8	316.4	41.5	7.3
All other sectors	420.2	418.2	443.2	23.0	2.7
Total	1,751.8	1,691.4	1,716.3	-35.6	-1.0

Source: USITC DataWeb/Census, accessed June 30, 2025.

Notes: Average change is calculated using the compound annual growth rate formula. The all other sectors category includes electronics, minerals and metals; textiles and apparel; and footwear, miscellaneous manufactures, and special provisions.

U.S. Exports by Major Trading Partners

Canada, Mexico, and China remained the first-, second-, and third-largest export destinations, respectively, over the period of 2022–24 (table 1.4). These countries are likely to continue as the top destinations for U.S. exports, but shipments to each country declined in value over the period. The declines ranged from \$6.6 billion to \$8.6 billion. The collective declines for Canada, Mexico, and China were equivalent to 67.0 percent of the overall decline in U.S. exports. Exports to most leading destinations declined during 2022–24, with some exceptions. The Netherlands—the seventh-largest destination for U.S. exports in 2022—rose to the fourth-largest destination in 2024, with a \$12.0 billion increase in exports over the period. Exports to Germany also increased over the period, rising by \$3.2 billion from 2022 to 2024.

The increase in exports to the Netherlands was almost entirely supported by growth in shipments of crude petroleum and petroleum products.¹⁸ This increase was likely due to substitution by the Netherlands and other European countries away from sanctioned Russian oil products to other sources.¹⁹ Exports of energy-related products also increased to Germany, but more significant was the growth in medicinal chemicals, such as semaglutide. Although semaglutide continued to be used in anti-diabetic medicine, after its approval by the U.S. Food and Drug Administration in 2021 for use also as a weight-loss medication, it saw demand increase significantly during 2022–24.

Table 1.4: U.S. domestic exports by export market, 2022–24

In billions of dollars and percentages.

Sector	2022 (billion \$)	2023 (billion \$)	2024 (billion \$)	Absolute change, 2022–24 (billion \$)	Average change, 2022–24 (%)
Canada	295.9	290.4	289.2	-6.6	-1.1
Mexico	258.4	253.1	249.8	-8.6	-1.7
China	133.7	125.7	125.2	-8.6	-3.3
Netherlands	63.7	71.3	75.7	12.0	9.0
Japan	72.2	67.4	70.3	-1.9	-1.3
United Kingdom	67.3	63.0	65.9	-1.5	-1.1
Germany	62.5	67.0	65.7	3.2	2.6

¹⁸ USITC DataWeb/Census, domestic exports, digests EP004–EP005, Netherlands, accessed August 1, 2025.

¹⁹ Statistics Netherlands, “Netherlands Now More Dependent on US for Energy, Less on Russia,” Statistics Netherlands, July 3, 2025.

Sector	2022 (billion \$)	2023 (billion \$)	2024 (billion \$)	Absolute change, 2022–24 (billion \$)	Average change, 2022–24 (%)
South Korea	68.1	60.7	61.6	-6.5	-4.9
Brazil	47.1	37.2	40.8	-6.3	-6.9
Singapore	39.0	35.6	37.9	-1.1	-1.4
All other markets	644.1	619.9	634.2	-9.8	-0.8
Total	1,751.8	1,691.4	1,716.3	-35.6	-1.0

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

U.S. Trade Balance by Major Trading Partners

The United States had a negative merchandise trade balance with all but one of its 10 largest trading partners in 2022–24 (table 1.5).²⁰ This means the U.S. imported more products from its leading trading partners than it exported to those countries.²¹ The exception was the United Kingdom, where the United States ran a trade surplus in 2022–24. The largest negative trade balances for the United States were from China, Mexico, and Vietnam, each with more than \$100 billion more exports to the United States than imports in each year during 2022–24. The largest negative trade balance was with China, totaling -\$295.5 billion in 2024. Although the trade deficit with China was the largest among all U.S. trading partners, the value of the U.S.-China trade deficit decreased by \$86.8 billion in 2024 relative to 2022, when the trade deficit with China was \$382.3 billion. The U.S. trade deficits grew, however, with Mexico and Vietnam from 2022 to 2024. Although still holding a negative trade balance with Canada, the U.S. trade deficit shrank by \$16.4 billion during the period.

Table 1.5: U.S. merchandise trade balance by select trading partners, 2022–24

In billions of dollars.

Trading partner	2022 (billion \$)	2023 (billion \$)	2024 (billion \$)	Absolute change, 2022–24 (billion \$)
Mexico	-125.0	-149.3	-171.5	-46.5
Canada	-78.3	-63.6	-62.0	16.4
China	-382.3	-279.6	-295.5	86.8
Germany	-73.7	-82.5	-84.7	-10.9
Japan	-67.9	-71.4	-69.4	-1.5
South Korea	-43.3	-51.3	-66.0	-22.7
Taiwan	-47.8	-47.8	-73.7	-26.0
Vietnam	-116.1	-104.6	-123.5	-7.3
United Kingdom	12.9	10.9	11.4	-1.5
India	-38.7	-43.2	-45.8	-7.1
All Others	-206.9	-173.8	-224.1	-17.2

²⁰ This working paper focuses on merchandise trade and, therefore, trade balance data do not include trade in services. The direction and scale of U.S. trade balances differ from data that include trade in goods and services.

²¹ A negative trade balance is often referred to as a trade deficit; a positive trade balance is referred to as a trade surplus.

Trading partner	2022 (billion \$)	2023 (billion \$)	2024 (billion \$)	Absolute change, 2022–24 (billion \$)
Total	-1,167.1	-1,056.3	-1,204.7	-37.6

Source: USITC DataWeb/Census, accessed June 30, 2025.

Notes: Merchandise trade balance is calculated as total exports minus U.S. general imports. Calculations are based on unrounded data.

U.S. Trade Balance by Merchandise Sector

Of the six merchandise sectors highlighted in this working paper, only the energy-related products sector held a trade surplus during 2022–24 ([table 1.6](#)). Since 2019, the United States has exported more energy-related products than it has imported, with expanding domestic production of crude petroleum and petroleum products driving the move into a surplus.

For all other merchandise sectors, the United States held a consistent trade deficit through 2022–24, with the largest deficit in the transportation equipment sector. The most significant products within that sector are motor vehicles, which alone accounted for about two-thirds of the negative trade balance and more than 100.0 percent of the overall increase in the trade deficit from 2022 to 2024.²² The increase in motor vehicle imports was driven by increased demand in the United States for light motor vehicles, domestic sales of which rose by 2 million units during 2022–24.²³

Table 1.6: U.S. merchandise trade balance by industry or commodity sectors, 2022–24

In billions of dollars.

Sector	2022 (billion \$)	2023 (billion \$)	2024 (billion \$)	Absolute change, 2022–24 (billion \$)
Agricultural products	-17.7	-32.6	-46.7	-29.0
Chemicals and related products	-115.2	-102.7	-143.5	-28.3
Energy-related products	80.1	80.3	82.1	2.0
Forest products	-23.6	-13.1	-16.2	7.4
Machinery	-116.1	-115.0	-133.6	-17.5
Transportation equipment	-186.1	-218.1	-229.5	-43.4
All other sectors	-788.4	-655.3	-717.3	71.2
Total	-1,167.1	-1,056.3	-1,204.7	-37.6

Source: USITC DataWeb/Census, accessed June 30, 2025.

Notes: Merchandise trade balance is calculated as U.S. total exports minus U.S. general imports. Calculations based on unrounded data.

²² USITC DataWeb/Census, domestic exports and general imports, digests TE001–TE0015, accessed August 1, 2025.

²³ USITC DataWeb/Census, domestic exports and general imports, digests TE009, accessed August 1, 2025. Omdia, “U.S. Light Vehicle Sales, December 2024,” January 3, 2025; Omdia, “U.S. Light Vehicle Sales, December 2023,” January 3, 2024. Omdia, “North American Vehicle Production,” accessed August 1, 2025.

Bibliography

- Ball, Laurence, Daniel Leigh, and Prachi Mishra, “The Rise and Retreat of US Inflation: An Update.” CEPR, June 19, 2025. <https://cepr.org/voxeu/columns/rise-and-retreat-us-inflation-update>.
- Congressional Research Service (CRS). “The Economic Impact of Russia Sanctions.” Legislation, February 20, 2025. <https://www.congress.gov/crs-product/IF12092>.
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). “In 2024, the United States Produced More Energy than Ever before.” Accessed September 9, 2025. <https://www.eia.gov/todayinenergy/detail.php?id=65445>.
- Elshazly, Ahmed. “Suez Canal and Red Sea Disruption.” United Nations Conference on Trade and Development. Presentation at the Multi-Year Expert Meeting on Transport, Trade Logistics, and Trade Facilitation, Geneva, Switzerland, October 23–24, 2024. https://unctad.org/system/files/non-official-document/cimem7-2024-ppt05ahmedelshazly_en.pdf.
- Gordon, Matthew V., and Todd E. Clark. “The Impacts of Supply Chain Disruptions on Inflation.” *Economic Commentary* no. 2023–08 (May 10, 2023): 1–8. <https://doi.org/10.26509/frbc-ec-202308>.
- Siripurapu, Anshu. “What Happened to Supply Chains in 2021?” Council on Foreign Relations, Accessed September 9, 2025. <https://www.cfr.org/article/what-happened-supply-chains-2021>.
- Statistics Netherlands. “Netherlands Now More Dependent on US for Energy, Less on Russia,” Statistics Netherlands, July 3, 2025. <https://www.cbs.nl/en-gb/news/2025/27/netherlands-now-more-dependent-on-us-for-energy-less-on-russia>.
- United Nations Conference on Trade and Development (UNCTAD). “Import Diversification and Trade Diversion: Insights from United States of America-China Trade Patterns.” Working Paper No. 8. December 5, 2024. <https://www.un-library.org/content/papers/10.18356/30810906-8>.
- Omdia. “U.S. Light Vehicle Sales, December 2023.” January 3, 2024. <https://wardsintelligence.informa.com/wi967591/us-light-vehicle-sales-december-2023>.
- Omdia. “U.S. Light Vehicle Sales, December 2024.” January 3, 2025. <https://wardsintelligence.informa.com/wi968204/us-light-vehicle-sales-december-2024>.
- U.S. International Trade Commission Interactive Tariff and Trade DataWeb (USITC DataWeb)/U.S. Census Bureau (Census). Accessed various dates. <http://dataweb.usitc.gov>.

Chapter 2: Agricultural Products

Changes from 2024 to 2022

Between 2022 and 2024, U.S. general imports of agricultural products increased by \$10.8 billion (2.4 percent annually) to a total of \$233.0 billion.²⁴ Meanwhile, U.S. domestic exports decreased by \$19.5 billion (–5.1 percent annually) to \$178.1 billion.

Imports of Agricultural Products

Among the agricultural products that saw growth in import value during 2022–24, the cattle and beef digest experienced the largest increase ([table 2.1](#)).²⁵ The primary reason for its growth came from a tighter U.S. domestic supply of livestock as the industry prepared for an anticipated effort to rebuild the herd in 2025.²⁶ Livestock herds typically follow a “cattle cycle,” which is a period of growth in the national livestock herd—known as “herd rebuilding”—followed by a relative peak in cattle inventories and then a subsequent decline in herd size, all over the course of 8–12 years.²⁷ In 2024, the U.S. cattle herd was in the 11th year of its current cattle cycle, having experienced its sixth consecutive year of contraction in herd size.²⁸ Between January 2022 and January 2025, U.S. inventory of cattle and calves declined overall by 5.6 percent, while U.S. commercial slaughter of cows fell by 20.3 percent from 2022–24, in turn driving a greater demand for meat imports.²⁹ The majority of the increase in cattle and beef imports came from Australia, Canada, and Mexico, which saw increases of \$1.6 billion, \$750 million, and \$641 million in import value, respectively, during the period.³⁰

²⁴ Percentage changes included in trade data tables 2.1–2.5 are the average annual change during 2022–24 and not a simple percentage change in 2024 relative to 2022. The average annual change is presented in the form of compound annual growth rates (CAGRs) and is referred to as average change or average annual change in this working paper.

²⁵ The agricultural products sector consists of 50 product digests. Each USITC sector digest encompasses various 8-digit subheadings in the *Harmonized Tariff Schedule of the United States* (HTS). For a complete list of HTS subheadings classified in a particular sector or digest, see this [data table](#). Except where otherwise noted, the export data used in this section are for domestic exports. For more information on trade terminology, please refer to USITC, *Shifts in U.S. Merchandise Trade, 2014*, June 2015, “Special Topic: Trade Metrics.”

²⁶ “US Ranchers Begin Herd Rebuild,” August 8, 2025.

²⁷ Rutherford, “Restocking or Rebuilding: What’s the Difference?,” January 29, 2014; USDA, ERS, “Cattle & Beef,” May 22, 2025.

²⁸ USDA, ERS, *Livestock, Dairy, and Poultry Outlook*, February 18, 2025, 3.

²⁹ USDA, ERS, “Cattle & Beef,” May 22, 2025; USDA, NASS, “Quick Stats,” accessed August 10, 2025.

³⁰ USITC DataWeb/Census, digest AG002, accessed June 30, 2025.

Table 2.1 Agricultural products: changes in U.S. general imports by product group, 2022–24

In millions of dollars and percentages.

Product group (digest)	2022	2023	2024	Absolute change,	Average change,
	(million \$)	(million \$)	(million \$)	2022–24 (million \$)	2022–24 (%)
Cattle and beef	9,992	11,332	14,135	4,143	18.9
Pasta, cereals, and other bakery goods	12,583	13,663	15,100	2,516	9.5
Animal or vegetable fats and oils	14,082	15,163	16,592	2,509	8.5
Cocoa, chocolate, and confectionery	8,918	9,320	11,305	2,386	12.6
Fresh, chilled, or frozen vegetables	12,127	12,884	13,880	1,754	7.0
Shellfish	14,406	11,218	11,410	-2,995	-11.0
Fresh or frozen fish	12,449	11,227	11,015	-1,434	-5.9
Infant formulas, malt extracts, and other edible preparations	9,864	8,506	8,520	-1,344	-7.1
Distilled spirits	12,717	11,198	11,963	-755	-3.0
Wine and certain other fermented beverages	7,874	7,173	7,368	-506	-3.3
All other digests	107,238	103,948	111,728	4,489	2.1
Total	222,251	215,634	233,015	10,764	2.4

Source: USITC DataWeb/Census, digests AG001–050 accessed June 30, 2025.

Notes: Import values are based on U.S. customs value. Calculations are based on unrounded data. Average change is calculated using the compound annual growth rate formula. When a sector contains more than 10 digests, digest tables display the five largest positive value changes followed by the 5 largest negative changes over 2022–24. Full digest tables are available in Appendix A.

Notable increases in import value were also observed in the cocoa, chocolate, and confectionery digest and the pasta, cereals, and other bakery goods digest. In the former digest, the \$2.4 billion increase in value during 2022–24 was driven by a global acceleration in cocoa prices, which surged by an overall 311.9 percent during the two years.³¹ The rise in cocoa prices occurred primarily in 2023–24, as a global supply shortage followed a poor harvest in West Africa due to climate and crop disease pressures on cocoa farms; additionally, price speculation by investors in 2024 further pushed up cocoa prices.³² Meanwhile, the \$2.5 billion increase in imports of pasta, cereals, and other bakery goods reflected growing U.S. demand for processed products and elevated input costs for baked goods during 2022–24, particularly in refined sugar, chocolate, butter, and grain.³³ Once again, imports from Canada and Mexico were responsible for expansions in both digests, jointly contributing \$1.2 billion and \$1.5 billion to the

³¹ Further highlighting the impact that the surge in cocoa prices had on the digest, U.S. imports of products in the digest, by quantity, declined by an overall 12.7 percent between 2022 and 2024. St. Louis Fed, FRED database, Global price of cocoa, July 18, 2025.

³² Moreno, “Why Cocoa and Chocolate Prices Are Rising,” May 10, 2024.

³³ Berman and Nunes, “What Is Behind the Rise in Prices for Bakery Products?,” April 2025; CLAL, “Butter, US,” accessed August 10, 2025; St. Louis Fed, FRED database, Global price of cocoa, July 18, 2025; USDA, ERS, “U.S. Agricultural Trade at a Glance,” July 22, 2025.

increases in the cocoa, chocolate, and confectionery digest and the pasta, cereals, and other bakery goods digest, respectively.³⁴

The shellfish digest saw the largest drop in U.S. imports during 2022–24, losing \$3.0 billion in import value, principally a consequence of policy. After Russia’s invasion of Ukraine in 2022, the United States imposed sanctions prohibiting the entry of, among other things, seafood products harvested or produced in Russia or waters under Russian jurisdiction. U.S. shellfish imports from Russia completely ceased (–\$858 million during 2022–24), according to U.S. Customs and Border Protection, which reported zero U.S. imports of Russian shellfish in 2023–24.³⁵ Beyond this, lower global shrimp prices due to weaker demand in major markets caused reductions in U.S. import value of shellfish from Indonesia (–\$631 million) and India (–\$548 million), the latter being the biggest source of U.S. shellfish imports during 2022–24.³⁶

Import value in the infant formulas, malt extracts, and other edible preparations digest saw the second-largest decline in value; its imports fell by \$1.3 billion between 2022 and 2024. Nearly 100 percent of this reduction was caused by a decline in infant formula powder imports from Singapore.³⁷ During the U.S. infant formula shortage of 2022, Reckitt Benckiser, maker of the formula brand Enfamil, received temporary import approval from the U.S. government to produce and ship powder from its Singaporean facility to the United States for use in infant formula production.³⁸ This created an elevated baseline in 2022 for U.S. imports of infant formula because the United States was sourcing more powder from Singapore than typically observed, thereby setting up the digest for a massive reduction after the shipments ended in November 2022.³⁹

Source Countries

Mexico and Canada remained the leading sources of U.S. agricultural imports in 2024. Geographic proximity to the U.S. market and duty-free benefits under the United States-Mexico-Canada Agreement (USMCA) continued to encourage Mexican and Canadian agricultural exports.⁴⁰ Between 2022 and 2024, U.S. agricultural imports from its USMCA partners saw a combined growth of \$8.4 billion, and as of 2024, represented more than 40 percent of total U.S. agricultural imports ([table 2.2](#)).⁴¹ Other agricultural digests that grew in import value from Canada and Mexico during 2022–24 included fresh, chilled, or

³⁴ USITC DataWeb/Census, digest AG034, accessed June 30, 2025.

³⁵ Exec. Order No. 14068, “87 FR 14381 (March 15, 2025); Treasury, OFAC, “Determination Pursuant to Section 1(a)(i)(B) of Executive Order 14068,” December 22, 2023, 1; USITC DataWeb/Census, digest AG009, accessed June 30, 2025.

³⁶ FAO, “US Shrimp Imports Declined in 2023,” October 17, 2024; Peroni et al., “Shrimp Markets to See Uneven Recovery in Demand,” December 17, 2024; USITC DataWeb/Census, digest AG009, accessed June 30, 2025.

³⁷ USITC DataWeb/Census, digest AG009, accessed June 30, 2025.

³⁸ Naidu, “Enfamil Maker Reckitt Flies Baby Formula to U.S.,” July 13, 2022.

³⁹ Chaudhuri, “Enfamil Owner to Import Baby Formula to U.S.,” June 16, 2022.

⁴⁰ USTR, “Tariff Schedule of the United States – USMCA,” July 2020.

⁴¹ USITC DataWeb/Census, digests AG001–050, accessed June 30, 2025.

frozen vegetables (\$1.6 billion); malt beverages (\$860 million); prepared or preserved vegetables, mushrooms, and olives (\$684 million); and tropical fruit (\$609 million).⁴²

Table 2.2 Agricultural products: U.S. general imports by import source, 2022–24

In millions of dollars and percentages.

Import source	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Mexico	44,136	46,082	49,257	5,121	5.6
Canada	41,523	43,619	44,849	3,325	3.9
Italy	7,548	7,529	8,774	1,225	7.8
Brazil	6,175	6,124	8,016	1,840	13.9
China	6,623	6,218	7,245	622	4.6
France	8,227	6,681	6,841	-1,385	-8.8
Chile	6,816	6,406	6,340	-476	-3.6
India	6,077	5,388	5,745	-332	-2.8
Indonesia	6,976	5,586	5,548	-1,429	-10.8
Australia	4,368	4,467	5,478	1,110	12.0
All other sources	83,781	77,535	84,923	1,143	0.7
Total	222,251	215,634	233,015	10,764	2.4

Source: USITC DataWeb/Census, accessed June 30, 2025.

Notes: Import values are based on U.S. customs value. Calculations are based on unrounded data. Average change is calculated using the compound annual growth rate formula.

Import value from Indonesia and France fell by \$1.4 billion each, positioning them as the top sources of U.S. agricultural imports that saw the largest loss in import value between 2022 and 2024. A \$1.2 billion drop in imports of French distilled spirits was a key driver in the decline of U.S. imports from France.⁴³ Rising U.S. interest rates, along with higher levels of inflation that negatively impacted alcohol consumption, caused U.S. alcohol retailers and wholesalers in 2023 to focus on emptying their large inventories to reduce their working capital; this, in turn, put a noticeable pause in reordering.⁴⁴

Meanwhile, changes in U.S. imports from China between 2022 and 2024 point to other developments. Although agricultural imports from China as a whole increased by only \$622 million, imports of animal or vegetable fats and oils from China saw a much larger \$1.2 billion (366.1 percent annually) increase in value.⁴⁵ This growth in U.S. imports from China was driven by rising demand from biomass-based renewable energy producers in the United States as effects of the COVID-19 pandemic eased. U.S.

⁴² USITC DataWeb/Census, digests AG018, AG019, AG021, and AG040, accessed June 30, 2025.

⁴³ USITC DataWeb/Census, digest AG042, accessed June 30, 2025.

⁴⁴ Carruthers, “French Spirits Exports Drop 13% in 2023,” February 14, 2024; OIV, *State of the World Vine and Wine Sector in 2024*, April 2025, 12; St. Louis Fed, FRED database, “Merchant Wholesalers, Except Manufacturers’ Sales Branches and Offices: Nondurable Goods: Beer, Wine, and Distilled Alcoholic Beverages Inventories/Sales Ratio,” August 7, 2025; Brown, “Inventories, Market Poised for Return to Normal,” June 24, 2024.

⁴⁵ USITC DataWeb/Census, digests AG001–050, accessed June 30, 2025.

producers relied on imports of processed oil, particularly used cooking oil, to produce renewable diesel and help comply with U.S. federal and state policies on greenhouse gas emissions.⁴⁶

Exports of Agricultural Products

Among the U.S. agricultural products that saw an increase in export value during 2022–24, those in the swine and pork digest experienced the largest increase due to increased Mexican purchases from retail as well as hotel, restaurants, and institutions (e.g., hospitals and schools) (table 2.3). Swine and pork exports were driven by increased Mexican demand for U.S. fresh, chilled, and frozen pork, which supplied about half of the increase in U.S. swine and pork exports (i.e., \$517 million of the \$1.1 billion shift from 2022 to 2024).⁴⁷ Several Mexican government initiatives, such as Mexico’s increase in the minimum wage in 2023 and 2024, boosted the country’s consumer spending.⁴⁸ Mexican consumers purchased more imported pork, and at the same time U.S. pork became more price competitive with poultry in Mexico from 2022 to 2024. U.S. product remained competitive over pork sourced by Mexico from Brazil because the logistical strengths and proximity of U.S. exporters helped them provide fresh and chilled pork that met Mexican consumers’ preferences.⁴⁹ Mexico relies on imports for about half of its supply of pork; it sourced an average of roughly 85 percent of its pork imports from the United States from 2022 to 2024.⁵⁰

⁴⁶ Bukowski and Swearingen, “U.S. Imports of Animal Fats, Greases, and Processed Oils Surge,” August 21, 2024; Khan and Jao, “Renewable Diesel Glut Hits US Refiner Profits,” May 14, 2024; Khan and Aizhu, “US Imports of Chinese Used Cooking Oil Set for New Record,” August 28, 2024.

⁴⁷ Exports of fresh, chilled, and frozen pork (“pork”) [In Schedule B, heading 0203 is worded differently: “meat of swine (pork), fresh, chilled or frozen”] are classified under *Harmonized Commodity Description and Coding System* (HS)/Schedule B 4-digit heading 0203; this heading does not include offal and variety meats. However, the broader USITC digest AG003 includes offal and livers. USITC DataWeb/Census, HTS subheading 0203 and digest AG003, accessed June 30, 2025.

⁴⁸ *Brookings*, “Wages and Productivity in Mexico under USMCA,” accessed April 30, 2026.

⁴⁹ USDA, FAS, *Mexico: Livestock and Products Semi-Annual*, March 20, 2024, 1 and 18; USDA, FAS, *Mexico: Livestock and Products Annual*, September 5, 2024, 21–22.

⁵⁰ S&P Global, GTA database, “Mexico Imports from All Partners (HS 0203),” accessed August 29, 2025; USMEF, “Mexico’s Demand for U.S. Pork Continues to Grow,” May 20, 2025.

Table 2.3 Agricultural products: Changes in U.S. domestic export by product group, 2022–24

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Swine and pork	6,386	7,045	7,452	1,066	8.0
Edible nuts	9,706	9,712	10,758	1,052	5.3
Prepared or preserved vegetables, mushrooms, and olives	3,655	4,147	4,491	836	10.8
Ethyl alcohol for non-beverage purposes	3,588	3,794	4,319	732	9.7
Cocoa, chocolate, and confectionery	2,458	2,601	3,181	723	13.8
Oilseeds	34,597	28,056	24,802	-9,795	-15.3
Cereals	31,035	22,784	23,738	-7,297	-12.5
Cotton, not carded or combed	8,823	5,923	4,965	-3,858	-25.0
Animal or vegetable fats and oils	3,794	2,274	2,178	-1,615	-24.2
Dairy products	8,986	7,492	7,744	-1,242	-7.2
All other digests	84,634	82,302	84,518	-116	-0.1
Total	197,662	176,131	178,146	-19,516	-5.1

Source: USITC DataWeb/Census, accessed June 30, 2025.

Notes: Export values are based on free alongside ship value, U.S. port of export. Calculations are based on unrounded data. Average change is calculated using the compound annual growth rate formula. When a sector contains more than 10 digests, digest tables display the five largest positive value changes followed by the 5 largest negative changes over 2022–24. Full digest tables are available in Appendix A.

U.S. shipments of pistachios to China, India, and the European Union, among others, drove the increase in U.S. exports of edible nuts.⁵¹ The U.S. pistachio industry attributed increased demand for U.S. pistachios, in part, to U.S. marketing efforts that explained their health benefits.⁵² The United States, the world's largest pistachio supplier, readily met this demand, but faced competition in the global market from Iran. Although, U.S. pistachios are reportedly preferred by consumers in Beijing and Shanghai, smaller Chinese cities purchased price-competitive Iranian pistachios.⁵³ The European Union preferred U.S. pistachios, however, because the U.S. industry had addressed issues about aflatoxin mold, which is a food safety concern for the product.⁵⁴ Although Iran was competitive on price, the country faced aflatoxin issues amplified by the country's storage challenges.⁵⁵

Oilseeds, the agricultural products digest with the largest decrease in exports, was down by \$9.8 billion (-15.3 percent annually) during 2022–24 due to price competition in foreign markets. In particular, the drops in U.S. soybean exports to China (-\$5.3 billion, -16.0 percent annually) and Mexico (-\$1.3 billion,

⁵¹ Exports of pistachios in digest AG020 edible nuts and classified under HS/Schedule B 0802.51 and 0802.52. U.S. exports of pistachios increased by \$715 million from 2022 to 2024. USITC DataWeb/Census, HS subheadings 0802.51 and 0802.52, accessed June 30, 2025.

⁵² Fitchette, "Demand Rages Ahead of U.S. Pistachio Supply," April 9, 2025.

⁵³ USDA, FAS, *Tree Nuts: World Markets*, October 2024, 5 and 8.

⁵⁴ Fitchette, "Demand Rages Ahead of U.S. Pistachio Supply," April 9, 2025.

⁵⁵ Galestan, "EU Bans Iranian Pistachio Imports Over Aflatoxin," November 14, 2024.

–20.5 percent annually) were responsible for the digest’s downward shift.⁵⁶ China’s decline in demand for U.S. oilseeds was partially due to increased price competition from Brazil and Argentina. However, the growth in the U.S. domestic use of its soybeans for biofuel feedstock also played a role in this export shift.⁵⁷ Increased price competition with Brazil also affected the drop in U.S. soybean exports to Mexico, but the United States held on to some of that market share because U.S. exporters’ shorter trade distances and rail infrastructure somewhat reduced Brazil’s price advantage.⁵⁸

The cereals digest experienced the second-largest drop in U.S. exports from 2022 to 2024 (–\$7.3 billion, –12.5 percent annually). This shift was driven by Chinese policies that reduced U.S. exports of corn to China (–\$4.9 billion, –74.7 percent annually).⁵⁹ The decline in U.S. corn exports to China occurred after the Chinese government enacted policies to promote its own corn production, thereby reducing overall Chinese demand for imported corn. Furthermore, between 2022 and 2024, China shifted to Brazil and as its largest source of supply for corn.⁶⁰

Destination Markets

The United States increased agricultural exports to markets in North and South America. U.S. agricultural exports to Mexico, Canada, and Colombia grew by \$3.3 billion from 2022 to 2024 (table 2.4). U.S. exports to Mexico increased the most in the digests of sugar and sweetener, swine and pork, and prepared and preserved vegetables (the underlying reasons are discussed below in “Mexico Becomes the Largest Market for U.S. Agricultural Products”).⁶¹ Most U.S. exports digests to Canada that grew were retail-oriented products; for example, digests with large increases to Canada included cocoa, chocolate and confectionery, and infant formula.⁶² The surge in cocoa input prices also drove increases in the value of U.S. chocolate and confectionery exports.⁶³ From 2022 to 2024, Canada continued to rely on the United States as a source of infant formula (roughly 90 percent of Canadian imports). However, Canada established a Canadian domestic formula manufacturer at the end of the period, in 2024.⁶⁴ To Colombia,

⁵⁶ USITC DataWeb/Census, HTS subheading 1201.90, accessed June 30, 2025; USDA, FAS, *China: Oilseeds and Products Annual*, March 19, 2025, 9–10; USDA FAS, *Mexico: Oilseeds and Products Annual*, April 9, 2024.

⁵⁷ USDA, FAS, *China: Oilseeds and Products Annual*, March 19, 2025, 9–10 and 37; USDA, FAS, “U.S. Renewable Diesel Production Growth Impacts Feedstock Trade,” June 11, 2024.

⁵⁸ USDA, FAS, *Mexico: Oilseeds and Products Annual*, April 9, 2024, 6–7.

⁵⁹ The decline was offset slightly by increased U.S. corn exports to Mexico, Japan, Colombia, and South Korea. USITC DataWeb/Census, HS subheading 1005.90, accessed June 30, 2025; USDA, FAS, *China: Grain and Feed Annual*, April 3, 2025, 1 and 12.

⁶⁰ USDA, FAS, *China: Grain and Feed Annual*, April 3, 2025, 1 and 12.

⁶¹ Based on U.S. agricultural exports to Mexico by digest sorted by largest increase in absolute value from 2022 to 2024. USITC DataWeb/Census, U.S. exports to Mexico by digest (AG012, AG003, and AG019), accessed June 30, 2025.

⁶² Based on U.S. agricultural exports to Canada by digest sorted by largest increase in absolute value from 2022 to 2024. USITC DataWeb/Census, U.S. exports to Canada by digest (AG037, AG036, and AG002), accessed June 30, 2025; USDA, FAS, “Diverse Export Opportunities for Food & Beverage Trade,” February 16, 2024.

⁶³ St. Louis Fed, FRED database/IMF, Global price of cocoa, July 18, 2025.

⁶⁴ Government of Canada, “Infant Formula Situation in Canada,” August 27, 2024.

the U.S. increased its exports of cereals, ethanol, and swine and pork.⁶⁵ Colombia’s domestic livestock and poultry sectors both increased production, which drove demand for U.S. corn for use in feed.⁶⁶ In 2023, the United States also increased its duty-free, quota-free market access for corn, when U.S.-Colombia Trade Promotion Agreement tariff reductions were fully implemented.⁶⁷ U.S. exports of ethanol were competitively priced compared to Colombia’s local sources from 2022 to 2024.⁶⁸

Table 2.4 Agricultural products: U.S. domestic exports by export market, 2022–24

In millions of dollars and percentages.

Destination market	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Mexico	28,181	28,079	29,946	1,765	3.1
Canada	28,860	28,577	29,722	862	1.5
China	38,925	29,734	25,301	-13,624	-19.4
Japan	15,195	12,367	12,289	-2,907	-10.1
South Korea	9,888	7,892	8,782	-1,106	-5.8
Colombia	3,634	3,630	4,346	712	9.4
Taiwan	4,298	3,703	3,785	-512	-6.2
Vietnam	3,655	3,306	3,630	-25	-0.3
Philippines	4,021	3,596	3,463	-559	-7.2
Netherlands	3,234	3,254	3,244	11	0.2
All other markets	57,771	51,991	53,638	-4,132	-3.6
Total	197,662	176,131	178,146	-19,516	-5.1

Source: USITC DataWeb/Census, accessed June 30, 2025.

Notes: Export values are based on free alongside ship value, U.S. port of export. Calculations are based on unrounded data. Average change is calculated using the compound annual growth rate formula.

U.S. agricultural exports to Asian countries were down markedly during 2022–24. Collectively, China, Japan, and South Korea represented 90.4 percent of the overall \$19.5 billion decrease in U.S. agricultural exports. Between 2022 and 2024, as previously mentioned in “Export of Agricultural Products,” China’s demand for U.S. exports of oilseeds and cereals faced price competition with Brazil in the Chinese market and the Chinese government continued its supply diversification efforts.⁶⁹ U.S. oilseeds and cereals exports to Japan faced the headwind of a strong U.S. dollar that reduced the relative

⁶⁵ Based on U.S. agricultural exports to Colombia by digest sorted by largest increase in absolute value from 2022 to 2024. USITC DataWeb/Census, U.S. exports to Colombia by digest (AG030, AG050, and AG003) accessed June 30, 2025.

⁶⁶ USDA, FAS, *Colombia: Grain and Feed Update*, October 23, 2024, 1 and 15.

⁶⁷ The United States-Colombia Trade Promotion Agreement entered into force in 2012 and the TRQ and out of quota duty rates for yellow corn were phased out through 2022, resulting in duty-free, quota free access for yellow corn in 2023. USDA, FAS, *Colombia: Grain and Feed Update*, October 23, 2024, 1 and 15.

⁶⁸ USDA, FAS, *US Agricultural Exports to Colombia*, February 20, 2025, 3.

⁶⁹ USDA, FAS, *China: Oilseeds and Products Annual*, March 19, 2025, 9–10; USDA FAS, *China: Grain and Feed Annual*, April 3, 2025, 12.

competitiveness of U.S. export prices.⁷⁰ U.S. exports of beef led the decline in U.S. agricultural exports to South Korea, driven by an increasingly tight supply of U.S. beef from 2022 to 2024, for information on U.S. beef supply refer back to “Imports of Agricultural Products”.⁷¹ U.S. agricultural exports to other destinations in Asia, including Taiwan, Vietnam, and the Philippines, were down as well during the same period.

Analytical Narratives

Mexico Becomes the Largest Market for U.S. Agricultural Exports

In 2024, at a value of \$29.9 billion, Mexico became the largest destination market for U.S. agricultural exports.⁷² Mexico has several key advantages as a U.S. export market. For instance, Mexico features geographic proximity to the United States and supports substantial mutual foreign direct investment in each other’s agricultural and food industries.⁷³ During the period, the USMCA also provided duty-free market access in Mexico for several key U.S. agricultural goods, e.g., poultry (including turkey) and eggs, and reduced technical barriers to trade (e.g., wheat and wine).⁷⁴

Products That Saw Growth in U.S. Exports to Mexico

Between 2022 and 2024, the largest increases in U.S. agricultural exports to Mexico were in the digests of sugar and sweeteners, meat and poultry, and various prepared vegetables and processed foods. U.S. exports of sugar to Mexico saw the largest increases, having increased by 83.7 percent in value (35.5 percent annually) during the two-year period.⁷⁵ Mexican sugar production experienced low production levels over several years; thus, Mexican companies that process sugar into food and confectionery products imported more U.S. sugar.⁷⁶ The second-largest product digest increase was swine and pork, within this digest increases were led by U.S. exports of fresh, chilled, and frozen pork, as discussed in

⁷⁰ USITC DataWeb/Census, digests AG032–033, accessed June 30, 2025; Resnick, “Record U.S. Agricultural Trade Deficit,” June 20, 2024.

⁷¹ USITC DataWeb/Census, digest AG003, accessed June 30, 2025; USDA FAS, *South Korea: Livestock and Products Semi-Annual*, April 3, 2025, 5.

⁷² USITC DataWeb/Census, digests AG001–050, accessed June 30, 2025.

⁷³ USDA, ERS, “Mexico: Trade & FDI,” July 22, 2025.

⁷⁴ USDA, FAS, “USMCA,” accessed September 24, 2025; USTR, “Tariff Schedule of the United States – USMCA,” July 2020.

⁷⁵ USITC DataWeb/Census, digest AG012, accessed June 30, 2025.

⁷⁶ Since 2014, U.S. exports of sugar to Mexico have not qualified for the Industria Manufacturera, Maquiladora y de Servicios de Exportación Program (IMMEX), which provided tax benefits to the Mexican processors. However, in the past two years, the United States has increased beet and sugar production, and Mexico has faced record-low sugar production as a result of drought and reduced fertilizer use. This has led to increased U.S. exports despite the lack of IMMEX tax incentives. Abadam, “U.S. Sugar Exports to Mexico Rise,” February 29, 2024.

“Exports of Agricultural Products.” In the prepared or preserved vegetables digest, U.S. exports of frozen potatoes rose as Mexican consumption of fresh and frozen potatoes increased each year between 2022 and 2024; at this time Mexican consumer purchasing power also increased, leading to more purchases of processed foods, as discussed in “Demand from Mexico’s Consumers was Strong, as was the Peso.”⁷⁷ The United States supplied about 52 percent of Mexico’s frozen potato imports in marketing year 2024/25.⁷⁸

Examining the largest U.S. agricultural exports to Mexico by value—not only the largest gains in value—further underscores the strength of Mexican import demand for U.S. agricultural goods during the two-year period. Not all these digests recorded the largest absolute gains in value, but each experienced notable growth. Historically, U.S. exports to Mexico have been dominated by products that help meet Mexico’s internal demand for basic foodstuffs. These include cereals, dairy products, oilseeds, meat, animal feed, and sugar, which together accounted for more than two-thirds of U.S. agricultural exports to Mexico in 2024 ([table 2.5](#)). Between 2022 and 2024, robust Mexican consumer demand for staple foods was not fully satisfied by domestic production. Drought constrained Mexico’s domestic supply of grain and animal feed, prompting modest increases in U.S. exports of cereals and animal feed to support the country’s expanding livestock sector.⁷⁹ Oilseeds were the only exception to this trend, having experienced a \$1.3 billion decline (19.4 percent annually) during the two-year period because of a drop in global soybean prices from 2022 to 2024.⁸⁰

Table 2.5 Agricultural products: Changes in U.S. domestic exports to Mexico by selected product groups, 2022–24

In millions of dollars and percentages. Product groups were selected based on their U.S. export value in 2024 (greater than \$1.0 billion).

Product group (digest)	2022	2023	2024	Absolute change,	Average change,
	(million \$)	(million \$)	(million \$)	2022–24 (million \$)	2022–24 (%)
Cereals	6,880	6,772	7,071	191	1.4
Dairy products	2,418	2,300	2,446	28	0.6
Oilseeds	3,662	2,835	2,379	-1,284	-19.4
Swine and pork	1,854	2,150	2,371	517	13.1
Animal feeds	2,100	2,058	2,116	16	0.4
Poultry	1,116	1,113	1,319	203	8.7
Cattle and beef	986	1,116	1,262	276	13.1
Sugar and other sweeteners	652	893	1,198	546	35.5
All other digests	8,512	8,842	9,785	1,273	7.2
Total	28,181	28,079	29,946	1,765	3.1

Source: USITC DataWeb/Census, accessed June 30, 2025.

⁷⁷ USITC DataWeb/Census, Schedule B subheadings 2004.10.40 and 2004.10.80, accessed June 30, 2025.

⁷⁸ USDA, FAS, *Mexico’s Potato Market*, June 18, 2025, 5–8.

⁷⁹ USDA, FAS, *Mexico: Grain and Feed Update*, January 23, 2025, 3 and 8.

⁸⁰ USDA, FAS, *Mexico: Oilseeds and Products Annual*, April 9, 2024, 7; St. Louis Fed, FRED database/IMF, Global price of soybeans, July 18, 2025.

Notes: Export values are based on free alongside ship value, U.S. port of export. Calculations are based on unrounded data. Average change is calculated using the compound annual growth rate formula.

Demand from Mexico’s Consumers Was Strong, as Was the Peso

U.S. agricultural exports to Mexico increased in both value and share of total U.S. agricultural exports over 2022–24, with the increase in the latter underlining Mexico’s growing importance as an export destination for the U.S. agricultural sector.⁸¹ Strong macroeconomic development in Mexico from 2022 to 2024—as highlighted by the 2.2 percent annual growth in real gross domestic product (GDP)—drove Mexican purchasing power, consumer confidence, and therefore demand.⁸² This is further emphasized by the rise in the Mexican Consumer Confidence Index, which improved by 17.4 percent between August 2022 and December 2024.⁸³ This encouraged growth in Mexican purchases of U.S. products, particularly for prepared and processed foodstuffs (e.g., frozen potatoes as discussed above), which are also considered value-added.⁸⁴

Mexican importers and consumers of U.S. agricultural products also benefited from the “super peso,” a period from about 2022 to 2024 that saw the appreciation of the Mexican peso against the U.S. dollar due to higher interest rates offered by the central bank of Mexico ([figure 2.1](#)).⁸⁵ As a result, import demand among Mexican buyers increased during the period because the purchase of U.S. agricultural goods required fewer pesos, all else equal. Although this effect helps explain the observed increase in

⁸¹ Between 2022 and 2024, the value of U.S. agricultural exports to Mexico increased by 1.8 billion (3.1 percent annual) and Mexico’s share of U.S. agricultural exports increased by 2.6 percentage points. USITC DataWeb/Census, digests AG001–050, accessed June 30, 2025.

⁸² Real GDP for Mexico is measured in the domestic currency at constant prices, using a baseline year of 2018. Annual real GDP growth is calculated using the compound annual growth rate formula. IMF, “National Economic Accounts (NEA), Annual Data,” accessed August 10, 2025.

⁸³ The Mexican Consumer Confidence Index is a calculated series that measures the current and expected economic situation among interviewed households in Mexico. Index values are seasonally adjusted and based on the results of the National Consumer Confidence Survey, which is prepared jointly by the National Institute of Statistics and Geography (INEGI) and the Bank of Mexico. INEGI, “Consumer Confidence,” August 4, 2025.

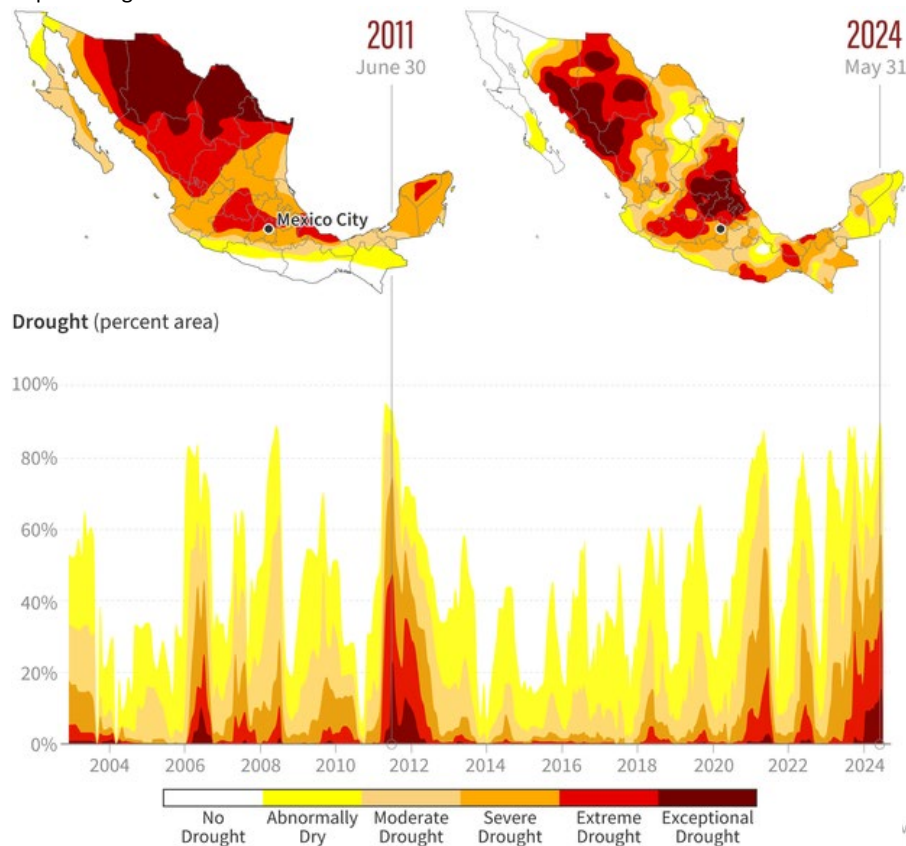
⁸⁴ According to the USDA, value-added products refer to an agricultural commodity or product that has changed physically or was produced, marketed or segregated in a manner that enhances its value or expands its customer base. “Mexican Consumption Shifts Toward Ultra-Processed Products,” November 11, 2024; AgMRC, “Value Added Agriculture,” accessed December 12, 2025.

⁸⁵ The Mexican peso appreciated by an overall 22.3 percent against the U.S. dollar between January 2022 and March 2024, when it reached its highest monthly value since 2015. During the same period, the Chinese renminbi depreciated by 11.7 percent. All else equal, these shifts in exchange rates from 2022 to 2024 in Mexico promoted higher import demand for U.S. goods and lower Chinese demand for U.S. goods simultaneously, since U.S. goods became cheaper for Mexican importers and more expensive for Chinese importers. All currency values are monthly spot exchange rates, not seasonally adjusted. For information on how increases in U.S. exports to Mexico compared to decreases in U.S. exports to China between 2022 and 2024, see box 2.1. St. Louis Fed, FRED database/Federal Reserve Board, Mexican pesos to U.S. dollar spot exchange rate,” August 4, 2025; St. Louis Fed, FRED database/Federal Reserve Board, “Chinese Yuan Renminbi to U.S. Dollar Spot Exchange Rate,” August 4, 2025; Cañas et al., “Mexican Peso Strength Noteworthy,” September 26, 2023.

Mexico—namely Baja California, Chihuahua, Coahuila, Durango, Sinaloa, and Sonora—although states farther south, including Jalisco, Michoacán, San Luis Potosí and Zacatecas, were also affected during the dry season of 2023–24.⁸⁹ The drought upset domestic production and increased market prices of various cereals and grains (e.g., corn, wheat, and sorghum), fruits and vegetables (e.g., tomatoes), and livestock in major producing regions. In turn, the drought drove Mexico to import agricultural products to meet demand, as observed with the increase U.S. exports to Mexico of cattle and beef from 2022 to 2024, for instance.⁹⁰

Figure 2.2 Mexico’s geographic area experiencing drought and dry conditions, 2004–24

In percentage of total area.



Sources: Thiem, “Multi-Year Drought and Heat Waves across Mexico,” July 22, 2024; NADM, NDMC, “North American Drought Monitor, Maps, Mexico,” July 15, 2025.

Note: Underlying data are from the North American Drought Monitor and Mexico’s National Meteorological Service.

⁸⁹ NADM, NDMC, “North American Drought Monitor, Maps, Mexico,” July 15, 2025.

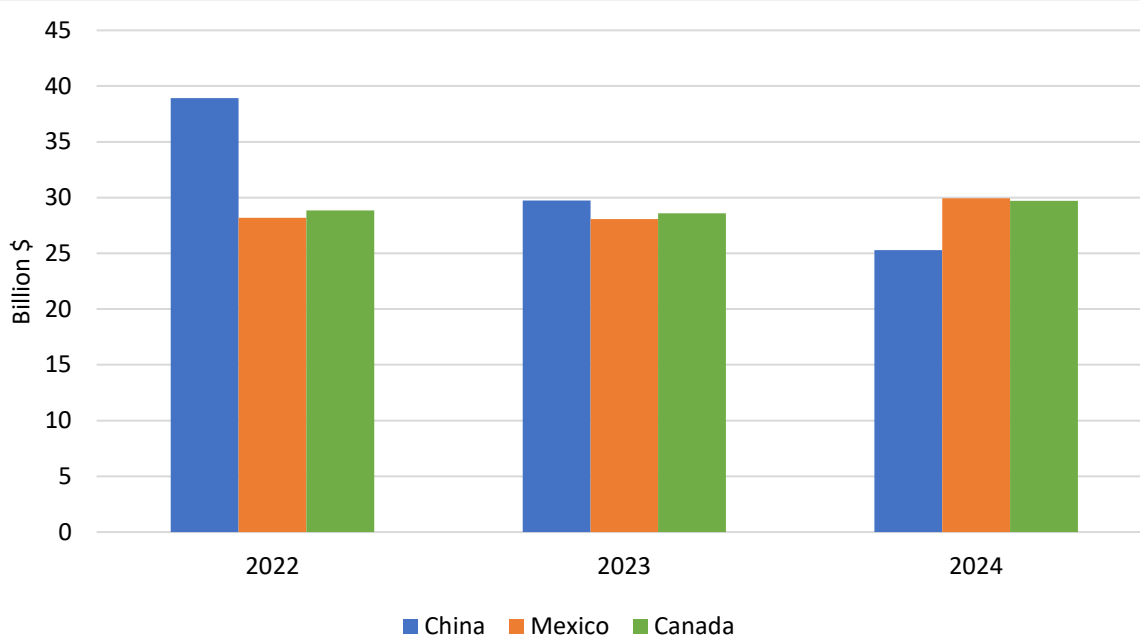
⁹⁰ USDA, FAS, *Mexico: Grain and Feed Update*, January 23, 2025, 2; USDA, FAS, *Mexico: Tomatoes and Products Annual*, June 4, 2024, 2; USDA, FAS, *Mexico: Livestock and Products Annual*, September 5, 2024, 5–7.

Box 1.1 U.S. Agricultural Exports to China Fell from 2022 to 2024

Between 2022 and 2024, U.S. agricultural exports overall dropped by \$19.5 billion. Although U.S. agricultural exports to Mexico expanded, that expansion was concurrent with a decline in U.S. agricultural exports to China. Since 2020, China had been the United States’ largest agricultural export market.^a During 2022–24, much of the drop in overall exports resulted from a \$13.6 billion decline in U.S. agricultural exports to China (figure 2.3). At the same time, U.S. exports to Mexico (and Canada) expanded by \$2.6 billion, a small expansion in comparison to the decline to China.

Figure 2.3 U.S. agricultural exports to China, Mexico, and Canada, 2022–24

In billions of dollars.



Source: USITC DataWeb/Census, accessed June 30, 2025.

Notes: Export values are based on free alongside ship value, U.S. port of export. Calculations are based on unrounded data.

Several factors point to the decline in Chinese agricultural imports from the United States. Most notably, China’s swine industry had recovered from an African Swine Fever (ASF) outbreak it experienced during 2018–22, after which the country reduced its need for global agricultural exports to support swine herd recovery (e.g. soybeans).^b Meanwhile, growth in Chinese domestic agricultural production during 2022–24 also helped drive down U.S. exports to the market. Chinese grain and oilseed crop production was boosted by government-sponsored large-scale yield improvement programs.^c Intensifying competition from other foreign suppliers, such as Brazilian soybean exporters, further displaced U.S. goods.^d

^a USITC DataWeb/Census, digests AG001–050, accessed June 30, 2025.

^b In 2020 and 2021, overlapping with the ASF outbreak, China agreed to soybean purchase commitments under the *Economic and Trade Agreement between the Government of the United States of America and the Government of the People’s Republic of China* (Phase One Agreement). By 2023, however, the purchase commitments had passed (ended 2021) and the ASF outbreak had resolved (largely ended by

2022). Phase One Agreement (January 15, 2020); Gale, Kee, and Huang, *China's African Swine Fever Outbreaks*, November 2023, 4–5; USDA FAS, *2021 U.S. Soybean Outlook Remains Strong*, June 2021, 1 and 4.

^c USDA, FAS, *China: Grain and Feed Annual*, April 3, 2025, 1, 6–7; USDA FAS, “Top Ag Policy Document Outlines Key Agricultural and Rural Development Priorities,” February 22, 2023; USITC DataWeb/Census, digest AG030, accessed June 30, 2025.

^d USDA, FAS, *China: Oilseeds and Products Annual*, March 19, 2025, 10.

Bibliography

- “Mexican Food Consumption Shifts Toward Ultra-Processed Products.” Mexico Business News, November 11, 2024. <https://mexicobusiness.news/agribusiness/news/mexicans-food-spending-shifts-toward-processed-foods>.
- “US Ranchers Begin Herd Rebuild as Beef Prices Soar.” The Cattle Site, August 8, 2025. <https://www.thecattlesite.com/news/us-ranchers-begin-herd-rebuild-as-beef-prices-soar>.
- Abadam, Vidalina. “U.S. Sugar Exports to Mexico Rise to Levels Seen During Nafta Years.” Economic Research Service, February 29, 2024. <https://www.ers.usda.gov/data-products/charts-of-note/chart-detail?chartId=108643>.
- AgAmerica. “Understanding Ag Trade-Weighted Foreign Exchange Rates.” October 29, 2021. <https://agamerica.com/blog/ag-trade-weighted-foreign-exchange-rate/>.
- Agricultural Marketing Resource Center (AgMRC). “Value Added Agriculture.” Accessed December 12, 2025. <https://www.agmrc.org/staging.premier.siteviz.com/value-added-agriculture>.
- Berman, Sarah, and Joe Nunes. “What Is behind the Rise in Prices for Bakery Products?” U.S. Department of Labor. U.S. Bureau of Labor Statistics. April 2025. <https://www.bls.gov/opub/btn/volume-14/bakery-products-btn.htm>.
- Board of Governors of the Federal Reserve System via FRED, “Chinese Yuan Renminbi to U.S. Dollar Spot Exchange Rate,” August 4, 2025. <https://fred.stlouisfed.org/series/EXCHUS>.
- Board of Governors of the Federal Reserve System via FRED, “Mexican Pesos to U.S. Dollar Spot Exchange Rate,” August 4, 2025. <https://fred.stlouisfed.org/series/EXMXUS>.
- Brookings. “Wages and Productivity in Mexico under USMCA.” Accessed April 30, 2026. <https://www.brookings.edu/articles/wages-and-productivity-in-mexico-under-usmca/>.
- Brown, Sarah. “Inventories, Market Poised for Return to Normal.” Wine Business, June 24, 2024. <https://www.winebusiness.com/news/article/289069>.
- Bukowski, Maria, and Bryn Swearingen. “U.S. Imports of Animal Fats, Greases, and Processed Oils Surge to Meet Demand from Biomass-Based Diesel Production.” U.S. Department of Agriculture. Economic Research Service. August 21, 2024. <https://www.ers.usda.gov/data-products/charts-of-note/chart-detail?chartId=109758>.
- Cañas, Jesus, Pon Sagnanert, and Luis Torres. “Mexican Peso Strength Noteworthy among Emerging Markets during Fed Tightening.” Federal Reserve Bank of Dallas, September 26, 2023. <https://www.dallasfed.org/research/economics/2023/0926>.
- Carruthers, Nicola. “French Spirits Exports Drop 13% in 2023.” *The Spirits Business*, February 14, 2024. <https://www.thespiritsbusiness.com/2024/02/french-spirits-exports-drop-13-in-2023/>.

- Centro Latte Alimentare Lendinara (CLAL). “Butter, US.” Accessed August 10, 2025. https://www.clal.it/en/?section=burro_usa.
- Chaudhuri, Saabira. “Enfamil Owner to Import Baby Formula to U.S. to Help Alleviate Shortages.” *The Wall Street Journal*, June 16, 2022. <https://www.wsj.com/business/enfamil-owner-to-import-baby-formula-to-the-u-s-to-help-alleviate-shortages-11655378948>.
- Peroni, Felipe, Karan Dadure, Elvis John, and Ignacio Garcia. “COMMODITIES 2025: Shrimp Markets to See Uneven Recovery in Demand.” S&P Global Commodity Insights, December 17, 2024. <https://www.spglobal.com/commodity-insights/en/news-research/latest-news/agriculture/121724-commodities-2025-shrimp-markets-to-see-uneven-recovery-in-demand>.
- Executive Office of the President (EOP). “Prohibiting Certain Imports, Exports, and New Investment with Respect to Continued Russian Federation Aggression.” 87 *Fed. Reg.* 14381, March 11, 2025. <https://www.federalregister.gov/documents/2022/03/15/2022-05554/prohibiting-certain-imports-exports-and-new-investment-with-respect-to-continued-russian-federation>.
- Federal Reserve Bank of St. Louis (St. Louis Fed). Federal Reserve Economic Data (FRED) database/International Monetary Fund (IMF). Global price of cocoa. July 18, 2025. <https://fred.stlouisfed.org/series/PCOCOUSD>.
- Federal Reserve Bank of St. Louis (St. Louis Fed). Federal Reserve Economic Data (FRED) database/International Monetary Fund (IMF). Global price of soybeans. July 18, 2025. <https://fred.stlouisfed.org/series/PSOYBUSDQ>.
- Federal Reserve Bank of St. Louis (St. Louis Fed). Federal Reserve Economic Data (FRED) database. “Merchant Wholesalers, Except Manufacturers’ Sales Branches and Offices: Nondurable Goods: Beer, Wine, and Distilled Alcoholic Beverages Inventories/Sales Ratio.” August 7, 2025. <https://fred.stlouisfed.org/series/R4248IM163SCEN>.
- Fitchette, Todd. “Demand Rages Ahead of U.S. Pistachio Supply.” *Farm Progress*, April 9, 2025. <https://www.farmprogress.com/tree-nuts/demand-rages-ahead-of-u-s-pistachio-supply>.
- Food and Agriculture Organization (FAO) of the United Nations. “US Shrimp Imports Declined in 2023.” FAO Globefish, October 17, 2024. <https://www.fao.org/in-action/globefish/news-events/news/news-detail/us-shrimp-imports-declined-in-2023/en>.
- Gale, Fred, Jennifer Kee, and Joshua Huang. How China’s African Swine Fever Outbreaks Affected Global Pork Markets. Washington, D.C: U.S. Department of Agriculture, Economic Research Service, November 2023. <https://doi.org/10.32747/2023.8134360.ers>.
- Galestan, Mansoureh. “Iran News: EU Bans Iranian Pistachio Imports Over Aflatoxin Contamination, State Officials Report.” National Council of Resistance of Iran (NCRI). November 14, 2024. <https://www.ncr-iran.org/en/news/economy/iran-news-eu-bans-iranian-pistachio-imports-over-aflatoxin-contamination-threatening-major-export-market/>.
- Government of Canada. “Question Period Note: Infant Formula Situation in Canada.” August 27, 2024. <https://search.open.canada.ca/qpnotes/record/aafc-aac%2CAAFC-2025-QP-00035>.

Behind the Trade: An Inside Look at U.S. Industry Trends

International Monetary Fund (IMF). “National Economic Accounts (NEA), Annual Data.” Accessed August 10, 2025. <https://data.imf.org/en/datasets/IMF.STA:ANEA>.

International Organization of Vine and Wine (OIV). *State of the World Vine and Wine Sector in 2024*. April 2025. https://www.oiv.int/sites/default/files/2025-04/OIV-State_of_the_World_Vine-and-Wine-Sector-in-2024.pdf.

Iran Pistachio Association. “Iran Pistachio Association.” September 21, 2013. <https://iranpistachio.org/en/about-us/projects/121-ipa>.

Khan, Shariq, and Chen Aizhu. “US Imports of Chinese Used Cooking Oil Set for New Record, Future Uncertain.” Reuters, August 28, 2024. <https://www.reuters.com/markets/commodities/us-imports-chinese-used-cooking-oil-set-new-record-future-uncertain-2024-08-28/>.

Khan, Shariq, and Nicole Jao. “Renewable Diesel Glut Hits US Refiner Profits, Threatens Nascent Industry.” Reuters, May 14, 2024. <https://www.reuters.com/markets/commodities/renewable-diesel-glut-hits-us-refiner-profits-threatens-nascent-industry-2024-05-13/>.

Mexico Business News. “Mexican Food Consumption Shifts Toward Ultra-Processed Products.” November 11, 2024. <https://mexicobusiness.news/agribusiness/news/mexicans-food-spending-shifts-toward-processed-foods>.

Moreno, J. Edward. “Why Cocoa and Chocolate Prices Are Rising.” *The New York Times*, May 10, 2024. <https://www.nytimes.com/2024/05/10/business/cocoa-prices-chocolate.html>.

Naidu, Richa. “Enfamil Maker Reckitt Flies Baby Formula to U.S. from Singapore.” Reuters, July 13, 2022. <https://www.reuters.com/business/healthcare-pharmaceuticals/enfamil-maker-reckitt-flies-baby-formula-us-singapore-2022-07-13/>.

North American Drought Monitor (NADM). National Drought Mitigation Center (NDMC). “North American Drought Monitor, Maps, Mexico.”, July 15, 2025. <https://droughtmonitor.unl.edu/NADM/Maps.aspx>.

North American Drought Monitor (NADM). National Drought Mitigation Center (NDMC). “North American Drought Monitor, Statistics, Mexico.”, July 15, 2025. <https://droughtmonitor.unl.edu/NADM/Statistics.aspx>.

National Institute of Statistics and Geography (INEGI). “Consumer Confidence.” August 4, 2025. <https://en.www.inegi.org.mx/temas/confianza/>.

Office of the United States Trade Representative. “Tariff Schedule of the United States – USMCA,” July 2020, <https://ustr.gov/trade-agreements/free-trade-agreements/united-states-mexico-canada-agreement/agreement-between>.

Resnick, Betty. “Record U.S. Agricultural Trade Deficit Forecasted to Keep Growing.” American Farm Bureau Federation, June 20, 2024. <https://www.fb.org/market-intel/record-u-s-agricultural-trade-deficit-forecasted-to-keep-growing>.

- Rutherford, Burt. “Restocking or Rebuilding: What’s the Difference?” *Beef Magazine*, January 29, 2014. <https://www.beefmagazine.com/livestock-management/restocking-or-rebuilding-what-s-the-difference->.
- Thiem, Haley. “Multi-Year Drought and Heat Waves across Mexico in 2024.” National Oceanic and Atmospheric Administration. *Climate.gov*, July 22, 2024. <https://www.climate.gov/news-features/event-tracker/multi-year-drought-and-heat-waves-across-mexico-2024>.
- U.S. Department of Agriculture (USDA). Economic Research Service (ERS). *Livestock, Dairy, and Poultry Outlook: February 2025*. Situation and Outlook Report No. LDP-M-368. February 18, 2025. <https://ers.usda.gov/sites/default/files/laserfiche/outlooks/110972/LDP-M-368.pdf?v=98786>.
- U.S. Department of Agriculture (USDA). Economic Research Service (ERS). “Cattle & Beef—Sector at a Glance.” May 22, 2025. <https://www.ers.usda.gov/topics/animal-products/cattle-beef/sector-at-a-glance>.
- U.S. Department of Agriculture (USDA). Economic Research Service (ERS). “U.S. Agricultural Trade—U.S. Agricultural Trade at a Glance.” July 22, 2025. <https://www.ers.usda.gov/topics/international-markets-us-trade/us-agricultural-trade/us-agricultural-trade-at-a-glance>.
- U.S. Department of Agriculture (USDA). Economic Research Service (ERS). “USMCA, Canada, & Mexico—Mexico: Trade & FDI.” July 22, 2025. <https://www.ers.usda.gov/topics/international-markets-us-trade/countries-regions/usmca-canada-mexico/mexico-trade-fdi>.
- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). *2021 U.S. Soybean Outlook Remains Strong After Record First Quarter Export Volume: International Agricultural Trade Report*, June 2021. <https://www.fas.usda.gov/sites/default/files/2021-07/SosybeanIATR-Final.pdf>
- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). *Diverse Export Opportunities for Food & Beverage Trade with Canada*. International Agricultural Trade Report. February 16, 2024. <https://www.fas.usda.gov/data/diverse-export-opportunities-food-beverage-trade-canada>.
- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). *Livestock and Products Semi-Annual: Mexico*. Report No. MX2024-0009. March 20, 2024. https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Livestock%20and%20Products%20Semi-annual_Mexico%20City_Mexico_MX2024-0009.pdf.
- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). *Oilseeds and Products Annual: Mexico*. Report No. MX2024-0019. April 9, 2024. https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Oilseeds+and+Products+Annual_Mexico+City_Mexico_MX2024-0019.pdf.
- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). *Mexico: Tomatoes and Products Annual: Tomatoes*. Report No. MX2024-0028. June 4, 2024. https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Tomatoes%20and%20Products%20Annual_Guadalajara_Mexico_MX2024-0028.

- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). *U.S. Renewable Diesel Production Growth Drastically Impacts Global Feedstock Trade*. International Agricultural Trade Report, by Timothy O’Neil, June 11, 2024. <https://www.fas.usda.gov/data/us-renewable-diesel-production-growth-drastically-impacts-global-feedstock-trade>.
- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). *Mexico: Livestock and Products Annual*. Report No. MX2024-0039. September 5, 2024. <https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Livestock%20and%20Products%20Annual%20Mexico%20City%20Mexico%20MX2024-0039.pdf>.
- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). *Tree Nuts: World Markets and Trade*. October 2024. <https://www.fas.usda.gov/sites/default/files/2024-11/TreeNuts.pdf>.
- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). *Mexico: Retail Foods Annual*. Report No. MX2024-0050. October 11, 2024. <https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Retail%20Foods%20Annual%20Mexico%20City%20ATO%20Mexico%20MX2024-0050.pdf>.
- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). *Colombia: Grain and Feed Update: Colombia*. Report No. CO2024-0019. October 23, 2024. <https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Grain%20and%20Feed%20Update%20Bogota%20Colombia%20CO2024-0019.pdf>.
- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). *Mexico: Grain and Feed Update*. Report No. MX2025-0003. January 23, 2025. <https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Grain%20and%20Feed%20Update%20Mexico%20City%20Mexico%20MX2025-0003>.
- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). *US Agricultural Exports to Colombia Reached Record High in 2024*. Global Agricultural Information Network Report No. CO2025-0004. February 20, 2025. <https://www.fas.usda.gov/data/colombia-us-agricultural-exports-colombia-reached-record-high-2024>.
- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). *China: Oilseeds and Products Annual*. Report No. CH2025-0055. March 19, 2025. <https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Oilseeds%20and%20Products%20Annual%20Beijing%20China%20-%20People%27s%20Republic%20of%20China%20CH2025-0055.pdf>.
- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). *China: Grain and Feed Annual (2025)*. Report No. CH2025-0064. April 3, 2025. <https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Grain%20and%20Feed%20Annual%20Beijing%20China%20-%20People%27s%20Republic%20of%20China%20CH2025-0064.pdf>.

- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). *South Korea: Livestock and Products Semi-Annual*. Report No. KS2025-0013. April 3, 2025. https://kr.usembassy.gov/wp-content/uploads/sites/67/2025/04/Livestock-and-Products-Semi-annual_Seoul_Korea-Republic-of_KS2025-0013.pdf.
- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). *Mexico's Potato Market*. Report No. MX2025-0027. June 18, 2025. https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Mexico%27s%20Potato%20Market_Mexico%20City_Mexico_MX2025-0027.pdf.
- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). "U.S.-Mexico-Canada Agreement (USMCA)." Accessed September 24, 2025. <https://www.fas.usda.gov/topics/us-mexico-canada-agreement-usmca>.
- U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). . *Mexico: Livestock and Products Annual*. Report No. MX2024-0039. September 5, 2024. https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Livestock%20and%20Products%20Annual_Mexico%20City_Mexico_MX2024-0039.
- U.S. Department of Agriculture (USDA). National Agricultural Statistics Service (NASS). "Quick Stats." Accessed August 10, 2025. <https://quickstats.nass.usda.gov/>.
- U.S. Department of the Treasury (Treasury). Office of Foreign Assets Control (OFAC). "Determination Pursuant to Section 1(a)(i)(B) of Executive Order 14068." December 22, 2023. <https://ofac.treasury.gov/media/932451/download?inline>.
- U.S. International Trade Commission Interactive Tariff and Trade DataWeb (USITC DataWeb)/U.S. Census Bureau (Census). Accessed various dates. <http://dataweb.usitc.gov>.
- U.S. Meat Export Federation (USMEF). "Mexico's Demand for U.S. Pork Continues to Grow." *National Hog Farmer*, May 20, 2025. <https://www.nationalhogfarmer.com/market-news/mexico-s-demand-for-u-s-pork-continues-to-grow>.

Chapter 3: Chemicals and Related Products

Introduction

The chemicals and related products sector plays a crucial role in the U.S. economy: roughly 96 percent of U.S. goods are made with products from this sector.⁹¹ These products range from agricultural fertilizers used for crop health to popular weight loss drugs.⁹² During 2022–24, U.S. imports and exports of chemicals and related products were on divergent paths, leading to a 23.9 percent increase in the U.S. trade deficit in this sector during this time period.⁹³

Imports of Chemicals and Related Products

U.S. imports of chemicals and related products increased from \$441.4 billion in 2022 to \$466.5 billion in 2024, with an average annual change of 2.8 percent.⁹⁴ Among the digests contained in the chemicals and related products sector, the top five increases in imports in 2022–24, by value, were in the following digests ([table 3.1](#)): medicinal chemicals; perfumes, cosmetics, and toiletries; soaps, detergents, and surface-active agents; organic commodity chemicals; and primary aromatics. Medicinal chemicals exhibited the largest increase, from \$197.3 billion in 2022 to \$250.8 billion in 2024, with an average annual change of 12.8 percent.⁹⁵

Within the medicinal chemicals digest, imports of certain polypeptide hormones, protein hormones, and glycoprotein hormones saw a tremendous increase in value, from \$5.3 billion in 2022 to \$16.4 billion in 2024, with an average annual change of 76.0 percent.⁹⁶ This high average annual change can be largely attributed to the rise in the imports of semaglutide drug products in bulk form towards the end of 2024. Increased demand for semaglutide drug products, which include popular brand-name anti-diabetic and

⁹¹ CISA, “Chemical Sector Profile,” March 2022.

⁹² The USITC separates the chemicals and related products sector into 36 digests. For a complete list of HTS subheadings classified in a particular sector or digest, see this data [table](#).

⁹³ USITC DataWeb/Census, digests CH001–036, accessed August 1, 2025.

⁹⁴ Percentage changes included in trade data tables 3.1–3.4 are the average annual change during 2022–24 and not a simple percentage change in 2024 relative to 2022. The average annual change is presented in the form of compound annual growth rates (CAGRs) and is referred to as average change or average annual change in this working paper. USITC DataWeb/Census, digests CH001–036, accessed August 1, 2025.

⁹⁵ Within the medicinal chemicals digest, in addition to certain polypeptide hormones (HTS subheading 2937.19.00), other HTS subheadings that contributed to this large increase are immunological products (HTS subheadings 3002.15.00 and 3002.14.00) and medicaments not elsewhere specified or included (HTS subheadings 3004.90.92). USITC DataWeb/Census, HTS subheading 3002.15.00, 3002.14.00, and 3004.90.92, accessed July 31, 2025.

⁹⁶ USITC DataWeb/Census, HTS subheading 2937.19.00, accessed July 31, 2025.

weight loss medications such as Ozempic and Wegovy, coincides with the high U.S. obesity rate (41.9 percent of Americans age 20 years and older during 2017–20).⁹⁷ According to a 2024 industry report, global obesity spending (which includes spending on semaglutide and other weight loss medications such as Wegovy and Zepbound) totaled almost \$24.0 billion in 2023 and is projected to reach as high as \$131.0 billion by 2028.⁹⁸

Table 3.1 U.S. general imports of chemicals and related products by product group, 2022–24

In millions of dollars and percentages

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022– 24 (million \$)	Average change, 2022–24 (%)
Medicinal chemicals	197,275	207,642	250,801	53,526	12.8
Perfumes, cosmetics, and toiletries	13,337	14,598	16,956	3,620	12.8
Soaps, detergents, and surface-active agents	4,177	4,146	4,696	519	6.0
Organic commodity chemicals	2,657	3,135	2,915	258	4.7
Primary aromatics	1,718	2,082	1,962	245	6.9
Other plastics in primary forms	11,304	8,415	8,793	-2,511	-11.8
Certain organic chemicals	11,991	8,475	8,988	-3,003	-13.4
Miscellaneous plastic products	57,280	49,426	53,671	-3,609	-3.2
Fertilizers	15,782	11,030	10,491	-5,291	-18.5
Organic specialty chemicals	24,064	19,537	16,196	-7,867	-18.0
All other digests	101,860	91,805	91,056	-10,804	-5.5
Total	441,444	420,292	466,526	25,082	2.8

Source: USITC DataWeb/Census, accessed June 30, 2025.

Notes: Average change is calculated using the compound annual growth rate formula. When a sector contains more than 10 digests, digest tables display the five largest positive value changes followed by the 5 largest negative changes over 2022–24. Full digest tables are available in Appendix A.

In 2024, the five largest sources of U.S. imports (table 3.2) were Ireland, China, Canada, Germany, and Switzerland. For the medicinal chemicals digest, the largest source of imports was Ireland (value shift of \$23.2 billion during 2022–24, 20.9 percent).⁹⁹ Ireland remains one of the top sources of imports of medicinal chemicals. Ireland’s medicinal chemicals industry benefits from favorable tax laws, targeted investments, and a well-educated, English-speaking workforce with proficiency in science, technology, engineering, and mathematics (STEM) fields.¹⁰⁰ In terms of tax laws, the global average corporate tax rate is 23.5 percent, but Ireland’s corporate tax rate is 12.5 percent.¹⁰¹

⁹⁷ CDC, “Adult Obesity Facts,” March 25, 2025.

⁹⁸ Gores and Rickwood, “2024: The Obesity Market’s Inflection Point?,” February 22, 2024.

⁹⁹ USITC DataWeb/Census, digest CH019, accessed August 1, 2025.

¹⁰⁰ Kehoe, “Biden, Tax and the ‘Enormous Economic Relationship,’” April 16, 2023.

¹⁰¹ Ireland signed the Organization for Economic Co-operation and Development (OECD) Pillar Two agreement in 2021, which increases the tax rate to 15 percent for corporations with revenues exceeding €750 million in at least two of the preceding four years (initial payments are not due until 2026). Organisation for Economic Co-operation and Development (OECD), “Statement on a Two-Pillar Solution,” October 8, 2021; IDA Ireland, “Key Players in

Table 3.2 U.S. general imports of chemicals and related products by import source, 2022–24

In millions of dollars and percentages.

Import source	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Ireland	61,467	61,221	80,862	19,395	14.7
China	58,365	39,337	42,867	-15,497	-14.3
Canada	43,161	39,802	38,542	-4,619	-5.5
Germany	32,515	32,073	30,476	-2,039	-3.2
Switzerland	22,259	20,129	24,389	2,130	4.7
Singapore	8,162	16,838	20,830	12,667	59.7
India	18,038	18,262	20,151	2,113	5.7
Mexico	19,252	19,258	19,973	721	1.9
Japan	20,046	18,195	18,891	-1,155	-2.9
Italy	11,374	13,189	16,900	5,526	21.9
All other sources	146,805	141,988	152,645	5,840	2.0
Total	441,444	420,292	466,526	25,082	2.8

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Ireland is strengthening its commitment to the pharmaceutical sector, including biopharmaceuticals as a focus in the €165.0 billion Euro National Development Plan, covering a wide variety of projects by the end of 2030 (improving transport and digital infrastructure, STEM training, research grants, and manufacturing incentives).¹⁰² Furthermore, Ireland is one of the two countries in the European Union (EU) that specifies English as an official language and has one of the youngest populations in the EU, with roughly 25 percent of its higher education graduates majoring in STEM.¹⁰³ In March 2025, the total imports of pharmaceutical preparations to the United States increased by \$20.9 billion during that month, as pharmaceutical companies such as Merck and Pfizer stockpiled imports to help mitigate the impacts of impending tariffs.¹⁰⁴

In the chemicals and related products sector, the five largest decreases in imports during 2022–24, by value, were in the following digests ([table 3.3](#)): organic specialty chemicals, fertilizers, miscellaneous plastic products, certain organic chemicals, and other plastics in primary forms. The large decrease in fertilizers was the result of declines in imports from Canada (-\$2.8 billion, -21.1 percent), Trinidad and

Ireland’s Pharmaceutical Manufacturing Space,” accessed July 14, 2025; Chartered Accountants Ireland, “The Global Corporation Tax Rate,” February 9, 2024.

¹⁰² Government of Ireland, Department of Public Expenditure, Infrastructure, Public Service Reform and Digitalisation, “National Development Plan 2021–2030,” October 4, 2021.

¹⁰³ The other country in the EU that has English as an official language is Malta. EU, “Languages,” accessed August 7, 2025; O’Brien, “Three Keys to Ireland’s Resilient Pharma Industry,” May 13, 2022.

¹⁰⁴ Erman, “Pharma Imports to US Surged,” May 6, 2025; U.S. Census Bureau, *U.S. International Trade in Goods and Services March 2025*, May 6, 2025, 1–2.

Tobago (–\$895 million, –37.7 percent), Russia (–\$689 million, –22.0 percent), Oman (–\$433 million, –59.1 percent), and Qatar (–\$331 million, –28.3 percent).¹⁰⁵

Within the fertilizers digest, imports of potassium chloride exhibited a noticeable drop in value, from \$6.0 billion in 2022 to \$3.5 billion in 2024, with an average annual change of –23 percent.¹⁰⁶ U.S. imports of select fertilizers such as potash (i.e., potassium chloride) have decreased sharply. Potash is an essential agricultural fertilizer required for all-around plant health; it aids in nitrogen and carbohydrate metabolism.¹⁰⁷ The United States is highly dependent on potash imports; from 2023 to 2024, the United States imported about 86 percent of its potash from Canada.¹⁰⁸ In March 2025, potash was designated by President Donald J. Trump as a critical mineral under the Defense Production Act of 1950, and the Trump administration has called for an increase in domestic potash production to reduce dependence on imports, improve national security, and secure the domestic supply chain.¹⁰⁹ In November 2025, the U.S. Geological Survey (USGS) published the 2025 List of Critical Minerals, with potash recently added.¹¹⁰

The global supply of potash was disrupted by the Russian invasion of Ukraine in February 2022. In response, multiple countries (e.g., United States, Canada, EU) imposed sanctions on Russia and Belarus, causing potash prices to spike to historic highs that year.¹¹¹ Both Russia and Belarus responded to such sanctions by shipping potash to alternative markets, including South America and Asia.¹¹² Subsequently, the 2024 global supply of potash rebounded to the preinvasion level, which in turn raised concerns about an overabundance of potash in the market and the potential to limit profits. As a result, potash producers were constrained to lower production to avoid further oversupplying the market and to protect profit margins.¹¹³ When potash prices fall below historic averages, farmers have more purchasing power.¹¹⁴

Exports of Chemicals and Related Products

U.S. exports of chemicals and related products decreased from \$293.7 billion in 2022 to \$283.4 billion in 2024 with an average annual change of –1.8 percent ([table 3.3](#)). During 2022–24, the five largest increases in exports of chemicals and related products, by value, occurred in the following digests:

¹⁰⁵ USITC DataWeb/Census, digest CH010, August 1, 2025.

¹⁰⁶ USITC DataWeb/Census, HTS subheading 3104.20.00, accessed July 31, 2025.

¹⁰⁷ Mosaic Company, “Improving Nitrogen Use Efficiency with Potassium Fertilizer,” accessed August 1, 2025;

Mosaic Company, “What Is Potash?,” accessed January 28, 2026.

¹⁰⁸ USITC DataWeb/Census, HTS subheading 3104.20, August 1, 2025.

¹⁰⁹ Exec. Order No. 14241, 90 FR 13673, (March 25, 2025); Neenan, “The Defense Production Act of 1950,” October 6, 2023.

¹¹⁰ Final 2025 List of Critical Minerals, 90 FR 50494 (November 7, 2025).

¹¹¹ Russia responded to the sanctions with export controls of its fertilizers and agricultural products. Glauber and Laborde, “How Sanctions on Russia and Belarus,” November 9, 2022; Paulson et al., “Fertilizer Prices Continue Year-Long Decline,” August 1, 2023.

¹¹² Veyet et al., “Potash Supply Nears Pre-War Levels,” October 23, 2024.

¹¹³ Veyet et al., “Potash Supply Nears Pre-War Levels,” October 23, 2024.

¹¹⁴ Veyet et al., “Potash Supply Nears Pre-War Levels,” October 23, 2024.

medicinal chemicals; miscellaneous plastic products; perfumes, cosmetics, and toiletries; explosives, propellant powders, and related items; and essential oils and other flavoring materials.

Table 3.3 Changes in U.S. domestic exports of chemicals and related products by product group, 2022–24
In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Medicinal chemicals	81,173	87,305	91,001	9,828	5.9
Miscellaneous plastic products	31,455	30,832	32,214	759	1.2
Perfumes, cosmetics, and toiletries	9,474	9,803	10,009	535	2.8
Explosives, propellant powders, and related items	670	776	953	283	19.3
Essential oils and other flavoring materials	3,454	3,351	3,665	210	3.0
Pesticide products and formulations	7,497	6,401	5,547	-1,950	-14.0
Other plastics in primary forms	18,352	16,398	16,313	-2,039	-5.7
Miscellaneous inorganic chemicals	20,688	19,664	18,522	-2,166	-5.4
Fertilizers	7,748	4,755	4,466	-3,282	-24.1
Certain organic chemicals	22,438	20,419	18,468	-3,969	-9.3
All other digests	90,712	82,202	82,240	-8,472	-4.8
Total	293,660	281,905	283,398	-10,262	-1.8

Source: USITC DataWeb/Census, accessed June 30, 2025.

Notes: Average change is calculated using the compound annual growth rate formula. When a sector contains more than 10 digests, digest tables display the five largest positive value changes followed by the 5 largest negative changes over 2022–24. Full digest tables are available in Appendix A.

In 2024, the five largest destination markets for exports of chemicals and related products ([table 3.4](#)) were Canada, Mexico, China, Germany, and Japan. The five largest decreases in exports of certain organic chemicals were to Mexico (-\$943 million, -10.3 percent), Canada (-\$675 million, -13.1 percent), South Korea (-\$414 million, -20.3 percent), Belgium (-\$371 million, -10.3 percent), and Japan (-\$323 million, -8.3 percent).

Exports of medicinal chemicals exceeded exports in the other chemicals and related products digests. The five largest increases in medicinal chemicals exports were to Italy (\$6.7 billion, 72.6 percent), Germany (\$2.7 billion, 16.7 percent), Singapore (\$1.2 billion, 60.0 percent), Japan (\$971 million, 7.4 percent), and Mexico (\$898 million, 21.0 percent).¹¹⁵ Italy, the leading export destination for medicinal chemicals in 2024, has robust contract manufacturing and pharmaceutical packaging industries.¹¹⁶ A 2022 report indicated that Italy spent 34.1 billion euros on their overall national pharmaceutical expenditure, which includes both public and private spending.¹¹⁷

¹¹⁵ USITC DataWeb/Census, digest CH019, August 1, 2025.

¹¹⁶ USDOC, ITA, "Italy Country Commercial Guide—Advanced Manufacturing," January 23, 2024.

¹¹⁷ The Medicines Utilisation Monitoring Centre. "National Report on Medicines Use in Italy Year 2022," December 2023.

Table 3.4 U.S. domestic exports of chemicals and related products by export market, 2022–24

In millions of dollars and percentages.

Destination market	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Canada	47,081	43,115	43,105	-3,976	-4.3
Mexico	43,862	42,202	41,594	-2,268	-2.6
China	21,750	20,868	21,389	-361	-0.8
Germany	13,064	13,874	15,007	1,943	7.2
Japan	14,378	13,113	14,477	98	0.3
Netherlands	14,287	13,478	12,928	-1,360	-4.9
Belgium	13,505	15,593	12,884	-621	-2.3
Italy	4,937	6,669	11,631	6,694	53.5
Brazil	12,469	10,123	11,258	-1,211	-5.0
South Korea	8,652	7,604	7,497	-1,156	-6.9
All other markets	99,674	95,265	91,629	-8,045	-4.1
Total	293,660	281,905	283,398	-10,262	-1.8

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Among the digests contained in the chemicals and related products sector, the five largest decreases in exports during 2022–24, by value (table 3.3), occurred in certain organic chemicals, fertilizers, miscellaneous inorganic chemicals, other plastics in primary forms, and pesticide products and formulations. Within the certain organic chemicals digest, exports of acrylonitrile (HTS subheading 2926.10.00) exhibited the largest drop, from \$665 million in 2022 to \$254 million in 2024, with an average annual change of -38.3 percent.¹¹⁸

Acrylonitrile is a petrochemical made from a reaction involving propylene and ammonia; the chemical can be used in a wide range of chemical products ranging from acrylonitrile butadiene styrene (ABS) resins to carbon fibers.¹¹⁹ Decreased U.S. output was a likely impetus behind the decline in exports. Ineos Nitriles, the largest acrylonitrile producer in the United States, announced the closure of its ABS production plant in Addyston, Ohio, in the second quarter of 2025. The company cited unfavorable market conditions and pressure from imports as reasons for closing the facility.¹²⁰

¹¹⁸ USITC DataWeb/Census, HTS subheading 2926.10.00, accessed July 31, 2025

¹¹⁹ Bilandi et al., “Acrylonitrile,” July 15, 2025, 2.

¹²⁰ The Alliance for Chemical Distribution (ACD), an industry group representing various sectors of the chemical industry supply chain, has expressed concerns about the tariffs on imports from Mexico, Canada, and China. According to the ACD, the tariffs would drive up costs for businesses and would restrict the availability of inputs and raw materials needed for production, which could strain the chemical supply chain and have negative impacts on downstream products (thereby limiting the growth of this sector). Greene, “INEOS to Close Its ABS Manufacturing Facility,” November 4, 2024; Williams, “ACD Statement on Trump Administration’s Tariffs,” March 4, 2025; Williams, “ACD Statement on Conclusion of IEEPA Tariff,” November 5, 2025.

Analytical Narratives

The Generic Drug Market

Generic drugs provide consumers with a less expensive alternative to brand-name drugs and, therefore, are an essential part of the global pharmaceutical supply chain. The term “generic drug” refers to a duplicate of a brand-name drug that was developed and patented by another company; the term “authorized generic” refers to a brand-name drug that is marketed without the brand name on the label.¹²¹ The Food and Drug Administration’s (FDA’s) Office of Generic Drugs conducts a thorough review process to ensure that generic drugs have the same effect in the human body as brand-name drugs (e.g., Ozempic, Wegovy).¹²²

Generic drugs generally function largely the same as brand-name drugs. Both have the same active ingredients, dosage strength and form, route of administration, conditions of use, and labeling (with allowed differences).¹²³ Compared to brand-name drugs, generic drugs may have different inactive ingredients.¹²⁴ Generic drugs benefit the public by mitigating the risk of drug shortages and supply chain disruptions, promoting healthy competition, and giving patients access to previously inaccessible therapies.¹²⁵ An FDA study estimated that 742 generic drugs approved in 2022 saved patients and consumers a total of \$18.9 billion in the first 12 months following approval.¹²⁶

The United States is highly dependent on foreign countries to produce generic drugs. An overwhelming majority (roughly 90 percent) of prescriptions in the United States are filled using generic drugs, and most of the active pharmaceutical ingredients (APIs) are of foreign origin, primarily from China and India.¹²⁷ A recent paper by the API Innovation Center noted that about 72 percent of FDA-approved API manufacturing facilities are located outside of the United States.¹²⁸ A 2022 industry survey indicated that 83 of the 100 most consumed drugs in the United States do not have a domestic source for their APIs.¹²⁹ The American Society of Health-System Pharmacists (ASHP) maintains a list of drug shortages, which stands at approximately 200 as of December 2025.¹³⁰ The FDA also maintains a drug shortages list, which

¹²¹ FDA, “FDA List of Authorized Generic Drugs,” July 3, 2025.

¹²² FDA, “Overview & Basics,” September 16, 2025.

¹²³ FDA, “FDA List of Authorized Generic Drugs,” July 3, 2025.

¹²⁴ Inactive ingredients can include fillers, binders, flavorings, coatings, stabilizers, and fillers to help change a chemical into its final deliverable drug product. Smith Marsh, “Bioequivalence and Interchangeability of Generic Drugs,” August 2025; FDA, “FDA List of Authorized Generic Drugs,” July 3, 2025.

¹²⁵ Minosi, “The Landscape of Drug Development,” April 3, 2025.

¹²⁶ FDA, “Generic Competition and Drug Prices,” October 17, 2024.

¹²⁷ API refers to the active component of a medicine that provides the therapeutic effect. Callahan et al., “The FDA Hasn’t Inspected This Drug Factory,” December 12, 2024; APIIC, “Building a Resilient Domestic Drug Supply Chain,” March 25, 2025, 2.

¹²⁸ APIIC, “Building a Resilient Domestic Drug Supply Chain,” March 25, 2025, 2.

¹²⁹ APIIC, “Building a Resilient Domestic Drug Supply Chain,” March 25, 2025, 26.

¹³⁰ ASHP, “Drug Shortages List,” accessed December 2, 2025.

previously included popular semaglutide drug products such as Ozempic and Wegovy, but the FDA removed both drugs from the list in February 2025.¹³¹

The Role of FDA Drug Investigators

Generic drugs are required to meet the same standards in terms of quality and manufacturing as the brand-name drug.¹³² To receive approval for a generic drug, a company must submit an Abbreviated New Drug Application (ANDA) to the FDA for review to prove its bioequivalence to the brand-name drug.¹³³ The application process for a generic drug is generally less costly because the company does not have to provide independent evidence that the drug is safe and effective—it may instead rely on previous FDA rulings for prior approved drugs.¹³⁴

One of the main mechanisms the FDA uses to ensure that drugs are safe and effective is its drug inspection program.¹³⁵ The FDA drug investigators conduct inspections at both domestic and foreign pharmaceutical plants. Their inspections uncover safety and quality issues ranging from contaminated supplies to counterfeit testing records.¹³⁶ Since 2015, the FDA has conducted more foreign inspections than domestic inspections.¹³⁷ In 2024, doctors, patients, and consumers submitted more than 1 million “serious” reports of product quality issues and adverse reactions to drugs to the FDA Adverse Events Reporting System (FAERS).¹³⁸ FDA drug investigators play a crucial role in ensuring the safety and efficacy of drugs, especially because most generic drugs in the U.S. market are being manufactured in countries which one former FDA inspector described as being “semi-regulated or unregulated.”¹³⁹

The FDA faces certain challenges that affect its ability to carry out such inspections and could hinder the agency’s ability to make sure all drugs imported into the United States are safe and effective. The complexities of foreign inspections require extensive infrastructure and support staff to help

¹³¹ Hoover, “The FDA Removes Semaglutide,” accessed December 2, 2025.

¹³² FDA, “FDA List of Authorized Generic Drugs,” July 3, 2025.

¹³³ A generic drug is considered to be “bioequivalent” to the brand-name drug if the generic drug is shown to reach the targeted part of the body at the same time with the same amount. FDA, “FDA List of Authorized Generic Drugs,” July 3, 2025.

¹³⁴ The FDA is located under the U.S. Department of Health and Human Services (HHS) and is responsible for ensuring that the drugs in the United States are both safe and effective for the American public. FDA, “FDA List of Authorized Generic Drugs,” July 3, 2025.

¹³⁵ The FDA conducts three primary types of drug manufacturing establishment inspections: preapproval inspections, surveillance inspections, and for-cause inspections. Preapproval inspections are performed before the approval of a new brand-name drug or generic drug for the U.S. market. Surveillance inspections are performed at facilities where drugs are already being marketed for sale in the United States. For-cause inspections are initiated after consumer complaints, product quality issues, or previous FDA regulatory action. GAO, *FDA Should Implement Strategies*, November 13, 2024.

¹³⁶ Malis et al., “FDA Layoffs Could Compromise Safety of Medications,” July 7, 2025.

¹³⁷ GAO, *FDA Should Implement Strategies*, November 13, 2024.

¹³⁸ A report is designated as serious when one of the following outcomes are recorded: hospitalization, life-threatening, disability, congenital anomaly, required intervention, or another serious outcome. FDA, “FDA Adverse Events Reporting System (FAERS),” accessed July 7, 2025.

¹³⁹ Lupkin, “How FDA Cuts Could Make,” April 18, 2025.

investigators accomplish their goal of performing safe and meaningful inspections.¹⁴⁰ The FDA’s investigative unit, however, constantly struggles with staffing shortages because investigators tend to have a high turnover rate.¹⁴¹ This high attrition rate has negatively affected the FDA’s inspection goals.¹⁴² For example, the FDA conducted about 36 percent fewer inspections in FY2023 than in FY2019 because of a shortage of investigators.¹⁴³ Fewer drug inspections could lead to supply chain disruptions caused by delays in drug approvals for imported drugs.

In May 2024, the FDA announced two pilot programs designed to improve the quality of foreign inspections: (1) conducting unannounced inspections and (2) using independent interpreters.¹⁴⁴ For domestic inspections, FDA investigators can show up on-site without warning; however, for foreign inspections, FDA investigators must give advance notice to these companies before inspecting their facilities.¹⁴⁵ The foreign firms have the advantage of weeks in which to prepare for an inspection; this undermines the foreign inspection process that is meant to be equivalent to the domestic inspection process.¹⁴⁶ The foreign firms also typically provide their own interpreters, who may sometimes affect the investigators’ ability to conduct a thorough and timely inspection of the plant.¹⁴⁷ Along with other tools, these programs may help improve the quality of foreign inspections. Ultimately, however, the agency may have to make do with its existing staff and come up with more innovative solutions in the future to address the backlog of inspections, especially for countries like China and India.

Generic Drugs Imported from China and India

Both China and India have become major global manufacturing hubs for generic drugs. According to 2022–24 trade data for U.S. imports of medicinal chemicals, China ranked last in terms of value shift with an average annual change of –19.3 percent. In 2022, imports from China were valued at \$14.9 billion; in 2024, imports from China fell to \$3.0 billion.¹⁴⁸ In 2025, China accounted for 7.6 percent (by revenue) of the global generic drug market.¹⁴⁹ According to Fortune Business Insights, the pharmaceutical sector’s total market value is projected to grow from \$252.4 billion in 2024 to \$540.8 billion in 2032.¹⁵⁰ Both

¹⁴⁰ Malis et al., “FDA Layoffs Could Compromise Safety of Medications,” July 7, 2025.

¹⁴¹ Malis et al., “FDA Layoffs Could Compromise Safety of Medications,” July 7, 2025.

¹⁴² GAO, *FDA Should Implement Strategies*, November 13, 2024.

¹⁴³ GAO, *FDA Should Implement Strategies*, November 13, 2024.

¹⁴⁴ Historically, foreign inspections are generally announced ahead of time, and the company provides their own interpreter. GAO, *FDA Should Implement Strategies*, November 13, 2024.

¹⁴⁵ FDA, “FDA Announces Expanded Use of Unannounced Inspections,” May 28, 2025.

¹⁴⁶ FDA, “FDA Announces Expanded Use of Unannounced Inspections,” May 28, 2025.

¹⁴⁷ GAO, *FDA Should Implement Strategies*, November 13, 2024.

¹⁴⁸ USITC DataWeb/Census, digest CH019, August 1, 2025.

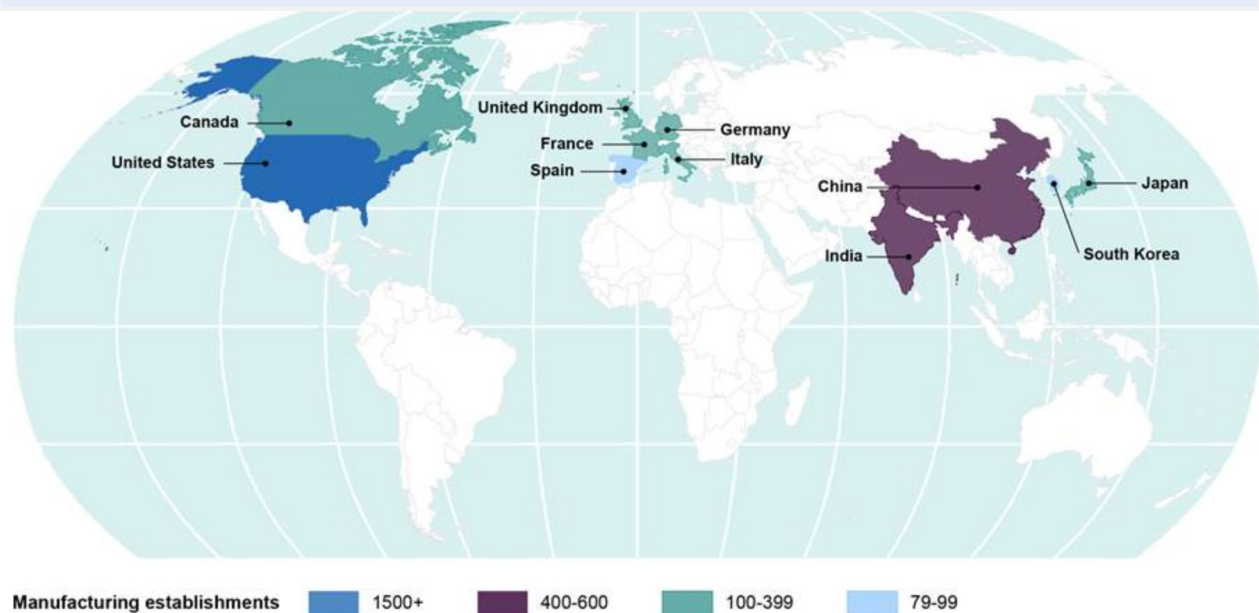
¹⁴⁹ Grand View Research, “China Generic Pharmaceuticals Market Size & Outlook, 2033,” accessed January 27, 2026.

¹⁵⁰ Fortune Business Insights, “China Pharmaceuticals Market Size,” January 12, 2026.

China and India combine to supply about 70 to 80 percent of the total U.S. generic drug supply, with India being heavily reliant on China for its source of API (about 70 to 80 percent).¹⁵¹

India ranked sixth globally in terms of largest value shift, with an average annual change of 16.4 percent.¹⁵² In 2023, India was the third-largest producer of pharmaceuticals (by volume) and contributed about 20 percent of global exports of generic drugs.¹⁵³ According to the Federation of Indian Chambers of Commerce and Industry, the pharmaceutical sector’s total market value is projected to grow from \$50.0 billion in 2023 to \$120.0 billion in 2030.¹⁵⁴ India, sometimes referred to as the “pharmacy of the world,” supplies the United States with about 40 percent of its generic drug demand.¹⁵⁵ China and India together account for about 40 percent of all foreign drug manufacturing facilities supplying the U.S. market (figure 3.1).¹⁵⁶ Accordingly, the FDA carries out the largest number of foreign inspections in China and India.¹⁵⁷

Figure 3.1 Top 10 foreign countries with the most drug manufacturing facilities for the U.S. market plus the United States (Jan 2024)



Source: GAO, *FDA Should Implement Strategies*, November 13, 2024.

¹⁵¹ Lu et al. “Value-Based Generic Drug Evaluation,” December 1, 2023; Rechenberg, “U.S. Dangerously Reliant on High-Risk,” May 29, 2025.

¹⁵² USITC DataWeb/Census, digest CH019, accessed August 1, 2025.

¹⁵³ Harish et al., “Indian Pharmaceutical Industry,” March–April 2025.

¹⁵⁴ Harish et al., “Indian Pharmaceutical Industry,” March–April 2025.

¹⁵⁵ Harish, et al., “Indian Pharmaceutical Industry,” March–April 2025.

¹⁵⁶ Harish, et al., “Indian Pharmaceutical Industry,” March–April 2025; GAO, *FDA Should Implement Strategies*, November 13, 2024.

¹⁵⁷ GAO, *FDA Should Implement Strategies*, November 13, 2024.

FDA inspections have uncovered a host of issues with drug manufacturing facilities in India in recent years. In 2022, FDA investigators cited a pharmaceutical plant in western India belonging to Sun Pharma for multiple issues, including records of contaminated vials of medication sent to the United States, metal shavings on drug-making equipment, and tainted raw materials of unknown “extraneous matter” mixed into drug batches.¹⁵⁸ The FDA also cited an Intas Pharmaceuticals plant in India for a “cascade of failure[s],” such as workers destroying test records by pouring acid on them and manipulating records to cover up the presence of foreign contaminants in the drugs.¹⁵⁹ In 2023, the CDC issued a report identifying contaminated eyedrops from Global Pharma (Chennai, India) that caused death in four patients and resulted in eye removal surgery in another four patients.¹⁶⁰ As a result, the FDA banned these Indian companies from exporting drugs to the United States.¹⁶¹

The Rise of Semaglutide and Their Brand-Name Drugs

As noted above, one of the major drivers contributing to growth in imports was an increase in trade in medicinal chemicals, namely those classified under HTS subheading 2937.19.00—certain polypeptide hormones, protein hormones, and glycoprotein hormones. In 2024, imports under this subheading totaled more than \$16.4 billion and exports totaled about \$8.9 billion.¹⁶² This subheading covers a class of drugs known as semaglutide, which the FDA approved for use in weight management in 2021.¹⁶³ Semaglutide belongs to a class of injectable drugs known as GLP-1 RAs (glucagon-like peptide-1 receptor antagonists) and is used to treat diabetes and obesity.¹⁶⁴

The discovery of semaglutide is one of the most significant medical breakthroughs in recent memory, and pharmaceutical companies are vying to produce this class of drugs. Currently, most brand-name semaglutide drug products, such as Wegovy and Ozempic,¹⁶⁵ are protected by patents and data exclusivity, meaning brand-name drugs are not yet subject to competition from generic drugs.¹⁶⁶ Novo Nordisk, the manufacturer for both Wegovy and Ozempic, currently holds a U.S. patent that is set to

¹⁵⁸ Cenziper et al., “Threat in Your Medicine Cabinet,” June 17, 2025.

¹⁵⁹ Cenziper et al., “Threat in Your Medicine Cabinet,” June 17, 2025.

¹⁶⁰ The eyedrops were contaminated with a highly drug-resistant bacteria called *Pseudomonas aeruginosa*. CDC, “Outbreak of Extensively Drug-Resistant *Pseudomonas Aeruginosa*,” May 23, 2023.

¹⁶¹ Cenziper et al., “Threat in Your Medicine Cabinet,” June 17, 2025; FDA, “Import Alert 66-40,” June 5, 2025.

¹⁶² USITC DataWeb/Census, HTS subheading 2937.19.00, accessed July 31, 2025.

¹⁶³ UCLA Health, “Semaglutide for Weight Loss,” January 12, 2023.

¹⁶⁴ UCLA Health, “Semaglutide for Weight Loss,” January 12, 2023.

¹⁶⁵ Ozempic is used mainly for type 2 diabetes treatment, and Wegovy is used for weight management because of its higher semaglutide content. Lee, “The Battle for Billions,” November 26, 2024.

¹⁶⁶ A brand-name drug with a new active moiety can have 5 years of data exclusivity, during which the FDA will not accept any applications for generic drugs that rely on the same active moiety. Active moiety refers to the part of the drug that works in the human body to produce the intended medical effect (i.e., the molecule, ion, or other noncovalent derivative). FDA, “Small Business Assistance,” November 3, 2018; FDA, “Frequently Asked Questions on Patents and Exclusivity,” August 21, 2024.

expire in 2032; the company's separate patents in various foreign countries (e.g., China, Canada, India, etc.) are set to expire in 2026.¹⁶⁷

The rise in demand for semaglutide—combined with expiring patents in 2026 in several foreign markets—could alter the semaglutide landscape. In China, at least 15 pharmaceutical companies are lining up to produce generic versions of semaglutide; 11 of these companies have drugs that are in final-stage clinical trials.¹⁶⁸ In Canada, Novo Nordisk did not pay a maintenance fee of 250 Canadian dollars, causing its patent to expire in 2026.¹⁶⁹ In India, Novo Nordisk has already reduced the price of Wegovy by roughly 37 percent because of the impending arrival of generic versions after the patent expires in March 2026.¹⁷⁰

In various foreign markets, the patents for these semaglutide drug products are facing expiration dates, some of which are being contested.¹⁷¹ This could lead to a shift in the locations where semaglutide is being exported to and imported from in the future. In 2024, the top three export destinations of certain polypeptide hormones, protein hormones, and glycoprotein hormones were Italy (\$6.1 billion), Germany (\$1.6 billion), and Denmark (\$617 million).¹⁷² In 2024, the top three import sources of certain polypeptide hormones, protein hormones, and glycoprotein hormones were Ireland (\$15.4 billion), Argentina (\$650 million), and China (\$123 million).¹⁷³

¹⁶⁷ Lee, "The Battle for Billions," November 26, 2024.

¹⁶⁸ Lee, "The Battle for Billions," November 26, 2024.

¹⁶⁹ Lowe, "Novo Nordisk's Canadian Mistake," June 10, 2025.

¹⁷⁰ Sadam and Sadam, "Novo Nordisk Cuts Wegovy Price," November 11, 2025.

¹⁷¹ Health Tech World, "Changes in the Ozempic Patent Landscape," February 5, 2026.

¹⁷² Official imports and exports statistics under HS subheading 2937.19, as reported by various national statistical authorities in the Global Trade Atlas Suite database, accessed August 27, 2025.

¹⁷³ Official imports and exports statistics under HS subheading 2937.19, as reported by various national statistical authorities in the Global Trade Atlas Suite database, accessed August 27, 2025.

Bibliography

- American Society of Health-System Pharmacists (ASHP). “Drug Shortages List.” Accessed December 2, 2025. <https://www.ashp.org/Drug-Shortages/Current-Shortages/drug-shortages-list>.
- API Innovation Center (APIIC). “White Paper: Building a Resilient Domestic Drug Supply Chain.” March 25, 2025. <https://apicenter.org/press-release/white-paper-building-a-resilient-domestic-drug-supply-chain>.
- Bilandi, Alicia, Ning Fu, and Adam Greenup. “Acrylonitrile.” S&P Global. *Chemical Economics Handbook*. July 15, 2025. <https://connect.spglobal.com/document/show/phoenix/110936>.
- Callahan, Patricia, Debbie Cenziper, and Megan Rose. “The FDA Hasn’t Inspected This Drug Factory After 7 Recalls for the Same Flaw, 1 Potentially Deadly.” ProPublica, December 12, 2024. <https://www.propublica.org/article/glenmark-pharmaceuticals-recalls-fda-oversight>.
- Centers for Disease Control and Prevention (CDC). “Outbreak of Extensively Drug-Resistant Pseudomonas Aeruginosa Associated with Artificial Tears.” May 23, 2023. https://archive.cdc.gov/www_cdc_gov/hai/outbreaks/crpa-artificial-tears.html.
- Centers for Disease Control and Prevention (CDC). “Adult Obesity Facts.” Obesity, March 25, 2025. <https://www.cdc.gov/obesity/adult-obesity-facts/index.html>.
- Cenziper, Debbie, Megan Rose, Brandon Roberts, and Irena Hwang. “Threat in Your Medicine Cabinet: The FDA’s Gamble on America’s Drugs.” ProPublica, June 17, 2025. <https://www.propublica.org/article/fda-drug-loophole-sun-pharma>.
- U.S. Census Bureau. U.S. International Trade in Goods and Services, March 2025. May 6, 2025. https://www.census.gov/foreign-trade/Press-Release/ft900/ft900_2503.pdf.
- Chartered Accountants Ireland. “The Global Corporation Tax Rate: What Are the Implications for Ireland?” February 9, 2024. <https://www.charteredaccountants.ie/News/the-global-corporation-tax-rate-what-are-the-implications-for-ireland>.
- Cybersecurity & Infrastructure Security Agency. “Chemical Sector Profile.” March 2022. https://www.cisa.gov/sites/default/files/2023-02/chemical_sector_profile_final_508_2022_0.pdf.
- Government of Ireland. Department of Public Expenditure, Infrastructure, Public Service Reform and Digitalisation. “National Development Plan 2021–2030.” gov.ie, October 4, 2021. <https://gov.ie/en/department-of-public-expenditure-infrastructure-public-service-reform-and-digitalisation/publications/national-development-plan-2021-2030/>.
- Erman, Michael. “Pharma Imports to US Surged in March as Drugmakers Look to Avoid Tariffs.” Reuters, May 6, 2025. <https://www.reuters.com/business/healthcare-pharmaceuticals/pharma-imports-us-surged-march-drugmakers-look-avoid-tariffs-2025-05-06/>.

- European Union (EU). "Languages." Accessed August 7, 2025. https://european-union.europa.eu/principles-countries-history/languages_en.
- Executive Office of the President (EOP). Executive Order 14241—Immediate Measures to Increase American Mineral Production. 90 *Fed. Reg.* 13673. March 25, 2025. <https://www.federalregister.gov/documents/2025/03/25/2025-05212/immediate-measures-to-increase-american-mineral-production>.
- U.S. Department of the Interior (Interior). U.S. Geological Survey (USGS). Final 2025 List of Critical Minerals. 90 *Fed. Reg.* 50494. November 7, 2025. <https://www.federalregister.gov/documents/2025/11/07/2025-19813/final-2025-list-of-critical-minerals>.
- U.S. Food and Drug Administration (FDA). "Small Business Assistance: Frequently Asked Questions for New Drug Product Exclusivity." November 3, 2018. <https://www.fda.gov/drugs/cder-small-business-industry-assistance-sbia/small-business-assistance-frequently-asked-questions-new-drug-product-exclusivity>.
- U.S. Food and Drug Administration (FDA). "Frequently Asked Questions on Patents and Exclusivity." August 21, 2024. <https://www.fda.gov/drugs/development-approval-process-drugs/frequently-asked-questions-patents-and-exclusivity>.
- U.S. Food and Drug Administration (FDA). "Generic Competition and Drug Prices." October 17, 2024. <https://www.fda.gov/about-fda/center-drug-evaluation-and-research-cder/generic-competition-and-drug-prices>.
- U.S. Food and Drug Administration (FDA). "FDA Announces Expanded Use of Unannounced Inspections at Foreign Manufacturing Facilities." May 28, 2025. <https://www.fda.gov/news-events/press-announcements/fda-announces-expanded-use-unannounced-inspections-foreign-manufacturing-facilities>.
- U.S. Food and Drug Administration (FDA). "FDA List of Authorized Generic Drugs." July 3, 2025. <https://www.fda.gov/drugs/abbreviated-new-drug-application-anda/fda-list-authorized-generic-drugs>.
- U.S. Food and Drug Administration (FDA). "Personal Importation." August 18, 2025. <https://www.fda.gov/industry/import-basics/personal-importation>.
- U.S. Food and Drug Administration (FDA). "Overview & Basics." September 16, 2025. <https://www.fda.gov/drugs/generic-drugs/overview-basics>.
- U.S. Food and Drug Administration (FDA). "FDA Adverse Events Reporting System (FAERS) Public Dashboard," accessed July 7, 2025. <https://fis.fda.gov/sense/app/95239e26-e0be-42d9-a960-9a5f7f1c25ee/sheet/7a47a261-d58b-4203-a8aa-6d3021737452/state/analysis>.
- U.S. Food and Drug Administration (FDA). "Import Alert 66-40." June 5, 2025. https://www.accessdata.fda.gov/cms_ia/importalert_189.html.

U.S. International Trade Commission Interactive Tariff and Trade DataWeb (USITC DataWeb)/U.S. Census Bureau (Census). Accessed various dates. <http://dataweb.usitc.gov>.

Fortune Business Insights. “China Pharmaceuticals Market Size, Share | Growth, 2025-2032.” January 12, 2026. <https://www.fortunebusinessinsights.com/china-pharmaceuticals-market-113976>.

Glauber, Joseph, and David Laborde. “How Sanctions on Russia and Belarus Are Impacting Exports of Agricultural Products and Fertilizer.” International Food Policy Research Institute. *IFPRI Blog*. November 9, 2022. <https://www.ifpri.org/blog/how-sanctions-russia-and-belarus-are-impacting-exports-agricultural-products-and-fertilizer/>.

Grand View Research. “China Generic Pharmaceuticals Market Size & Outlook, 2033.” Accessed January 27, 2026. <https://www.grandviewresearch.com/horizon/outlook/generic-pharmaceuticals-market/china>.

Gores, Markus, and Sarah Rickwood. “2024: The Obesity Market’s Inflection Point?” IQVIA, February 22, 2024. <https://www.iqvia.com/locations/emea/blogs/2024/10/2024-the-obesity-markets-inflection-point>.

U.S. Government Accountability Office (GAO). *FDA Should Implement Strategies to Retain Its Inspection Workforce*. Report to Congressional Committees GAO-25-106775, November 13, 2024. <https://files.gao.gov/reports/GAO-25-106775/index.html>.

Greene, Timothy. “INEOS to Close Its ABS Manufacturing Facility.” *Che Analyst*, November 4, 2024. <https://www.chemanalyst.com/NewsAndDeals/NewsDetails/ineos-to-close-its-abs-manufacturing-facility-31145>.

Harish, Lata, Prema Desai, and Kaushik Desai. “Indian Pharmaceutical Industry: Creating Global Impact.” International Society for Pharmaceutical Engineering. *Pharmaceutical Engineering*, March–April 2025. <https://ispe.org/pharmaceutical-engineering/march-april-2025/indian-pharmaceutical-industry-creating-global-impact>.

Health Tech World, “Changes in the Ozempic Patent Landscape.” February 5, 2026. <https://www.htworld.co.uk/insight/features/changes-in-the-ozempic-patent-landscape-rg25/>.

Hoover, Jim. “The FDA Removes Semaglutide from the Drug Shortage List.” Accessed December 2, 2025. <https://www.birminghammedicalnews.com/article/9195/the-fda-removes-semaglutide-from-the-drug-shortage-list>.

Government of Ireland. Industrial Development Agency (IDA Ireland). “Key Players in Ireland’s Pharmaceutical Manufacturing Space.” Accessed July 14, 2025. <https://www.idaireland.com/latest-news/insights/pharmaceutical-manufacturing-companies-ireland>.

U.S. Department of Commerce (USDOC). International Trade Administration (ITA). “Italy Country Commercial Guide—Advanced Manufacturing.” January 23, 2024. <https://www.trade.gov/country-commercial-guides/italy-advanced-manufacturing>.

- Kehoe, Ian. "Biden, Tax and the 'Enormous Economic Relationship' Between Ireland and the US: Rewinding the Week That Was." *The Currency*, April 16, 2023. <https://thecurrency.news/articles/115679/biden-tax-and-the-enormous-economic-relationship-between-ireland-and-the-us-rewinding-the-week-that-was/>.
- Longae Law. "China's GLP-1 Patent Cliff: What 2026 Means for the Global Weight Loss Market." July 15, 2025. <https://lengaelaw.com/chinas-glp-1-patent-cliff-what-2026-means-for-the-global-weight-loss-market/>.
- Lee, Grace. "The Battle for Billions: Understanding the Ozempic Patent Landscape." *Science and Technology Law Review*, November 26, 2024. <https://journals.library.columbia.edu/index.php/stlr/blog/view/653>.
- Lu, Jinmiao, Xiaohua Ying, and Zhiping Li. "Value-Based Generic Drug Evaluation Focus on Chinese Real-World Evidence." *International Journal of Health Policy and Management* no. 12, Issue 1 (December 1, 2023): 1–2. <https://doi.org/10.34172/ijhpm.2023.7970>.
- Lupkin, Sydney. "How FDA Cuts Could Make the Food and Drug Supply Less Safe." National Public Radio, April 18, 2025. <https://www.npr.org/sections/shots-health-news/2025/04/18/nx-s1-5364544/fda-inspections-layoffs-food-and-drug-supply-less-safe>.
- Malis, Victoria, Sadie Leite, Debbie Cenziper, and Megan Rose. "FDA Layoffs Could Compromise Safety of Medications Made at Foreign Factories, Inspectors Say." ProPublica, July 7, 2025. <https://www.propublica.org/article/fda-cuts-drug-factory-inspections>.
- The Medicines Utilization Monitoring Centre. "National Report on Medicines Use in Italy Year 2022." Rome: Italian Medicines Agency (AIFA). December 2023. https://www.aifa.gov.it/documents/20142/2143103/Rapporto-OsMed-2022_EN.pdf.
- Minosi, Anzola. "The Landscape of Drug Development and the Pharmaceutical Industry in Italy: Challenges, Trends, and the Role of Generics." *Pharmacy Times*, April 3, 2025. <https://www.pharmacytimes.com/view/the-landscape-of-drug-development-and-the-pharmaceutical-industry-in-italy-challenges-trends-and-the-role-of-generics>.
- Mosaic Company. "Improving Nitrogen Use Efficiency with Potassium Fertilizer." *AgriSight*. Accessed August 1, 2025. <https://www.croptonutrition.com/resource-library/improving-nitrogen-use-efficiency-with-potassium-fertilizer/>.
- Mosaic. "What Is Potash?" Mosaic Crop Nutrition. Accessed January 28, 2026. <https://www.croptonutrition.com/resource-library/what-is-potash/>.
- Neenan, Alexandra. "The Defense Production Act of 1950: History, Authorities, and Considerations for Congress." *Legislation*, October 6, 2023. <https://www.congress.gov/crs-product/R43767>.
- Lowe, Derek. "Novo Nordisk's Canadian Mistake." American Association for the Advancement of Science. *Science*, June 10, 2025. <https://www.science.org/content/blog-post/novo-nordisk-s-canadian-mistake>.

O'Brien, Damien. "Three Keys to Ireland's Resilient Pharma Industry." *Pharmaceutical Executive*, May 13, 2022. <https://www.pharmexec.com/view/three-keys-to-ireland-s-resilient-pharma-industry>.

Organisation for Economic Co-operation and Development (OECD). "Statement on a Two-Pillar Solution to Address the Tax Challenges Arising from the Digitalisation of the Economy – 8 October 2021." October 8, 2021. <https://www.oecd.org/en/about/news/announcements/2021/10/statement-on-a-two-pillar-solution-to-address-the-tax-challenges-arising-from-the-digitalisation-of-the-economy-october-2021.html>.

Paulson, Nick, Carl Zulauf, Gary Schnitkey, and Jim Baltz. "Fertilizer Prices Continue Year-Long Decline from 2022 Peak." *farmdoc daily* 13, no. 142 (August 1, 2023). <https://farmdocdaily.illinois.edu/2023/08/fertilizer-prices-continue-year-long-decline-from-2022-peak.html>.

Rechenberg, Andrew. "U.S. Dangerously Reliant on High-Risk Imported Drug Supply." May 29, 2025. <https://prosperousamerica.org/u-s-dangerously-reliant-on-high-risk-imported-drug-supply/>.

Sadam, Rishika. "Novo Nordisk Cuts Wegovy Price by Up to 37% in India." Reuters, November 11, 2025. <https://www.reuters.com/business/healthcare-pharmaceuticals/novo-nordisk-cuts-wegovy-price-by-up-33-india-document-shows-2025-11-11/>.

Setser, Brad. "American Pharmaceutical Companies Still Aren't Paying Tax in the U.S." March 14, 2025. <https://www.cfr.org/articles/american-pharmaceutical-companies-still-arent-paying-tax-us>.

Smith Marsh, Daphne. "Bioequivalence and Interchangeability of Generic Drugs." *Merck Manual: Consumer Version*. August 2025. <https://www.merckmanuals.com/home/drugs/brand-name-and-generic-drugs/bioequivalence-and-interchangeability-of-generic-drugs>.

Tallent, Aaron. "Report Finds FDA Allowed Drugs Made in Banned Factories into US." MedCentral, June 25, 2025. <https://www.medcentral.com/biz-policy/report-finds-fda-allowed-drugs-made-in-banned-factories-into-us>.

Ting, Peng, Tao Wang, Min Fu, Ren Lin, Min Hong, Zhian Zheng, Jiangang Wang, and Yanhui Lin. "Prevalence and Inequalities of Obesity and Associated Complications in China: A Multicentre Nationwide Survey." *Public Health* 237 (December 1, 2024): 97–106. <https://doi.org/10.1016/j.puhe.2024.09.021>.

Tingley, Kim. "Nature's 'Swiss Army Knife': What Can We Learn from Venom?" *The New York Times*, November 13, 2024. <https://www.nytimes.com/2024/11/13/magazine/venom-animals-drugs-ozempic.html>.

UCLA Health. "Semaglutide for Weight Loss—What You Need to Know." January 12, 2023. <https://www.uclahealth.org/news/article/semaglutide-weight-loss-what-you-need-know>.

Veyet, Tristan, Jesus Calero, and Luca Fratangelo. "Potash Supply Nears Pre-invasion Levels, Pushing Producers to Cut Output." Reuters, October 23, 2024.

<https://www.reuters.com/markets/commodities/potash-supply-nears-pre-invasion-levels-pushing-producers-cut-output-2024-10-23/>.

Williams, Susannah. "ACD Statement on Trump Administration's Tariffs on Canada, Mexico." Alliance for Chemical Distribution. Press release, March 4, 2025. <https://www.acd-chem.com/media-center/press-releases/acd-statement-on-trump-administrations-tariffs-on-canada-mexico/>.

Williams, Susannah. "ACD Statement on Conclusion of IEEPA Tariff Oral Arguments Before U.S. Supreme Court." Alliance for Chemical Distribution, November 5, 2025. [https://www.acd-](https://www.acd-chem.com/media-center/press-releases/acd-statement-on-conclusion-of-ieepa-tariff-oral-arguments-before-u-s-supreme-court/)

[chem.com/media-center/press-releases/acd-statement-on-conclusion-of-ieepa-tariff-oral-arguments-before-u-s-supreme-court/](https://www.acd-chem.com/media-center/press-releases/acd-statement-on-conclusion-of-ieepa-tariff-oral-arguments-before-u-s-supreme-court/).

Chapter 4: Energy-Related Products

Introduction

Imports and exports of energy-related products (energy products) decreased between 2022 and 2024.¹⁷⁴ Imports of energy products dropped from \$315.9 billion in 2022 to \$249.8 billion in 2024, reflecting an 11.1 percent average annual decrease during this period.¹⁷⁵ Domestic exports of energy products also decreased from \$389.3 billion in 2022 to \$326.8 billion in 2024, resulting in a relatively lower decrease of 8.4 percent.

Imports of Energy Products

The landscape of U.S. energy product imports has undergone notable changes from 2022 to 2024, reflecting shifting dynamics in domestic production and global supply. As highlighted in table 4.1, the only uptick in imports was seen in nuclear materials, driven primarily by enriched uranium and natural uranium compounds, which are crucial for the operation of commercial nuclear reactors. Conversely, imports of other energy products—such as natural gas, petroleum products, and electrical energy—experienced substantial declines, attributable to record levels of domestic production and changing consumption patterns. The growing U.S. energy product production to supply domestic markets coupled with an altered import landscape resulted in a pivotal shift during this period.

¹⁷⁴ The USITC separates the energy-related products sector into six digests. Each USITC sector digest encompasses various 8-digit subheadings in the Harmonized Tariff Schedule of the United States (HTS). For a complete list of HTS subheadings classified in a particular sector or digest, see this data [table](#).

¹⁷⁵ Percentage changes included in trade data tables 4.1–4.4 are the average annual change during 2022–24 and not a simple percentage change in 2024 relative to 2022. The average annual change is presented in the form of compound annual growth rates (CAGRs) and is referred to as average change or average annual change in this working paper.

Table 4.1 Energy products: changes in U.S. general imports by product group, 2022–24

In millions of dollars and percentages.

Product group (digest)	2022	2023	2024	Absolute change,	Average change,
	(million \$)	(million \$)	(million \$)	2022–24 (million \$)	2022–24 (%)
Nuclear materials	4,164	5,563	7,308	3,144	32.5
Coal, coke, and related chemical products	2,598	2,216	2,007	-591	-12.1
Electrical energy	4,428	3,159	2,290	-2,138	-28.1
Natural gas and components	21,870	12,605	9,434	-12,436	-34.3
Petroleum products	84,577	69,784	61,058	-23,519	-15.0
Crude petroleum	198,257	165,070	167,705	-30,552	-8.0
Total	315,893	258,395	249,802	-66,091	-11.1

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Among the energy sector digests, the only significant increase in imports by value from 2022 to 2024 was in nuclear materials ([table 4.1](#)). This rise in nuclear material imports was primarily driven by increases in enriched uranium (HTS subheading 2844.20.00) and natural uranium compounds (HTS subheading 2844.10.20), which saw increases of \$1.6 billion and \$1.3 billion, respectively. Both enriched uranium and natural uranium compounds are essential for use in commercial nuclear reactors, with imports supplying around 99 percent of these materials.¹⁷⁶

Canada, France, and the United Kingdom were the top three suppliers of nuclear materials to the United States and accounted for the biggest increases in U.S. imports of nuclear materials from 2022 to 2024. The largest single country increase in nuclear materials imports was from Canada, rising to \$1.2 billion (58.4 percent average annual).¹⁷⁷ Canada possesses the world's largest deposits of high-grade uranium.¹⁷⁸ Following Canada, France saw a rise in imports of \$925 million, (107.5 percent), but imports from the United Kingdom experienced an increase of \$606 million, (47.5 percent).¹⁷⁹ Canada was the second-largest producer and exporter of uranium globally and is the primary supplier of uranium to the United States during this period, meeting about 25 percent of U.S. domestic demand.¹⁸⁰

In contrast to the nuclear material digest, all other energy product digests experienced a decrease in imports values.¹⁸¹ The largest decreases, by value, from 2022 to 2024 were in natural gas and components; electrical energy; petroleum products; coal, coke and related chemical products; and crude petroleum ([table 4.1](#)). Natural gas, which saw the most significant decline in imports (-\$12.4 billion,

¹⁷⁶ Energy, EIA, "U.S. Nuclear Generators Import Nearly All the Uranium," January 30, 2025.

¹⁷⁷ USITC DataWeb/Census, digests EP002, accessed June 30, 2025.

¹⁷⁸ Baskaran, "Canadian Tariffs Will Undermine U.S. Minerals Security," January 29, 2025.

¹⁷⁹ USITC DataWeb/Census, digests EP002, accessed June 30, 2025.

¹⁸⁰ Baskaran, "Canadian Tariffs Will Undermine U.S. Minerals Security," January 29, 2025.

¹⁸¹ Energy prices for natural gas and petroleum products experienced declines from 2022 to 2024. Natural gas prices dropped by about 68 percent and crude oil prices decreased by about 19 percent during the same period. This decline in prices partially accounts for the reduction in the value of energy product imports and exports during this period. Energy, EIA, "Spot Prices for Crude Oil and Petroleum Products," November 19, 2025; Energy, EIA, "Spot Henry Hub Natural Gas Prices," January 8, 2025.

–34.3 percent), experienced record domestic production during this period, with production outpacing consumption by 4.09 trillion cubic feet in 2022, effectively reducing the need for imports.¹⁸² Additionally, the price of natural gas experienced a dramatic reduction, with a drop of roughly 68 percent during this period, which has also contributed to the decreased import values of natural gas.¹⁸³

Outside of natural gas, petroleum products and crude petroleum both experienced a surge in U.S. domestic production coupled with decreased prices, which further diminished the need for imports.¹⁸⁴ Electrical energy imports, which were solely sourced from Canada between 2022 and 2024, declined from 2022 to 2024 (–\$2.1 billion, –28.1 percent) partly due to reduced hydropower generation in Canada and lower natural gas prices in the United States.¹⁸⁵ Coal and coke and related chemical products also saw a decrease in imports during this period, with the largest import category, bituminous coal, declining by \$310 million (–37.2 percent) from 2022 to 2024. Domestic demand for coal has consistently decreased each year since 2007, primarily because utilities opted for natural gas after its prices fell in 2008.¹⁸⁶ This decline has also been driven by decreasing costs and increased adoption of renewable energy options, rising regulatory costs associated with coal-fired power plants, and aging coal-fired power plants.¹⁸⁷

The largest decreases in natural gas imports were from Canada, with a decrease of \$11.9 billion (34.7 percent). Following Canada, Trinidad and Tobago, from which the United States imports mainly liquefied natural gas (HTS subheading 2711.11.00), saw a decline of \$598 million (–31.1 percent).¹⁸⁸ In terms of petroleum products, imports from Russia experienced the most significant decrease at –\$4.6 billion

¹⁸² The largest decreases in natural gas and components imports were driven by natural gas in a gaseous state (HTS subheading 2711.21.00, –\$11.5 billion, –45 percent), liquified natural gas (HTS subheading 27711.11.00, –\$288 million, –13 percent) and liquified propane (HTS subheading 2711.12.00, –\$404 million, –9 percent). EIA, “Natural Gas Imports and Exports,” June 30, 2023; USITC DataWeb/Census, digests EP006, accessed June 30, 2025.

¹⁸³ EIA, “Spot Henry Hub Natural Gas Prices Hit a Historic Low in 2024,” January 8, 2025.

¹⁸⁴ The largest decreases in petroleum products and crude petroleum imports were driven by distilled and residual fuel oils testing under 25 degrees American Petroleum Institute (A.P.I.) (HTS subheading 2710.19.06), –\$9.18 billion –22 percent); distilled and residual fuel oils testing 25 degrees A.P.I. or more (HTS subheading 2710.19.11, –\$4.7 billion, –22 percent), crude petroleum oils testing 25 degrees A.P.I. or more (HTS subheading 2709.00.20, –\$9.7 billion, –6 percent), and crude petroleum oils testing under 25 degrees A.P.I. (HTS subheading 2709.00.10, –\$20.8 billion, –9 percent). A.P.I. is a standard measure used in the petroleum industry to quantify the density of crude petroleum and other petroleum liquids. EIA, “U.S. Primary Energy Production, Consumption, and Exports Increased in 2024,” June 20, 2025; Energy, EIA, “Spot Prices for Crude Oil and Petroleum Products,” November 19, 2025; USITC DataWeb/Census, digests EP004-EP005, accessed June 30, 2025.

¹⁸⁵ Canada’s hydropower generation, their main source of electricity, was affected by drought conditions in Canada during this period. EIA, “U.S. Electricity Exports to Canada Have Increased since September 2023,” November 12, 2024.

¹⁸⁶ CRS, *U.S. Coal Industry Trends*, June 30, 2025, 3.

¹⁸⁷ CRS, *U.S. Coal Industry Trends*, June 30, 2025, 3.

¹⁸⁸ USITC DataWeb/Census, digests EP006, accessed June 30, 2025

(–99.9 percent), primarily because of sanctions imposed in 2023, discussed later in this chapter.¹⁸⁹ Additionally, crude petroleum imports from Canada decreased by \$15.0 billion (–6.8 percent) and coal products saw large decreases in imports from Colombia, amounting to –\$264 million (–41.9 percent).¹⁹⁰

The decline in imports from Canada was primarily due to a decrease in certain energy product prices, which outweighed the increase in imports of nuclear products.¹⁹¹ Similarly, other countries that supply nonnuclear energy products to the United States also saw a reduction in their exports to the United States, leading to a further decline in imports from those partners. From 2022 to 2024, Canada, Mexico, Saudi Arabia, and Brazil were the largest import sources for energy products, totaling \$545.1 billion worth of U.S. energy product imports over the period ([table 4.2](#)).

The countries from which the United States increased imports were Venezuela (5,765.4 percent), Guyana (40.7 percent), and Nigeria (11.0 percent). Venezuela saw a substantial percentage increase because the United States lifted most sanctions on their energy sector in October 2023; however, sanctions were put back in place after six months.¹⁹² Guyana had an overall increase in its total exports in energy products due to a rapid expansion in its offshore oil production during this period.¹⁹³

The countries where imports decreased the most were Saudi Arabia (–28.7 percent), Mexico (–20.8 percent), and Iraq (–13.5 percent). In total, U.S. imports of energy products decreased by 11.1 percent annually from 2022 to 2024

¹⁸⁹ Treasury, OFAC, “Guidance on Implementation of the Price Cap Policy,” December 20, 2023; USITC DataWeb/Census, digests EP005, accessed June 30, 2025.

¹⁹⁰ USITC DataWeb/Census, digests EP004, accessed June 30, 2025.

¹⁹¹ Energy, EIA, “Last year’s U.S.-Canada energy trade was valued around \$150 billion,” July 30, 2025.

¹⁹² In 2022, Chevron received a waiver permitting the resumption of oil and gas imports from their joint venture in Venezuela, which restarted in January 2023. In 2023, the U.S. Department of the Treasury’s Office of Foreign Assets Control temporarily lifted sanctions on the Venezuelan oil sector, allowing for imports of Venezuelan oil into the United States to increase. However, these sanctions were reinstated after the six-month period. Fernandez et al., “OFAC Revokes General License 44,” May 23, 2024; Treasury, “Treasury Issues Venezuela General License 41,” February 8, 2025; Treasury, OFAC, “General License No. 44,” accessed November 25, 2025; Energy, EIA, “Venezuela’s Heavy Crude Oil Output Increases Are Limited,” October 23, 2023.

¹⁹³ Guyana’s petroleum production increased from 15,000 barrels per day in December 2019, when the country began oil production, to 630,000 barrels per day in January 2024, with rapid increases from 2022 to 2023. Energy, EIA, “Country Analysis Brief: Guyana,” May 29, 2024.

Table 4.2 Energy products: U.S. general imports by import source, 2022–24

In millions of dollars and percentages.

Import source	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Canada	158,402	124,188	127,037	-31,365	-10.4
Mexico	26,167	24,254	16,415	-9,752	-20.8
Saudi Arabia	20,632	13,647	10,502	-10,131	-28.7
Brazil	7,367	8,005	8,523	1,156	7.6
Colombia	9,432	6,970	7,653	-1,779	-9.9
Iraq	10,018	8,419	7,495	-2,523	-13.5
Venezuela	2	3,265	5,739	5,738	5,765.4
Nigeria	4,318	5,242	5,321	1,002	11.0
Guyana	2,620	3,012	5,188	2,568	40.7
South Korea	5,415	4,722	4,920	-495	-4.7
All other sources	71,520	56,670	51,008	-20,512	-15.5
Total	315,893	258,395	249,802	-66,091	-11.1

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Exports of Energy Products

The export landscape for energy products in the United States experienced fluctuations from 2022 to 2024. Certain segments, including nuclear materials, electrical energy, and crude petroleum, saw growth in export values; others, including natural gas, coal, and petroleum products, have encountered notable declines in export values ([table 4.3](#)).¹⁹⁴ These trends suggest a complex interplay between domestic energy consumption, energy product prices, and international demand, although the United States has remained a net energy product exporter throughout this period. This section highlights the evolving dynamics of the energy market and the key drivers behind energy product exports from 2022 to 2024.

¹⁹⁴ As stated in the energy product imports section, energy prices for natural gas and petroleum products experienced declines from 2022 to 2024. Natural gas prices dropped by 68 percent and crude oil prices decreased by 19 percent during the same period. This decline in prices partially accounts for the reduction in the value of energy product imports and exports during this period. Energy, EIA, “Spot Prices for Crude Oil and Petroleum Products,” November 19, 2025; Energy, EIA, “Spot Henry Hub Natural Gas Prices,” January 8, 2025.

Table 4.3 Energy products: Changes in U.S. domestic exports by product group, 2022–24

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Nuclear materials	631	810	1,515	884	54.9
Crude petroleum	114,119	113,610	114,958	839	0.4
Electrical energy	732	1,187	890	158	10.3
Coal, coke, and related chemical products	20,640	18,005	15,453	-5,187	-13.5
Petroleum products	151,624	125,210	125,210	-26,413	-9.1
Natural gas and components	101,602	72,312	68,745	-32,857	-17.7
Total	389,347	331,133	326,772	-62,576	-8.4

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Among the energy digests, the only increases in exports by value from 2022 to 2024 were observed in nuclear materials, electrical energy, and crude petroleum. The rise in nuclear material exports was primarily driven by an increase in the exports of natural uranium compounds (HTS subheading 2844.10.20), which rose by \$859 million (204.6 percent) during this period.¹⁹⁵ Exports of electrical energy to Canada increased by \$158 million (10.3 percent) from 2022 to 2024.¹⁹⁶ The United States exclusively exports electricity to Canada. Similarly, the increase in crude petroleum exports was largely attributed to a \$2.4 billion (1.1 percent) rise in crude petroleum oils testing 25 degrees A.P.I. or higher (HTS subheading 2709.00.20).¹⁹⁷

The largest boosts in nuclear material exports were to the United Kingdom (UK), which saw a rise of \$458 million (429.8 percent). Following the UK, the Netherlands and Germany experienced increases in nuclear material exports of \$226 million (130.6 percent) and \$186 million (71.6 percent), respectively. In terms of crude petroleum products, the most significant increases were to the Netherlands (\$10.5 billion, 36.1 percent) and Nigeria (\$1.3 billion, 100 percent).¹⁹⁸

Conversely, all other energy product categories experienced declines in exports, with the most significant decreases in value occurring in natural gas and components, coal, coke and related chemical products, and petroleum products (table 4.3). The decline in natural gas exports was primarily driven by reductions in liquefied natural gas exports (HTS subheading 2711.11.00, -\$18.5 billion, -22.0 percent) and natural gas in its gaseous state (HTS subheading 2711.21.00, -\$10.8 billion, -41.7 percent).¹⁹⁹ Similarly, exports of coal, coke, and related chemical products, along with petroleum products, decreased significantly because bituminous coal (HTS subheading 2701.12.00) and distilled and residual fuel oil (testing 25

¹⁹⁵ USITC DataWeb/Census, digests EP002, accessed June 30, 2025.¹⁹⁶ USITC DataWeb/Census, digests EP001, accessed June 30, 2025.¹⁹⁷ USITC DataWeb/Census, digests EP004, accessed June 30, 2025.¹⁹⁸ USITC DataWeb/Census, digests EP002, accessed June 30, 2025.¹⁹⁹ USITC DataWeb/Census, digests EP006, accessed June 30, 2025.

degrees A.P.I. or less) (HTS subheading 2710.19.11) fell by \$3.8 billion (–11.6 percent) and \$12.9 billion (–12.3 percent), respectively.²⁰⁰

Despite these declines in certain energy product exports, the United States remained a net energy product exporter, achieving a record high of 30.9 quadrillion British thermal units in energy product exports in 2024, up 4.0 percent year over year from 2023.²⁰¹ This increase in energy product exports coincided with a rise in U.S. energy product consumption, particularly natural gas, which reached an all-time high of 34.2 quadrillion British thermal units in 2024.²⁰² However, this increase in consumption and exports was accompanied by a significant drop in prices of certain natural gas and crude petroleum products, leading to a decrease in the total value of these exports.²⁰³

The largest decreases in natural gas and component exports were observed in exports to Mexico, which experienced a decline of \$9.0 billion (–33.9 percent).²⁰⁴ Following Mexico, France recorded a decrease of \$5.2 billion (–40.8 percent).²⁰⁵ Regarding petroleum products, exports to Mexico also faced a significant decline of \$9.1 billion (–11.1 percent).²⁰⁶ Additionally, exports of coal, coke, and related chemical products to the Netherlands decreased by \$1.4 billion (–31.7 percent).²⁰⁷

The decline overall energy product exports, excluding nuclear materials and electrical energy, was primarily driven by higher domestic consumption in the United States and lower prices for certain energy products, which together reduced exports to certain trading partners. The largest export destinations for U.S. energy products were Mexico, the Netherlands, Canada, and South Korea, representing \$391.0 billion in U.S. exports between 2022 and 2024 ([table 4.4](#)). The countries where the United States increased exports were the Netherlands (18.1 percent), and China (4.5 percent). The countries where U.S. exports decreased the most were France (–23.1 percent), Mexico (–16.6 percent), and the United Kingdom (–14.0 percent). In total, U.S. exports of energy products decreased by 8.4 percent annual change from 2022 to 2024.

²⁰⁰ USITC DataWeb/Census, digests EP003 and EP005, accessed June 30, 2025.

²⁰¹ Energy exports are defined here as exports of coal, coal coke, natural gas, petroleum products, crude petroleum, biomass, and electricity. Energy, EIA, “U.S. Primary Energy Production, Consumption, and Exports Increased in 2024,” June 20, 2025.

²⁰² Energy, EIA, “U.S. Primary Energy Production, Consumption, and Exports Increased,” June 20, 2025.

²⁰³ EIA, “Spot Henry Hub Natural Gas Prices,” January 8, 2025; Energy, EIA, “Petroleum & Other Liquids—Data,” spot prices for crude oil and petroleum products,” November 19, 2025.

²⁰⁴ USITC DataWeb/Census, digests EP006, accessed June 30, 2025.

²⁰⁵ USITC DataWeb/Census, digests EP002, accessed June 30, 2025.

²⁰⁶ USITC DataWeb/Census, digests EP005, accessed June 30, 2025.

²⁰⁷ USITC DataWeb/Census, digests EP003, accessed June 30, 2025.

Table 4.4 Energy products: U.S. domestic exports by export market, 2022–24

In millions of dollars and percentages.

Destination market	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Mexico	60,000	47,469	41,690	-18,310	-16.6
Netherlands	24,513	30,035	34,200	9,688	18.1
Canada	35,567	30,734	28,915	-6,652	-9.8
South Korea	20,661	17,916	19,282	-1,379	-3.4
China	13,857	17,386	15,125	1,268	4.5
United Kingdom	20,200	14,957	14,940	-5,260	-14.0
Japan	13,405	12,427	12,401	-1,004	-3.8
India	14,585	11,041	11,053	-3,532	-12.9
Singapore	12,540	10,298	9,769	-2,771	-11.7
France	15,610	10,924	9,242	-6,368	-23.1
All other markets	158,409	127,947	130,154	-28,256	-9.4
Total	389,347	331,133	326,772	-62,576	-8.4

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Analytical Narratives

Explosion of Domestic Production: U.S. Energy Production Continues to Outpace Consumption

The U.S. energy product landscape is undergoing a remarkable transformation that began in 2019, characterized by an unprecedented surge in domestic production of crude petroleum and natural gas.²⁰⁸ Continuing between 2022 and 2024, advances in extraction technology, particularly in shale resources, propelled oil production to record highs, surpassing consumption rates and solidifying the U.S. position as a leading energy product exporter. This remarkable growth has been primarily concentrated in the Permian Basin states of Texas and New Mexico, even as overall rig activity declined.²⁰⁹ Crude petroleum and natural gas production experienced significant fluctuations, with robust output growth followed by a plateau due to declining prices. This evolving energy paradigm has altered the dynamics of domestic

²⁰⁸ In 2019, U.S. total energy product production exceeded total energy product consumption for the first time in over 60 years. Energy, EIA, “In 2019, U.S. Energy Production Exceeded Consumption,” April 28, 2020.

²⁰⁹ The Permian Basin is a one of the largest producing oil and gas producing regions in the United States, located in west Texas and southeastern New Mexico. Energy, EIA, “Permian Basin: Wolfcamp and Spraberry Shale,” March 2022, 7-8.

supply and shifted export patterns, with European markets emerging as key destinations for U.S. energy products.²¹⁰

Expansion of U.S. Crude Petroleum and Natural Gas Production

From 2022 through 2024, U.S. crude petroleum production increased significantly, reaching historic highs largely because of advances in shale extraction technology and improved well productivity, despite declining rig counts.²¹¹ Production grew rapidly in 2022 and 2023 before slowing in 2024. In 2022, the United States produced approximately 12 million barrels per day (mb/d) of crude petroleum.²¹² By 2023, output increased by about 940,000 barrels per day (b/d), reflecting an 8.0 percent gain that brought production to approximately 12.93 mb/d, surpassing previous records.²¹³ Notably, by December 2023, the monthly average production exceeded 13.3 mb/d.²¹⁴ Almost all of this growth from 2022 through 2023 originated from the Permian Basin, encompassing the states of Texas and New Mexico, which demonstrated significant contributions to U.S. output.²¹⁵

In 2024, production continued rising but at a slower pace. The U.S. Energy Information Administration (EIA) reported that crude petroleum production reached approximately 13.2 mb/d in 2024, an annual increase of 270,000 b/d.²¹⁶ Output in the Permian Basin reached approximately 6.3 mb/d, accounting for nearly 48 percent of total U.S. crude output by the end of 2024.²¹⁷ Conversely, several regions, including Alaska and the Gulf of America, experienced declines in crude petroleum output during this period.²¹⁸

The production gains from 2022 to 2024 occurred despite a drop in rig activity and oil-specific rigs in the lower 48 states fell approximately 18 percent in this time period.²¹⁹ In the Permian Basin, rig counts declined from 333 to 308 during this timeframe.²²⁰ However, technological improvements led to

²¹⁰ USITC DataWeb/Census, digests EP001–006, accessed June 30, 2025.

²¹¹ Shale extraction, also known as hydraulic fracturing or fracking, is a technique used to enable extraction of natural gas or crude petroleum from shale and other forms of “tight” rock. This process is achieved by injecting large quantities of water, chemicals, and sand into the rock formations at high pressures to crack the rock, allowing the trapped fossil fuels to flow to the surface. Energy, EIA, “More Productive Wells Spur U.S. Crude Oil Production,” March 5, 2024; NRDC, “Fracking 101,” April 19, 2019.

²¹² Energy, EIA, “Petroleum & Other Liquids: U.S. Field Production of Crude Oil, Annual,” August 29, 2025.

²¹³ Energy, EIA, “Petroleum & Other Liquids: U.S. Field Production of Crude Oil, Annual,” August 29, 2025.

²¹⁴ Energy, EIA, “Petroleum & Other Liquids: U.S. Field Production of Crude Oil, Monthly,” August 29, 2025; Energy, EIA, “More Productive Wells Spur U.S. Crude Oil Production,” March 5, 2024.

²¹⁵ Golding et al., “New Mexico Fuels U.S. Crude Oil Output,” March 24, 2025.

²¹⁶ Energy, EIA, “U.S. Crude Oil Production Rose by 2%,” April 16, 2025.

²¹⁷ Energy, EIA, “U.S. Crude Oil Production Rose by 2%,” April 16, 2025.

²¹⁸ Energy, EIA, “U.S. Crude Oil Production Rose by 2%,” April 16, 2025.

²¹⁹ Energy, EIA, “Short-Term Energy Outlook Data: 10a, Drill Productivity Metrics,” July 8, 2025.

²²⁰ Energy, EIA, “Short-Term Energy Outlook Data: 10a, Drill Productivity Metrics,” July 8, 2025.

productivity gains of about 9 percent per rig in the Permian Basin, driven by enhanced fracturing techniques, longer horizontal laterals, and advanced operational analytics.²²¹

Natural gas production displayed a trend related to the one seen in crude petroleum production. In 2022, U.S. natural gas production averaged approximately 119 billion cubic feet per day (Bcf/d).²²² In 2023, production rose by about 4.0 percent from a year earlier to 125 Bcf/d, supported by robust activity in the Appalachian (Marcellus and Utica) and Haynesville shale basins, as well as associated gas from oil-rich basins like the Permian.²²³ The expansion of pipeline infrastructure, such as the Matterhorn Express pipeline, helped alleviate constraints on natural gas takeaway capacity that had previously hampered gas production in the Permian Basin, supporting continued growth.²²⁴

However, 2024 saw a plateau in natural gas production. The EIA reported that 2024 production rose by approximately 0.4 bcf/d, down from the 5.0 bcf/d increase in 2022–23.²²⁵ The slower production growth in 2024 coincided with a drop in gas prices, which fell to about \$2.21 per million British thermal units (MMBtu)—the lowest average annual price in inflation-adjusted dollars ever recorded.²²⁶ The annual average Henry Hub natural gas spot price in 2024 decreased by about 16 percent from the 2023 average and was down roughly 68 percent from its 2022 average.²²⁷ The drastic decline in prices led to a reduction in overall trade values, even though production increased.²²⁸

Although the production trends for crude petroleum and natural gas from 2022 through 2024 were similar, they could see different trends going forward. EIA forecasts indicate that crude petroleum production will likely continue to grow in 2025, reaching about 13.4 mb/d. However, growth may slow or even decline slightly if prices remain suppressed.²²⁹ Conversely, natural gas production is projected to decrease slightly, averaging about 116 bcf/d in 2025, unless a significant market rebound occurs.²³⁰

²²¹ These technological improvements led to increased productivity outside of the Permian Basin as well. Longer horizontal laterals refer to extending the horizontal portion of a well to increase the surface area of the oil or gas exposed to the well. Energy, EIA, “Improved Efficiency Is Enabling . . . Production from Fewer Rigs,” December 23, 2024; Spencer, “US Upstream Industry Relying on Longer Lateral Drilling,” May 21, 2021.

²²² Energy, EIA, “U.S. Natural Gas Production Grew by 4% in 2022,” March 29, 2023.

²²³ Energy, EIA, “U.S. Natural Gas Production Grew by 4% in 2023, Similar to 2022,” March 27, 2024.

²²⁴ Natural gas takeaway capacity refers to the maximum volume that a pipeline system can transport away from a producing region or storage facility on a daily basis. Energy, EIA, “Natural Gas Pipeline Capacity from the Permian Basin Is Set to Increase,” September 10, 2024.

²²⁵ Energy, EIA, “U.S. Natural Gas Production Remained Flat in 2024,” April 17, 2025.

²²⁶ Energy, EIA, “Spot Henry Hub Natural Gas Prices,” January 8, 2025.

²²⁷ Energy, EIA, “Spot Henry Hub Natural Gas Prices,” January 8, 2025.

²²⁸ Energy, EIA, “U.S. Natural Gas Exports and Re-Exports,” July 31, 2025.

²²⁹ Energy, EIA, “Short-Term Energy Outlook,” July 8, 2025.

²³⁰ Energy, EIA, “Short-Term Energy Outlook, Natural Gas,” August 12, 2025.

Effects of Increased Production on U.S. Exports of Petroleum and Natural Gas Products

The significant increase in U.S. crude petroleum and natural gas production between 2022 and 2024 has notably transformed the export landscape. This surge in domestic output has allowed the United States to maintain its status as a net energy product exporter throughout this period, resulting in a rise in exports of crude petroleum, petroleum products, liquefied natural gas (LNG), and natural gas liquids (NGLs).²³¹

Following the removal of crude petroleum export restrictions in 2015, U.S. crude exports began to expand rapidly.²³² In 2022, crude exports averaged approximately 3.6 mb/d and continued to rise, reflecting increased domestic production that outpaced domestic consumption.²³³ In the first half of 2023, exports rose to about 3.99 mb/d, a nearly 19 percent increase year over year.²³⁴ By the end of 2023, annual average crude exports reached about 4.1 mb/d, about 13 percent higher compared to 2022.²³⁵ Export volumes in 2024 were relatively stable, increasing by only about 1 percent compared to 2023, in line with slower production growth, indicating healthy demand for U.S. crude in international markets, particularly from European and Asian buyers.²³⁶

Petroleum product exports also expanded during this time. In 2024, exports of gasoline, diesel, jet fuel, and other petroleum products rose to a record high of 6.6 mb/d, an 8.3 percent increase over 2023.²³⁷ Combined crude and refined petroleum product exports totaled about 10.8 mb/d in 2024, compared to about 8.5 mb/d in crude and petroleum product imports, making the United States a continued net exporter of crude and petroleum products.²³⁸

Export destination patterns shifted during this period; Europe emerged as the largest recipient of U.S. crude in 2024, importing 1.93 mb/d, a roughly 6 percent increase over the prior year.²³⁹ However, Asia and Oceania received roughly 1.58 mb/d, a decrease of about 131,000 barrels per day compared to 2023.²⁴⁰ Notably, Indian imports of U.S. crude petroleum grew by about 55,000 barrels per day, or

²³¹ Energy, EIA, “U.S. Primary Energy Production, Consumption, and Exports,” June 20, 2025.

²³² GAO, *Crude Oil Markets*, October 2020, 16-19.

²³³ Energy, EIA, “In 2022, U.S. Crude Oil Exports Increased,” March 30, 2023; Energy, EIA, “U.S. primary energy production, consumption, and exports increased in 2024,” June 20, 2025.

²³⁴ Energy, EIA, “U.S. Crude Oil Exports Reached a Record High,” October 10, 2023.

²³⁵ Energy, EIA, “U.S. Crude Oil Exports Reached a Record in 2023,” March 18, 2024.

²³⁶ Energy, EIA, “U.S. Crude Oil Exports Reached a New Record,” April 10, 2025.

²³⁷ Energy, EIA, “Distillate and Jet Fuel Contribute,” April 23, 2024.

²³⁸ Energy, EIA, “Distillate and Jet Fuel Contribute,” April 23, 2024; Energy, EIA, “FAQ: How Much Petroleum Does the United States Import and Export?,” March 24, 2024.

²³⁹ Energy, EIA, “U.S. Crude Oil Exports Reached a New Record in 2024,” April 10, 2025.

²⁴⁰ U.S. exports of crude petroleum products to Asia overall increased, yet exports to China specifically decreased by approximately 53 percent in 2024. Energy, EIA, “U.S. Crude Oil Exports Reached a New Record,” April 10, 2025.

around 32 percent, reflecting shifting global energy product trade flows amid the ongoing Russian invasion of Ukraine.²⁴¹

U.S. LNG exports grew significantly as well. In 2022, LNG exports averaged about 10.2 Bcf/d, trailing only Qatar and Australia.²⁴² In 2023, U.S. LNG exports rose to approximately 11.9 Bcf/d, a 12.0 percent annual increase, making the United States the largest LNG exporter globally.²⁴³ Peak monthly LNG export volumes in late 2023 reached 12.9 in November and 13.6 Bcf/d in December owing to high utilization rates, resulting in production exceeding nominal terminal export capacities.²⁴⁴ Europe and Asia accounted for about 66.0 percent and 26.0 percent (approximately 3.1 Bcf/d) of U.S. LNG exports, respectively, in 2023.²⁴⁵

In 2024, the United States remained the world's largest LNG exporter, though export volumes remained flat at 11.9 Bcf/d.²⁴⁶ However, the price of U.S. LNG exports fell by approximately 47.0 percent from 2022 to 2024, as reflected in the overall drop in export values of U.S. LNG.²⁴⁷ From 2023 to 2024, European LNG imports from the United States declined by 19.0 percent but Asian imports from the United States increased by about 26 percent, reflecting shifts in global demand.²⁴⁸

Exports of natural gas liquids (NGLs) also expanded. Ethane exports, a key petrochemical feedstock, surged to an all-time high of 537,000 b/d in March 2023, which was coupled with an increased domestic production of ethane from natural gas.²⁴⁹ Overall NGLs exports increased by about 321,000 b/d in 2023, serving growing markets primarily in Asia.²⁵⁰

The expansion of natural gas production, especially associated gas from oil reservoirs such as the Permian, supported LNG and NGLs export growth by increasing production volumes of LNG and NGLs,

²⁴¹ Energy, EIA, "U.S. Crude Oil Exports Reached a New Record in 2024," April 10, 2025.

²⁴² In 2021, the Freeport export terminal averaged 1.9 Bcf/d of LNG exports. If the terminal had not been shut down because of a fire on June 8, 2022, the United States may have been the leading global exporter of LNG in 2022. Energy, EIA, "Global Liquefied Natural Gas Trade Volumes Set a New Record in 2022," July 5, 2023; Energy, EIA, "Fire Causes Shutdown," June 23, 2022.

²⁴³ Energy, EIA, "The United States Was the World's Largest," April 1, 2024.

²⁴⁴ The EIA estimates that the utilization rate of U.S. LNG export capacity reached 104 percent in 2023. Energy, EIA, "The United States Was the World's Largest," April 1, 2024.

²⁴⁵ Energy, EIA, "The United States Was the World's Largest," April 1, 2024.

²⁴⁶ Energy, EIA, "The United States Remained the World's Largest," March 27, 2025.

²⁴⁷ Energy, EIA, "Natural Gas: Price of Liquefied," July 31, 2025.

²⁴⁸ As stated in the previous section, U.S. LNG exports to Europe decreased because of lower LNG consumption and high storage inventories. Energy, EIA, "The United States Remained the World's Largest," March 27, 2025.

²⁴⁹ Energy, EIA, "U.S. Ethane Exports Set a Monthly Record," June 12, 2023; Energy, EIA, "U.S. Ethane Production Established a New Record in April 2023," September 13, 2023.

²⁵⁰ Dallas Fed, "Energy Indicators," January 24, 2024.

even as dedicated natural gas production slowed.²⁵¹ Infrastructure investments, including new pipelines from the Permian and LNG terminal expansions, enabled higher exports.²⁵²

Changes in U.S. production allowed for larger export volumes globally, filling in supply gaps in Europe. The shift away from Russian energy product imports following the country's 2022 invasion of Ukraine; the invasion led Europe to rely heavily on U.S. LNG and crude imports. In 2023, the European (including Turkey) share of U.S. LNG exports spiked to 7.8 Bcf/d and U.S. crude replaced Russian oil in European refineries.²⁵³

By 2024, U.S. export growth began to plateau. Softer demand in Asia and Europe, increased renewable energy use, and logistical challenges in LNG shipping slowed global demand.²⁵⁴ LNG prices declined, reducing export revenues despite steady export volumes. Crude exports also saw limited growth because of production constraints and heightened competition in global markets.

Energy product exports significantly improved the U.S. energy trade balance. Increases in these energy product exports contributed to the status of the United States as a net energy product exporter.²⁵⁵ Notably, the energy sector was the only one covered in this working paper with a positive trade balance.

From 2022 to 2024, U.S. crude petroleum and natural gas production growth drove record-high exports of crude, refined products, LNG, and NGLs. This increased production reshaped global energy product flows. Export volumes peaked and stabilized by 2024 amid shifting market dynamics, allowing the United States to maintain its position as a leading global energy product exporter.

The Russian Invasion of Ukraine and Shifts in Global Energy Markets: How the Invasion Has Changed U.S. Imports and Exports of Energy Products

The Russian invasion of Ukraine has significantly transformed the landscape of global energy markets, particularly affecting the dynamics of energy supply and demand among the United States, Russia, and

²⁵¹ Associated natural gas production is natural gas produced in crude petroleum reservoirs either as free gas or as gas in solution with crude petroleum. Energy, EIA, "U.S. Associated Natural Gas Production Increased," November 13, 2024.

²⁵² Energy, EIA, "Natural Gas Pipeline Capacity from the Permian Basin," September 10, 2024.

²⁵³ Energy, EIA, "The United States was the world's largest liquefied natural gas exporter in 2023," April 1, 2024,

²⁵⁴ Multiple global chokepoints exist in the maritime transport of energy products. Chokepoints are defined by the EIA as narrow channels along widely used global sea routes that are critical to global energy security. Major chokepoints of concern include the Panama Canal, the Strait of Malacca, the Suez Canal, and the Turkish Straits, among others. All these chokepoints hold a maximum transport capacity that restricts the movement of energy products, leading to higher shipping costs and energy prices. Energy, EIA, "2024 World Oil Transit Chokepoints," June 25, 2024.

²⁵⁵ Energy, EIA, "U.S. Primary Energy Production, Consumption, and Exports Increased in 2024," June 20, 2025.

the European Union (EU). Historically, Russia has been a principal energy product supplier to Europe, but the invasion of Ukraine has triggered a series of sanctions that have reshaped energy product dependencies. This section examines the extent to which the invasion has altered U.S. energy product imports and exports, highlighting the reductions in U.S. imports of Russian energy products and the concurrent rise in U.S. energy product exports, particularly to Europe.

Russian Energy Products in Global Markets and Western Sanctions

Russia holds importance in the global energy market—primarily because the country remains one of the largest producers and exporters of petroleum, coal, and natural gas—and is an Organization of the Petroleum Exporting Countries plus (OPEC+) member. As of early 2022, Russia was the world’s third-largest petroleum producer, with a daily output of 11 million barrels per day (mb/d), of which 10 mb/d were crude petroleum.²⁵⁶ This large production made Russia the largest exporter of oil globally, supplying about 60.0 percent of its oil exports to Europe and the United Kingdom.²⁵⁷ Additionally, before the invasion, Russian natural gas accounted for approximately 25 percent of total gas supply in Europe, with a considerable portion of this gas transiting through pipelines in Ukraine.²⁵⁸

By late 2021, Russia had already begun reducing its pipeline deliveries to Europe; after the invasion in early 2022, its reliance on Western markets diminished.²⁵⁹ Following the invasion of Ukraine, several countries, including the United States, the UK, and the EU, implemented sanctions aimed at curtailing Russia’s energy product exports, leading to further declines in pipeline gas and other energy product supplies to Europe.²⁶⁰ In response to sanctions, Russia redirected its energy product exports toward Asia and Oceania; Russian coal, crude petroleum, petroleum products, and natural gas exports to Asia and Oceania rising to roughly 85 percent, 63 percent, 36 percent, and 30 percent market shares, respectively, in those markets by 2024 ([figure 4.1](#)).²⁶¹ This shift marks a critical change in energy product trading patterns, transforming Russia from a key energy product supplier for Europe into a more dominant player in the Asian market, necessitating that Europe find alternative sources for energy products.

²⁵⁶ IEA, *Russian Supplies to Global Energy Markets*, February 2022.

²⁵⁷ IEA, *Russian Supplies to Global Energy Markets*, February 2022.

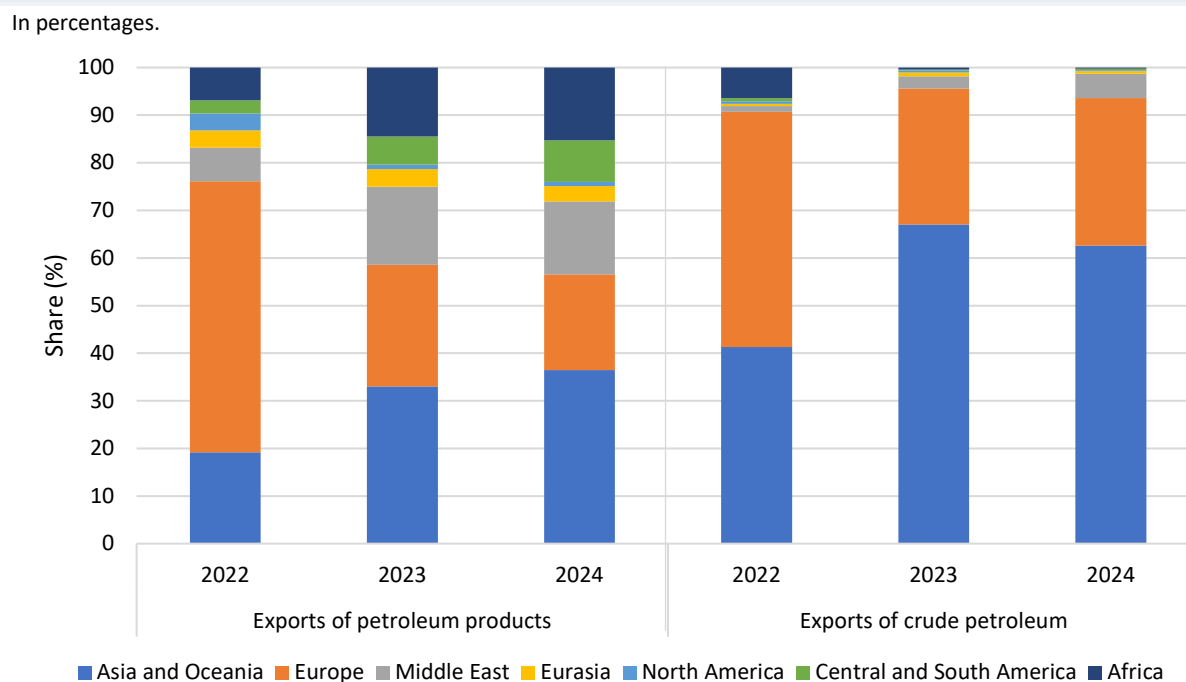
²⁵⁸ IEA, *Russian Supplies to Global Energy Markets*, February 2022.

²⁵⁹ In the lead-up to Russia’s full invasion of Ukraine, Russia began reducing pipeline gas exports to Europe, resulting in pipeline deliveries reducing by 25 percent year over year in the fourth quarter of 2021. The United States was able to supply more than half of the additional LNG needed, accounting for 37 percent of total LNG supplies at the beginning of 2022. IEA, “*Russian Supplies to Global Energy Markets*,” February 2022.

²⁶⁰ See, e.g., Exec. Order No. 14,066, 87 Fed. Reg. 13,625.

²⁶¹ Russian exports of energy products may be understated because of its use of a “shadow fleet.” Such a fleet obscures the ownership of the tankers and masks the origin of the Russian oil they carry. Strategies such as repeated ship-to-ship transfers of liquid cargo, blending oil from multiple countries, spoofing ship location data, and blackouts of the automatic identification system have enabled Russia to bypass some of the sanctions imposed by Western governments on its energy products. Energy, EIA, “*Country Analysis Brief: Russia*,” July 24, 2025, 12; Brooks and Harris, “*Where Did Russia’s Shadow Fleet Come From?*,” February 27, 2025.

Figure 4.1 Share of exports of petroleum products and crude petroleum from Russia by destination region, 2022–24



Source: Energy, EIA, “Country Analysis Brief: Russia,” July 24, 2025.

Notes: These graphics were adapted from publicly available EIA data. Individual percentages may not add to the total because of rounding.

The United States and the European Union, along with other allies, have implemented stringent measures aimed at limiting the import of Russian energy products in response to the Russian invasion of Ukraine. The EU’s sanctions include bans on the importation of Russian coal and a phased prohibition on the imports of crude and refined petroleum products that went into effect in two phases, effective December 2022 and February 2023, respectively.²⁶² Additionally, the EU, the United States, and their G7 allies set price caps on maritime transport of Russian oil to third countries to restrict revenue flows to the Russian government but not completely upend the global energy market.²⁶³ Meanwhile, in March 2022, the United States enacted bans on the import of Russian crude petroleum, petroleum products,

²⁶² Northam, “Europe Bans Russian Oil Products,” February 5, 2023; Trainer et al., “Sanctions by The Numbers,” April 4, 2024; EC, “Timeline—EU Sanctions against Russia,” accessed July 29, 2025.

²⁶³ The price cap was designed under the Price Cap Coalition of G7 nations aimed at restricting Russia’s ability to gather revenue from energy sales, still allowing for some level of supply to prevent significant disruptions in global energy markets. At the end of 2024, the price caps were set at \$60 per barrel for crude petroleum, \$100 per barrel for petroleum products that trade at a premium, and \$45 per barrel for petroleum products that trade at a discount. Treasury, “The Price Cap on Russian Oil,” February 8, 2025; EC, “Timeline—EU Sanctions against Russia,” accessed July 29, 2025.

natural gas, coal, and coal products and, in 2024, expanded the ban to include certain nuclear fuels.²⁶⁴ These coordinated actions reflect a comprehensive strategy by Western governments to reduce dependence on Russian fossil fuels, resulting in Europe seeking alternative supply to promote its own energy security.²⁶⁵

The Rise of U.S. Energy Product Exports to the EU

As shown in figure 4.1, Russia's export share of both crude petroleum and petroleum products to the EU drastically decreased after 2022. This decline was mainly due to sanctions imposed on Russian energy exports and Russia's deliberate reduction in pipeline deliveries to Europe before the onset of the invasion.²⁶⁶ This situation created an opportunity for the United States to fill the gap. The United States provided over half of the additional LNG required by the EU by early 2022, which accounted for 37.1 percent of total EU LNG supplies.²⁶⁷

In 2022, the United States exported \$20.2 billion worth of natural gas products to the EU, marking a 132.9 percent increase from the previous year.²⁶⁸ Since then, export values have slightly decreased, primarily because of lower natural gas consumption and high storage inventories in the EU, along with a decrease in natural gas prices.²⁶⁹ Looking ahead, LNG import capacity in the EU and the UK is expected to expand by more than 40 percent and is projected to continue growing into 2024, when new and upgraded regasification facilities in Croatia, Cyprus, and Italy will come online.²⁷⁰

Exports of crude petroleum products to the EU also increased significantly at the beginning of 2022, with a 103.2 percent rise compared to 2021.²⁷¹ The increases persisted into 2024, with total crude petroleum exports growing by \$7.7 billion from 2022 to 2024.²⁷² In 2024, U.S. crude petroleum exports reached record high levels, with the majority directed toward the EU, particularly to the Netherlands.²⁷³

The Netherlands, which has a large crude petroleum storage and trading hub in Rotterdam, imported more U.S. crude petroleum than any other country in 2024, averaging 825,000 barrels per day—a 32.3 percent increase from a year earlier.²⁷⁴ Furthermore, exports of petroleum products to the EU also saw a notable increase from 2022 to 2024, with an average annual growth rate of 28.5 percent, reflecting an increase of \$4.8 billion.²⁷⁵

²⁶⁴ Certain U.S. companies can apply for waivers until 2028 to circumvent the nuclear fuel ban. Executive Order No. 14066, 87 FR 13625 (March 10, 2022); CFR, "Three Years of War in Ukraine," July 14, 2025.

²⁶⁵ IEA, "Russia's War on Ukraine: Analyzing the Impacts," accessed December 1, 2025.

²⁶⁶ IEA, "Russian Supplies to Global Energy Markets," February 2022.

²⁶⁷ IEA, "Russian Supplies to Global Energy Markets," February 2022.

²⁶⁸ USITC DataWeb/Census, digests EP001–006, accessed June 30, 2025.

²⁶⁹ IEA, "Russian Supplies to Global Energy Markets," February 2022.

²⁷⁰ Energy, EIA, "The United States Remained the World's Largest," March 27, 2025.

²⁷¹ USITC DataWeb/Census, digests EP004, accessed June 30, 2025.

²⁷² USITC DataWeb/Census, digests EP004, accessed June 30, 2025.

²⁷³ Energy, EIA, "U.S. Crude Oil Exports Reached a New Record in 2024," April 10, 2025.

²⁷⁴ Energy, EIA, "U.S. Crude Oil Exports Reached a New Record in 2024," April 10, 2025.

²⁷⁵ USITC DataWeb/Census, digests EP005, accessed June 30, 2025.

Decreases in U.S. Energy Product Imports from Russia

The impact of sanctions on Russia on U.S. energy product imports has been less significant than EU imports from Russia because the trade relationship between the two countries concerning energy products is more limited.²⁷⁶ However, these sanctions have led to a reduction in imports of most Russian energy products into the United States. As a result, Russia has dropped from being the fourth-largest source of petroleum product imports to one of the lowest, with imports decreasing by \$4.6 billion in 2024 compared to 2022—a decrease of 99.9 percent.²⁷⁷ Additionally, all imports of coal, coke, and related chemical products; crude petroleum; and natural gas and components fell from values ranging in the tens to hundreds of millions of dollars in 2022 to zero in 2024 ([table 4.5](#)).

Table 4.5 U.S. general imports from Russia, by product group, 2022–24

In millions of dollars and percentages

Product group (digest)	2022	2023	2024	Absolute change,	Average change,
	(million \$)	(million \$)	(million \$)	2022–24 (million \$)	2022–24 (%)
Nuclear materials	871	1,218	670	-201	-12.3
Petroleum products	4,567	0	**	-4,567	-99.9
Coal, coke, and related chemical products	7	0	0	-7	-100.0
Crude petroleum	511	1	0	-511	-100.0
Natural gas and components	29	0	0	-29	-100.0
Total	5,985	1,219	670	-5,315	-66.5

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

²⁷⁶ CRS, *The Economic Impact of Russia Sanctions*, February 20, 2025, 2.

²⁷⁷ USITC DataWeb/Census, digests EP005, accessed February 22, 2022.

Bibliography

- Baskaran, Gracelin. “Canadian Tariffs Will Undermine U.S. Minerals Security.” Center for Strategic and International Studies, January 29, 2025. <https://www.csis.org/analysis/canadian-tariffs-will-undermine-us-minerals-security>.
- Brooks, Robin, and Ben Harris. “Where Did Russia’s Shadow Fleet Come from?” Brookings Institution, February 27, 2025. <https://www.brookings.edu/articles/where-did-russias-shadow-fleet-come-from/>.
- Trainer, Jocelyn, Nicholas Lokker, Kristen Taylor, and Uliana Certan. “Sanctions by The Numbers: The Russian Energy Sector.” Center for a New American Security (CNAS), April 4, 2024. <https://www.cnas.org/publications/reports/sanctions-by-the-numbers-the-russian-energy-sector>.
- Congressional Research Service (CRS). *The Economic Impact of Russia Sanctions*. In Focus, February 20, 2025. <https://www.congress.gov/crs-product/IF12092>.
- Congressional Research Service (CRS). *U.S. Coal Industry Trends*. Report No. 48587. June 30, 2025. <https://www.congress.gov/crs-product/R48587>.
- Council on Foreign Relations (CFR). “Three Years of War in Ukraine: Are Sanctions Against Russia Making a Difference?” July 14, 2025. <https://www.cfr.org/in-brief/three-years-war-ukraine-are-sanctions-against-russia-making-difference>.
- Executive Order 14066. “Prohibiting Certain Imports and New Investments With Respect to Continued Russian Federation Efforts to Undermine the Sovereignty and Territorial Integrity of Ukraine.” *Federal Register* 87, no. 46 (March 10, 2022): 13625. <https://www.federalregister.gov/d/2022-05232>.
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). “Permian Basin: Wolfcamp and Spraberry Shale Plays of the Midland Sub-Basin.” March 2022. https://www.eia.gov/maps/pdf/Permian-p2_Spraberry_Midland.pdf.
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). “2024 World Oil Transit Chokepoints.” June 25, 2024. https://www.eia.gov/international/analysis/special-topics/World_Oil_Transit_Chokepoints.
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). “Short-Term Energy Outlook Data: 10a, Drill Productivity Metrics.” July 8, 2025. <https://www.eia.gov/outlooks/steo/tables/pdf/10atab.pdf>.
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). “Country Analysis Brief: Russia.” July 24, 2025. URL.
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). “Natural Gas—Data.” Price of liquefied U.S. natural gas exports, annual. July 31, 2025. <https://www.eia.gov/dnav/ng/hist/n9133us3A.htm>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). “Natural Gas—Data.” U.S. natural gas exports and re-exports by country, annual. July 31, 2025. https://www.eia.gov/dnav/ng/ng_move_expc_s1_a.htm.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). “Petroleum & Other Liquids: U.S. Field Production of Crude Oil, Annual.” August 29, 2025. <https://www.eia.gov/dnav/pet/hist/leafhandler.ashx?n=pet&s=mcrfps2&f=m>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). “Petroleum & Other Liquids—Data.” U.S. field production of crude oil, monthly. August 29, 2025. <https://www.eia.gov/dnav/pet/hist/leafhandler.ashx?n=pet&s=mcrfps2&f=m>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). “Petroleum and Other Liquids—Data.” Spot prices for crude oil and petroleum products; crude oil, WTI-Cushing, Oklahoma.” November 19, 2025. https://www.eia.gov/dnav/pet/pet_pri_spt_s1_a.htm.

European Council (EC). “Timeline—EU Sanctions against Russia.” Consilium. Accessed July 29, 2025. <https://www.consilium.europa.eu/en/policies/sanctions-against-russia/timeline-sanctions-against-russia/>.

Executive Office of the President (EOP). Executive Order 14066—Prohibiting Certain Imports and New Investments With Respect to Continued Russian Federation Efforts to Undermine the Sovereignty and Territorial Integrity of Ukraine. 87 *Fed. Reg.* 13625. March 10, 2022. <https://www.federalregister.gov/documents/2022/03/10/2022-05232/prohibiting-certain-imports-and-new-investments-with-respect-to-continued-russian-federation-efforts>.

Federal Reserve Bank of Dallas (Dallas Fed). “Energy Indicators.” January 24, 2024. <https://www.dallasfed.org/research/energy/indicators/2024/en2402>.

Golding, Garrett, Diego Morales-Burnett, and Kunal Patel. “New Mexico Fuels U.S. Crude Oil Output, Funding for Local Programs.” Federal Reserve Bank of Dallas, March 24, 2025. <https://www.dallasfed.org/research/swe/2025/swe2504>.

Fernandez, Andres, Jose V. Zapata, Gabriel Caballero Jr, Jonathan M. Epstein, Ronald A. Oleynik, Andrew K. McAllister, and Daniel A. Noste. “OFAC Revokes General License 44 Related to Venezuela’s Oil and Gas Sector.” Holland & Knight, May 23, 2024. <https://www.hklaw.com/en/insights/publications/2024/04/ofac-revokes-general-license-44-related-to-venezuelas-oil>.

International Energy Agency (IEA). *Russian Supplies to Global Energy Markets*, February 2022. <https://www.iea.org/reports/russian-supplies-to-global-energy-markets>.

International Energy Agency (IEA). “Russia’s War on Ukraine: Analyzing the Impacts on Energy Markets and Energy Security.” Accessed December 1, 2025. <https://www.iea.org/topics/russias-war-on-ukraine>.

Natural Resources Defense Council (NRDC). "Fracking 101." April 19, 2019.
<https://www.nrdc.org/stories/fracking-101>.

Northam, Jackie. "Europe Bans Russian Oil Products, the Latest Strike on the Kremlin War Chest."
National Public Radio, February 5, 2023. <https://www.npr.org/2023/02/03/1153833640/europe-russian-oil-products-ban>.

U.S. Department of the Treasury (Treasury). Office of Foreign Assets Control (OFAC). "Guidance on Implementation of the Price Cap Policy for Crude Oil and Petroleum Products of Russian Federation Origin." December 20, 2023.
<https://ofac.treasury.gov/media/931036/download?inline>.

Spencer, Starr. "US Upstream Industry Relying on Longer Lateral Drilling to Boost Cash Flows." S&P Global. Commodity Insights, May 21, 2021. <https://www.spglobal.com/commodity-insights/en/news-research/latest-news/crude-oil/052121-us-upstream-industry-relying-on-longer-lateral-drilling-to-boost-cash-flows>.

U.S. Department of the Treasury (Treasury). "Treasury Issues Venezuela General License 41 Upon Resumption of Mexico City Talks." U.S. Department of the Treasury, February 8, 2025.
<https://home.treasury.gov/news/press-releases/jy1127>.

U.S. Department of the Treasury (Treasury). "The Price Cap on Russian Oil: A Progress Report." U.S. Department of the Treasury, February 8, 2025. <https://home.treasury.gov/news/featured-stories/the-price-cap-on-russian-oil-a-progress-report>.

U.S. Department of the Treasury (Treasury). Office of Foreign Asset Controls (OFAC). "General License No. 44." Accessed November 25, 2025. <https://ofac.treasury.gov/media/932231/download?inline>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). "In 2019, U.S. Energy Production Exceeded Consumption for the First Time in 62 Years." April 28, 2020.
<https://www.eia.gov/todayinenergy/detail.php?id=43515>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). "Fire Causes Shutdown of Freeport Liquefied Natural Gas Export Terminal." June 23, 2022.
<https://www.eia.gov/todayinenergy/detail.php?id=52859>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). "U.S. Natural Gas Production Grew by 4% in 2022." March 29, 2023.
<https://www.eia.gov/todayinenergy/detail.php?id=56000>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). "In 2022, U.S. Crude Oil Exports Increased to a New Record, 3.6 Million Barrels a Day." March 30, 2023.
<https://www.eia.gov/todayinenergy/detail.php?id=56020>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). "U.S. Ethane Exports Set a Monthly Record in March 2023." June 12, 2023.
<https://www.eia.gov/todayinenergy/detail.php?id=56780>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). “Natural Gas Imports and Exports.” June 30, 2023. <https://www.eia.gov/energyexplained/natural-gas/imports-and-exports.php>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). “Global Liquefied Natural Gas Trade Volumes Set a New Record in 2022.” July 5, 2023. <https://www.eia.gov/todayinenergy/detail.php?id=57000>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). “U.S. Ethane Production Established a New Record in April 2023.” September 13, 2023. <https://www.eia.gov/todayinenergy/detail.php?id=60362>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). “U.S. Crude Oil Exports Reached a Record High in First Half of 2023.” October 10, 2023. <https://www.eia.gov/todayinenergy/detail.php?id=60622>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). “Venezuela’s Heavy Crude Oil Output Increases Are Limited Following U.S. Sanctions Relief.” October 23, 2023. <https://www.eia.gov/todayinenergy/detail.php?id=60762>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). “More Productive Wells Spur U.S. Crude Oil Production Higher.” March 5, 2024. <https://www.eia.gov/todayinenergy/detail.php?id=61523>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). “U.S. Crude Oil Exports Reached a Record in 2023.” March 18, 2024. <https://www.eia.gov/todayinenergy/detail.php?id=61584>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). “FAQ: How Much Petroleum Does the United States Import and Export?” March 24, 2024. <https://www.eia.gov/tools/faqs/faq.php?id=727&t=6>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). “U.S. Natural Gas Production Grew by 4% in 2023, Similar to 2022.” March 27, 2024. <https://www.eia.gov/todayinenergy/detail.php?id=61646>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). “The United States Was the World’s Largest Liquefied Natural Gas Exporter in 2023.” April 1, 2024. <https://www.eia.gov/todayinenergy/detail.php?id=61683>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). “Distillate and Jet Fuel Contribute to Record U.S. Petroleum Product Exports in 2024.” April 23, 2024. <https://www.eia.gov/todayinenergy/detail.php?id=65084>.

- U.S. Department of Energy (Energy). Energy Information Administration (EIA). "Country Analysis Brief: Guyana." May 29, 2024. https://www.eia.gov/international/content/analysis/countries_long/Guyana/pdf/Guyana%202024%20CAB.pdf.
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). "Last year's U.S.-Canada energy trade was valued around \$150 billion." July 30, 2025. <https://www.eia.gov/todayinenergy/detail.php?id=65825>
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). "Natural Gas Pipeline Capacity from the Permian Basin Is Set to Increase." September 10, 2024. <https://www.eia.gov/todayinenergy/detail.php?id=63044>.
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). "The United States was the world's largest liquefied natural gas exporter in 2023." April 1, 2024. <https://www.eia.gov/todayinenergy/detail.php?id=61683>
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). "U.S. Electricity Exports to Canada Have Increased since September 2023." November 12, 2024. <https://www.eia.gov/todayinenergy/detail.php?id=63684>.
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). "U.S. Associated Natural Gas Production Increased Nearly 8% in 2023." November 13, 2024. <https://www.eia.gov/todayinenergy/detail.php?id=63704>.
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). "Improved Efficiency Is Enabling Record U.S. Crude Oil Production from Fewer Rigs." December 23, 2024. <https://www.eia.gov/todayinenergy/detail.php?id=64124>.
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). "Spot Henry Hub Natural Gas Prices Hit a Historic Low in 2024." January 8, 2025. <https://www.eia.gov/todayinenergy/detail.php?id=64184>.
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). "U.S. Nuclear Generators Import Nearly All the Uranium Concentrate They Use." January 30, 2025. <https://www.eia.gov/todayinenergy/detail.php?id=64444>.
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). "The United States Remained the World's Largest Liquefied Natural Gas Exporter in 2024." March 27, 2025. <https://www.eia.gov/todayinenergy/detail.php?id=64844>.
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). "U.S. Crude Oil Exports Reached a New Record in 2024." April 10, 2025. <https://www.eia.gov/todayinenergy/detail.php?id=64964>.
- U.S. Department of Energy (Energy). Energy Information Administration (EIA). "U.S. Crude Oil Production Rose by 2% in 2024." April 16, 2025. <https://www.eia.gov/todayinenergy/detail.php?id=65024>.

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U.S. Department of Energy (Energy). Energy Information Administration (EIA). "U.S. Natural Gas Production Remained Flat in 2024." April 17, 2025.

<https://www.eia.gov/todayinenergy/detail.php?id=65025>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). "U.S. Primary Energy Production, Consumption, and Exports Increased in 2024." June 20, 2025.

<https://www.eia.gov/todayinenergy/detail.php?id=65524>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). "Short-Term Energy Outlook." July 8, 2025. <https://www.eia.gov/outlooks/steo/>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). "Short-Term Energy Outlook, Natural Gas." August 12, 2025. <https://www.eia.gov/outlooks/steo/report/natgas.php>.

U.S. Government Accountability Office (GAO). *Crude Oil Markets: Effects of the Repeal of the Crude Oil Export Ban*. Report to Congressional Requestors GAO-21-118. October 2020.

<https://www.gao.gov/assets/gao-21-118.pdf>.

U.S. International Trade Commission Interactive Tariff and Trade DataWeb (USITC DataWeb)/U.S. Census Bureau (Census). Accessed various dates. <http://dataweb.usitc.gov>.

Chapter 5:

Forest Products

U.S. forest product imports and exports decreased between 2022 and 2024.²⁷⁸ Imports decreased by an average of 9.7 percent over this period, from \$66.9 billion in 2022 to \$54.6 billion in 2024.²⁷⁹ Exports decreased by an average of 6.2 percent, from \$41.3 billion in 2022 to \$36.3 billion in 2024.

Imports of Forest Products

U.S. forest product imports declined across most product digests from 2022 to 2024. Residual demand shifts from the effects of the COVID-19 pandemic contributed to an increase in imports of some paper products, but the decrease in imports of other wood products was much greater.

Among the forest product sector digests, the only increases in imports from 2022 to 2024, by value, were industrial paper and paperboards and miscellaneous paper products ([table 5.1](#)).²⁸⁰ The largest drivers of industrial paper and paperboard product imports were sanitary products, such as toilet paper, facial tissues, pads, tampons, and diapers, among others. The growth of tissue and other sanitary product imports was a result of the easing of the effects of the COVID-19 pandemic and cyclical changes in demand. Tissue product consumption suddenly increased in 2020, when consumers began stockpiling products at the onset of the pandemic. When stockpiling subsided, consumption dipped in 2021; consumption rebounded in 2022 and is expected to remain at pre-COVID-19-pandemic growth rates.²⁸¹

The largest drivers of miscellaneous paper products were stationery products (binders, folders, notebooks, etc.) and various types of paper dishware (plates, trays, cups, etc.). Similar to tissue products, consumption of paper dishware increased during the COVID-19 pandemic primarily because of growth in demand for takeout and delivery food services. In addition, consumer preferences for single-use products during the COVID-19 pandemic and growing demand for sustainability contributed to steady growth in the consumption of paper dishware products.²⁸²

²⁷⁸ The USITC separates the forest products sector into 16 digests. Each USITC sector digest encompasses various 8-digit subheadings in the *Harmonized Tariff Schedule of the United States* (HTS). For a complete list of HTS subheadings classified in a particular sector or digest, see this data [table](#).

²⁷⁹ Percentage changes included in trade data tables 5.1–5.4 are the average annual change from 2022 to 2024 and not a simple percentage change in 2024 relative to 2022. The average annual change is presented in the form of compound annual growth rates and is referred to as average change or average annual change in this working paper.

²⁸⁰ Industrial papers and paperboards refer to a variety of paper products used for applications other than printing and writing. Miscellaneous paper products include notebooks, binders and folders, paper plates and dishes, and other paper products not specified elsewhere in HTS chapter 48. USITC DataWeb/Census, accessed June 30, 2025.

²⁸¹ Consumption was primarily affected in the “away from home” sector, such as office buildings, as remote work trends continued into 2021. Uutela, “2022 Tissue Demand Was Revived,” August 2, 2023.

²⁸² Markwide Research, *US Paper Cups and Paper Plates Market Analysis*, May 2025.

Table 5.1 Forest products: changes in U.S. imports by product group, 2022–24

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change 2022–24 (million \$)	Average change, 2022–24 (%)
Industrial papers and paperboards	8,628	8,184	9,125	497	2.8
Miscellaneous paper products	3,777	3,578	3,955	177	2.3
Certain specialty papers	1,089	998	1,051	–38	–1.7
Printed matter	5,392	4,807	5,290	–102	–1.0
Tools and tool handles of wood	584	443	473	–111	–10.0
Paper boxes and bags	3,491	3,141	3,261	–230	–6.6
Miscellaneous articles of wood	2,522	1,990	2,055	–468	–9.7
Printing and writing papers	4,217	2,936	3,137	–1,080	–13.8
Moldings, millwork, and joinery	5,605	4,271	4,212	–1,393	–13.3
Wood veneer and wood panels	10,817	6,716	7,346	–3,471	–17.6
Lumber	12,269	7,407	7,295	–4,974	–22.9
All other digests	8,468	6,867	7,374	–1,094	–12.9
Total	66,859	51,338	54,573	–2,286	–9.7

Source: USITC DataWeb/Census, accessed June 30, 2025.

Notes: Average change is calculated using the compound annual growth rate formula. When a sector contains more than 10 digests, digest tables display the five largest positive value changes followed by the 5 largest negative changes over 2022–24. Full digest tables are available in Appendix A.

The largest decreases in imports from 2022 to 2024, by value, were lumber, wood veneer and wood panels, printing and writing papers, moldings and millwork, and tools and tool handles made of wood ([table 5.1](#)). Most of these decreases (lumber, wood panels, and moldings) were driven by decreases in demand for new housing construction in 2023.²⁸³

The top five countries that supplied U.S. imports of forest products in 2024 were Canada, China, Brazil, Mexico, and Vietnam. During 2022–24, Mexico and Vietnam had the largest increases in forest products imported into the United States ([table 5.2](#)). The largest driver of imports from Mexico was wood pulp and recovered paper, which increased by over 155 percent on average during 2022–24. Specifically, imports of old corrugated containers (OCC) increased almost fivefold, and imports of unsorted wastepaper increased twofold over this period.²⁸⁴ The largest drivers of imports from Vietnam were of logs and rough wood products, industrial papers and paperboards, and printed matter, all of which increased more than 100 percent, on average, during 2022–24.²⁸⁵

²⁸³ Single family home-building decreased by over 5 percent from 2022 to 2023. Census, “Housing Units Started: United States,” Accessed September 19, 2025. See the “U.S. Monetary Policy and the Impacts on Lumber and Other Wood Imports” section for more information.

²⁸⁴ USITC DataWeb/Census, digest FP009, accessed June 30, 2025. U.S. demand for imported recovered paper products increased as a result of domestic supply constraints from office closures during the COVID-19 pandemic. See “Demand Changes and Declining Recovered Paper Exports” section for more information on U.S. demand.

²⁸⁵ USITC DataWeb/Census, digests FP001, FP011, and FP016, accessed June 30, 2025.

U.S. imports from Chile, Germany, Sweden, Indonesia, and Canada saw the largest average decreases during that period. Canada—the largest U.S. trading partner for forest products, accounting for almost 40 percent of imports in 2024—saw a 12.1 percent average decrease during 2022–24.²⁸⁶ The United States imports much of its softwood lumber from Canada. As previously mentioned, the decrease in lumber imports was largely attributable to the decrease in demand for new housing. As such, U.S. imports from Canada were impacted by this decrease in demand. While representing the four largest decreases in imports, Chile, Germany, Sweden, and Indonesia collectively made up only about 10 percent of U.S. forest product imports in 2024.

Table 5.2 Forest products: U.S. general imports by import source, 2022–24

In millions of dollars and percentages.

Import source	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change 2022–24 (million \$)	Average change, 2022–24 (%)
Canada	27,517	20,813	21,252	-6,264	-12.1
China	8,915	6,838	7,266	-1,649	-9.7
Brazil	4,655	3,306	3,622	-1,033	-11.8
Mexico	2,994	3,014	3,203	209	3.4
Vietnam	1,918	1,678	2,064	146	3.7
Germany	2,699	1,951	1,864	-834	-16.9
Finland	1,294	1,149	1,264	-30	-1.2
Indonesia	1,657	1,033	1,250	-406	-13.1
Chile	1,811	1,117	1,138	-673	-20.7
Sweden	1,424	1,056	1,069	-355	-13.3
All other sources	11,976	9,383	10,579	-1,397	-6.0
Total	66,859	51,338	54,573	-12,286	-9.7

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Exports of Forest Products

U.S. exports of forest products declined across most product digests from 2022 to 2024. Weak demand in key industries drove exports down during this period. Some smaller digests, namely newsprint and wooden containers, saw steep levels of growth, but the larger digests offset the growth for an overall decline in forest product exports by about 6 percent on average during 2022–24. Exports decreased the largest in Asian markets. Exports to Canada and Mexico, the largest export markets for U.S. forest products, declined only slightly between 2022 and 2024.

From 2022 to 2024, the only increases in exports, by value, were in wooden containers, logs and rough wood products, and newsprint ([table 5.3](#)). Although newsprint was the digest that saw the sharpest average increase, it accounted for less than 0.2 percent of total U.S. domestic exports of forest products during 2022–24. Exports of wooden containers increased by 13.0 percent on average from 2022 to 2024.

²⁸⁶ Percentage of imports by value.

This was mainly driven by an increase in exports of wooden barrels and similar products.²⁸⁷ Exports of logs and rough wood products increased by less than 1 percent.

Table 5.3 Forest products: changes in U.S. domestic exports by product group, 2022–24

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute	Average
				change 2022–24 (million \$)	change, 2022–24 (%)
Wooden containers	478	573	611	133	13.0
Logs and rough wood products	3,898	3,787	3,951	53	0.7
Newsprint	40	44	61	20	22.8
Cork and rattan	36	37	31	-6	-8.3
Miscellaneous articles of wood	164	170	156	-8	-2.6
Paper boxes and bags	2,318	2,243	2,242	-76	-3.3
Wood veneer and wood panels	1,206	1,023	987	-219	-9.5
Printed matter	3,708	3,490	3,237	-471	-6.6
Lumber	3,446	2,754	2,831	-616	-9.4
Industrial papers and paperboards	10,333	9,011	9,521	-812	-4.0
Wood pulp and recovered paper	10,658	8,556	8,121	-2,538	-12.7
All other digests	7,302	6,809	6,834	-467	-3.3
Total	41,270	36,256	36,341	-4,929	-6.2

Source: USITC DataWeb/Census, accessed June 30, 2025.

Notes: Average change is calculated using the compound annual growth rate formula. When a sector contains more than 10 digests, digest tables display the five largest positive value changes followed by the 5 largest negative changes over 2022–24. Full digest tables are available in Appendix A.

From 2022 to 2024, the largest decreases in exports by value were of wood pulp and recovered paper, wood veneer and wood panels, lumber, cork and rattan, and printed matter.²⁸⁸ Wood pulp and recovered paper exports declined by 12.7 percent on average from 2022 to 2024, though it remains the second-largest U.S. export market for forest products ([table 5.3](#)). The decrease in exports was largely driven by weak global demand for downstream paper packaging products.²⁸⁹ Weak global demand in housing and construction also drove down exports of wood veneer and lumber to large markets in 2022 and 2023.²⁹⁰

²⁸⁷ Exports of subheading 4416.00.30 (wooden casks, barrels, and hogsheads) grew by an average of 24 percent from 2022 to 2024 and had the largest export value of all wooden containers (\$247 million in 2024). Exports of subheading 4416.00.90 (wooden vats, tubs, and other coopers' products and parts thereof) grew by an average of 36 percent from 2022 to 2024. USITC DataWeb/Census, accessed June 30, 2025.

²⁸⁸ Cork and rattan made up less than 0.1 percent of total U.S. exports of forest products in 2024.

²⁸⁹ See the "Global Overcapacity in Paper Packaging" and "Demand Changes and Declining Recovered Paper Exports" sections for more information.

²⁹⁰ By late 2023, U.S. exports of softwood lumber to China began to increase despite China's continuous struggle in the real estate sector. Fastmarkets, "Could headwinds hinder softwood lumber," January 28, 2024. USITC DataWeb/Census, digests FP002 and FP004, accessed June 30, 2025.

The only market to which U.S. forest product exports increased from 2022 to 2024 was the United Kingdom (table 5.4). In 2023, the United Kingdom surpassed Japan as the fourth-largest export market for U.S. forest products. The largest U.S. forest product exports to the United Kingdom were logs and rough wood products, newsprint, and wooden containers.²⁹¹ Exports of logs and wooden containers to the United Kingdom increased significantly on average from 2022 to 2024 (18.7 percent and 56.8 percent, respectively).²⁹² Growth in exports of wood containers to the United Kingdom was driven by growth in the region’s premium spirits industries such as scotch and whiskey.²⁹³

Table 5.4 Forest products: U.S. domestic exports by export market, 2022–24

In millions of dollars and percentages.

Destination market	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change 2022–24 (million \$)	Average change, 2022–24 (%)
Canada	10,930	10,199	10,393	-537	-2.5
Mexico	6,938	6,456	6,338	-600	-4.4
China	4,435	3,861	3,569	-866	-10.3
United Kingdom	1,705	1,805	2,112	407	11.3
Japan	2,136	1,756	1,538	-598	-15.1
India	1,302	1,004	1,011	-290	-11.9
Vietnam	776	602	694	-81	-5.4
Germany	802	673	635	-167	-11.0
South Korea	729	551	539	-191	-14.1
Thailand	653	564	527	-126	-10.2
All other markets	10,864	8,784	8,985	-1,879	-9.1
Total	41,270	36,256	36,341	-4,929	-6.2

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Demand for U.S. forest products, particularly pulp and paper products, weakened the most in Asian markets during 2022–24.²⁹⁴ The largest decreases in exports were to Japan, South Korea, India, Germany, China, and Thailand (table 5.4). Wood pulp and recovered paper is one of the largest forest product digests exported to Japan, South Korea, and India.²⁹⁵ Between 2022 and 2024, exports of wood pulp and recovered paper to Japan and South Korea each decreased by 19.9 percent and exports to India decreased by 15.7 percent.²⁹⁶

²⁹¹ USITC DataWeb/Census, digests FP001, FP005, and FP012, accessed June 30, 2025.

²⁹² USITC DataWeb/Census, digests FP001 and FP005, accessed June 30, 2025.

²⁹³ In response to consumer demand for premium spirits, distilleries in the United Kingdom are investing more in barrels to age whiskey longer. In 2022, Scotch whisky contributed £7.1 billion to the United Kingdom’s economy. Research Nester, *Wine, Scotch, and Whiskey Barrels*, December 4, 2024; SWA, “Facts & Figures,” accessed September 19, 2025.

²⁹⁴ See the “Global Overcapacity in Paper Packaging” and “Demand Changes and Declining Recovered Paper Exports” sections for more information. These narratives are not exhaustive examples of declining demand.

²⁹⁵ Wood pulp and recovered paper is the largest export digest to South Korea and India. It is the second-largest export digest to Japan. USITC DataWeb/Census, digest FP009, accessed June 30, 2025.

²⁹⁶ USITC DataWeb/Census, digest FP009, accessed June 30, 2025.

Analytical Narratives

U.S. Monetary Policy and the Impacts on Lumber and Other Wood Imports

From 2022 to 2024, the United States imported \$27.0 billion in lumber products (table 5.3). Through 2022, lumber represented the largest import value across all forest product digests. In 2022–24, U.S. lumber imports decreased by an average of 22.9 percent (\$5.0 billion), driving down the lumber digest to the third-highest value digest in the forest products sector ([table 5.1](#)). This decrease can be attributed to the declining demand for new housing construction since the Federal Reserve began raising interest rates in 2022.²⁹⁷

Looking Back on Interest Rates from 2020 to 2022

In March 2020, following the onset of the COVID-19 pandemic, the Federal Reserve cut the federal funds rate to a range of 0.0–0.25 percent with the hope of strengthening labor market conditions and stimulating economic growth.²⁹⁸ In 2021, the vast majority of members on the Federal Open Market Committee anticipated the low rates would last through the end of 2022.²⁹⁹ However, inflation climbed to over 6 percent toward the end of 2022, though labor markets were rebounding.³⁰⁰

In response to the climbing inflation, the Federal Reserve began increasing the federal funds rate earlier than expected in March 2022. Within the year, the target moved from 0.0–0.25 percent to 4.25–4.5 percent.³⁰¹ The federal funds rate serves as a benchmark for other short-term and long-term interest rates set by banks, which influences the cost of borrowing for households and businesses. As such, bank interest rates went up and borrowing became much more expensive by the end of 2022.

²⁹⁷ The Federal Reserve uses interest rates as a key tool to help either stimulate the economy or slow inflation. The Federal Reserve controls the federal funds rate, which is the rate banks pay to borrow from each other overnight. St. Louis Fed, “Federal Funds Effective Rate,” September 2, 2025.; Joint Center for Housing Studies, *The State of the Nation’s Housing 2023*, 2023, 4.

²⁹⁸ Milstein and Wessel, “What did the Fed Do in Response,” January 2, 2024.

²⁹⁹ The Federal Open Market Committee is the body within the Federal Reserve that is directly responsible for making decisions about interest rates. Ihrig and Waller, “The Federal Reserve’s Responses to the Post-Covid Period,” February 14, 2024.

³⁰⁰ Almost 3 million jobs were created between August and December 2021. Inflation later peaked at 9.1 percent in June 2022. See chapter 1 for more information on inflation. Ihrig and Waller, “The Federal Reserve’s Responses to the Post-Covid Period,” February 14, 2024. USDOL, BLS, “12-Month Percentage Change, Consumer Price Index,” accessed September 19, 2025.

³⁰¹ Ihrig and Waller, “The Federal Reserve’s Responses to the Post-Covid Period,” February 14, 2024.

Impact on U.S. Imports

In response to high inflation and rising interest rates, single-family homebuilding declined 10.8 percent from 2021 to 2022.³⁰² Downward trends continued into 2023 at a slower rate (5.7 percent), with declines in new home construction and home sales.³⁰³

In the housing industry, inflation and high interest rates impact developers and buyers alike. Developers pay higher borrowing costs because of rising interest rates and pay more for building materials because of inflation.³⁰⁴ Homebuilding becomes more expensive for developers, leading to fewer housing starts. Buyers experiencing a higher cost of living also struggle to secure loans when interest rates are high, which reduces consumer demand for new housing projects.³⁰⁵

Construction is the leading end use for certain wood products such as softwood lumber and engineered wood products (plywood, etc.).³⁰⁶ The three largest forest product digests, by value, with end uses in construction are wood veneer and wood panels; lumber; and moldings, millwork, and joinery.³⁰⁷ Wood veneer and wood panels are thin slices of wood that are used in furniture, cabinetry, and wall paneling. Softwood lumber has many structural applications in construction, such as framing, roofing, and flooring, because it is a high strength and light weight material.³⁰⁸ Moldings, millwork, and joinery are wood materials that are used for interior ornamentation.³⁰⁹

During 2022–24, imports of all three digests declined (figure 5.1). Over this period lumber imports decreased from \$12.3 billion to \$7.3 billion, with demand beginning to level out between 2023 and 2024. Softwood lumber made up more than 90.0 percent of lumber imports, by value, in 2024 (\$6.8 billion), most of which was imported from Canada.³¹⁰ During 2022–23, wood veneer and panel imports declined by \$4.1 billion before beginning to recover in 2024. Imports of moldings, millwork, and joinery decreased by a little more than \$1.4 billion from 2022 to 2024. The sharpest period of decline for all three digests, 2022–23, coincided with the Fed’s rising interest rates and declining demand in the construction industry.

³⁰² Census, “Housing Units Started: United States,” Accessed September 19, 2025.

³⁰³ Census, “Housing Units Started: United States,” Accessed September 19, 2025.

³⁰⁴ Softwood lumber prices began increasing in 2020 and remained extremely volatile through 2022. Statista, “Producer Price Index (PPI) of Softwood Lumber,” November 29, 2025. Bridgit, “Interest Rates Affect Construction,” accessed August 8, 2025.

³⁰⁵ Bridgit, “Interest Rates Affect Construction,” accessed August 8, 2025. See chapter 1 for more information on inflation.

³⁰⁶ Engineered wood products fall within the wood veneer and wood panels digest. USITC DataWeb/Census, digest FP004, accessed June 30, 2025.

³⁰⁷ USITC DataWeb/Census, FP002, FP003, and FP004, accessed June 30, 2025.

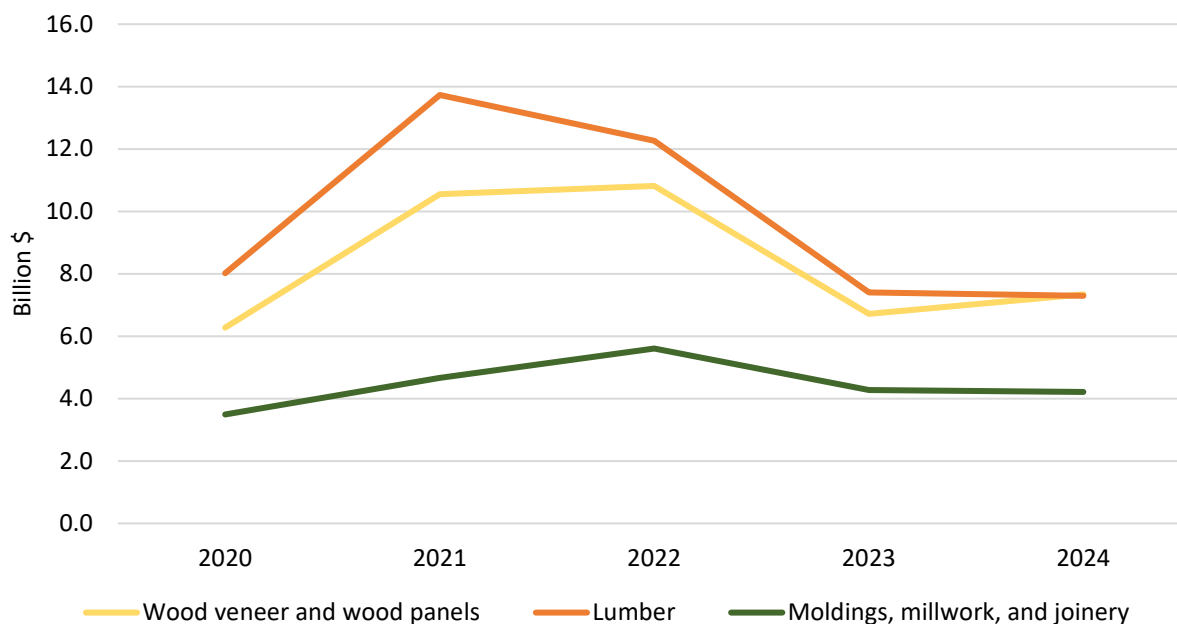
³⁰⁸ Softwood lumber refers to lumber from softwood trees such as pine, fir, and other coniferous species.

³⁰⁹ Examples include baseboards, crown moldings, and decorative trim. Johnson Brothers, “The Magic of Millwork,” August 3, 2022.

³¹⁰ USITC DataWeb/Census, HTS subheadings 4407.11, 4407.12, 4407.13, 4407.14, and 4407.19, accessed June 30, 2025.

Figure 5.1 U.S. imports of wood products for construction, 2020–24

In billions of dollars.



Source: USITC DataWeb/Census, accessed June 30, 2025.

Looking Forward

The federal funds rate peaked at the end of July 2023 at a range of 5.25–5.5 percent. In September 2024, the Fed began incrementally lowering rates. By the end of the year, the federal funds rate sat at a range of 4.25–4.5 percent. Although this was far higher than pre-pandemic interest rates (1.5–1.75 percent in October 2019), new housing construction was stimulated in 2024; new housing starts for single family homes was up almost 7 percent from 2023.³¹¹

Global Overcapacity in Paper Packaging

Over the past few decades, the paper packaging industry has experienced significant growth, driven by the expansion of e-commerce and consumer demand for sustainable packaging products.³¹² In 2023, the global paper packaging market was worth \$189.8 billion.³¹³ China is the largest producer of paper

³¹¹ St. Louis Fed, “Federal Funds Effective Rate,” September 2, 2025. Tepper, “Fed Funds Rate History,” May 8, 2025.

³¹² The paper packaging industry falls within the paper boxes and bags product digest, which includes products under HS subheading 4819: cartons, boxes, cases, bags and other packing containers, of paper, paperboard, cellulose wadding or webs of cellulose fibers; box files, letter trays and similar articles, of paper or paperboard of a kind used in offices, shops or the like. USITC, HTS (2025) Revision 17, Publication 5649, August 2025, 48.23.

³¹³ 2023 is the most recent year data are available for the global paper packaging market. MarketLine, *MarketLine Industry Profile: Global Containers & Packaging*, 2024.

packaging products, producing 82 million metric tons in 2023. The United States is the second-largest producer, producing 46 million metric tons in 2023.³¹⁴

Containerboard, used in the manufacturing of corrugated boxes for shipping and storage, is the most common type of paper packaging. In 2023, roughly 181 million metric tons of containerboard was produced globally.³¹⁵ Boxboard, also referred to as cartonboard, is also commonly used in paper packaging products, suitable for packaging consumer goods such as food products, cosmetics, and electronics.³¹⁶ In 2023, almost 48 million metric tons of boxboard were produced.³¹⁷ Other types of paper packaging include paper bags, which are often used in retail and food service, and mailers, which are increasingly being used in e-commerce for smaller purchases.³¹⁸

Investments In Capacity

The COVID-19 pandemic brought about large-scale closures of public gathering spaces in March 2020. These closures prompted a shift in consumer preferences and purchasing decisions, causing lasting effects on the paper packaging industry through 2024. Changes in consumer demand during the pandemic closures (i.e., more online shopping, more takeout from restaurants, etc.) created a surge in demand for paper packaging products such as containerboard and boxboard between 2020 and 2021.³¹⁹ For example, in 2021 U.S. containerboard production was 5.6 percent higher than in 2020.³²⁰

At the time, industry forecasts predicted that the surge in e-commerce demand would translate to longer term consumer purchasing patterns and would continue to stimulate growth in the global paper packaging industry.³²¹ This prompted many manufacturers in the pulp and paper industry to invest in their packaging capacity between 2021 and 2022. For example, in February 2022, WestRock announced plans to build a new corrugated box facility in Washington to meet growing customer demand.³²² In March 2022, Asia Pacific Resources International Ltd. (APRIL Group) announced the construction of a new production facility in Indonesia that planned to add over 1 million tons of folding boxboard

³¹⁴ This number includes containerboard, box board, and all other paper packaging materials. Before 2008, the United States was the largest producer. Other leading producers are Japan, Germany, and India. Statista, *Paper Packaging Industry Worldwide*, 2025, 11.

³¹⁵ Statista, *Paper Packaging Industry Worldwide*, 2025, 10.

³¹⁶ Hydropac, "What Is the Difference," accessed August 8, 2025.

³¹⁷ Statista, *Paper Packaging Industry Worldwide*, 2025.

³¹⁸ AF&PA, "Types of Paper Packaging", Accessed January 30, 2026. Rachal and Pyzyk, "5 Years Later, Pandemic-Era Effects," March 14, 2025.

³¹⁹ Rachal and Pyzyk, "5 Years Later, Pandemic-Era Effects," March 14, 2025.

³²⁰ Duguay, "How Rising Containerboard Capacity Has Influenced Boxplant Investments," March 28, 2022.

³²¹ Smithers, "World Packaging Demand to Break \$1-Trillion-Mark," 2021; Duguay, "How Rising Containerboard Capacity Has Influenced Boxplant Investments," March 28, 2022.

³²² Duguay, "How Rising Containerboard Capacity Has Influenced Boxplant Investments," March 28, 2022; WestRock is the largest paper packaging company globally. Statista, *Paper Packaging Industry Worldwide*, 2025, 21.

capacity.³²³ In 2023, however, growth did not continue on pace with industry forecasts. The lingering effects of inflation curbed consumer spending, which reduced demand for paper packaging.³²⁴

U.S. import and export data show the increase in demand for paper boxes and bags from 2020 to 2022 ([tables 5.1](#) and [5.3](#)), followed by a decrease in 2023.³²⁵ As consumer spending relaxed, manufacturers struggled with overcapacity of paper packaging products.³²⁶ From 2021 to 2023, global containerboard operating rates declined by about 4 percentage points from around 85 percent to nearly 80 percent as capacity exceeded demand.³²⁷ Fastmarkets estimates that, in 2023, global containerboard overcapacity was about 40 million tons, 68.3 percent of which was in Asia.³²⁸ Residual impacts from the lack of demand for packaging, both in the United States and globally, were also felt upstream in the recovered paper market.

Demand Changes and Declining Recovered Paper Exports

Recovered paper, also known as wastepaper, refers to any type of paper that is diverted from the waste stream for recycling. The four main categories of recovered paper that are exported from the United States are old corrugated containers (OCC), mixed paper, newsprint, and unsorted paper (figure 5.2).

³²³ Reuters, “APRIL Group Invests \$2.3 Billion in Paperboard Factory,” March 29, 2022.

³²⁴ Lopez, “Five Key Factors Shaping the Global Outlook,” September 16, 2024. See chapter 1 for more information on inflation.

³²⁵ USITC DataWeb/Census, accessed June 30, 2025.

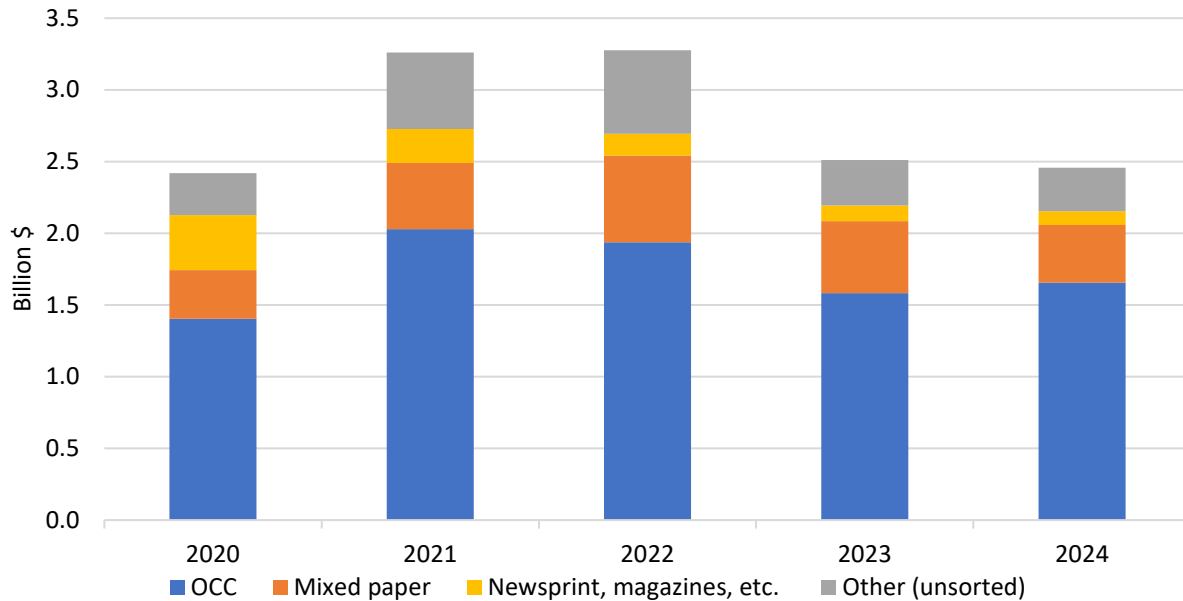
³²⁶ Overcapacity occurs when a company’s production capacity exceeds the market demand for a product, often represented by a decline in the company’s operating rate. Fastmarkets, “Global and European Containerboard Outlook,” May 18, 2023. Lopez, “Five Key Factors Shaping the Global Outlook,” September 16, 2024.

³²⁷ Fastmarkets, “Global and European Containerboard Outlook,” May 18, 2023.

³²⁸ Lopez, “Five Key Factors Shaping the Global Outlook,” September 16, 2024.

Figure 5.2 U.S. recovered paper exports, by value and type, 2020–24

In billions of dollars.



Source: USITC DataWeb/Census, accessed June 30, 2025.

Notes: OCC refers to products under *Harmonized Tariff Schedule of the United States* (HTS) subheading 4707.10; Mixed paper refers to products under HTS subheading 4707.20; Newsprint, magazines, etc. refers to products under HTS subheading 4707.30; Other (unsorted) refers to products under HTS subheading 4707.90.

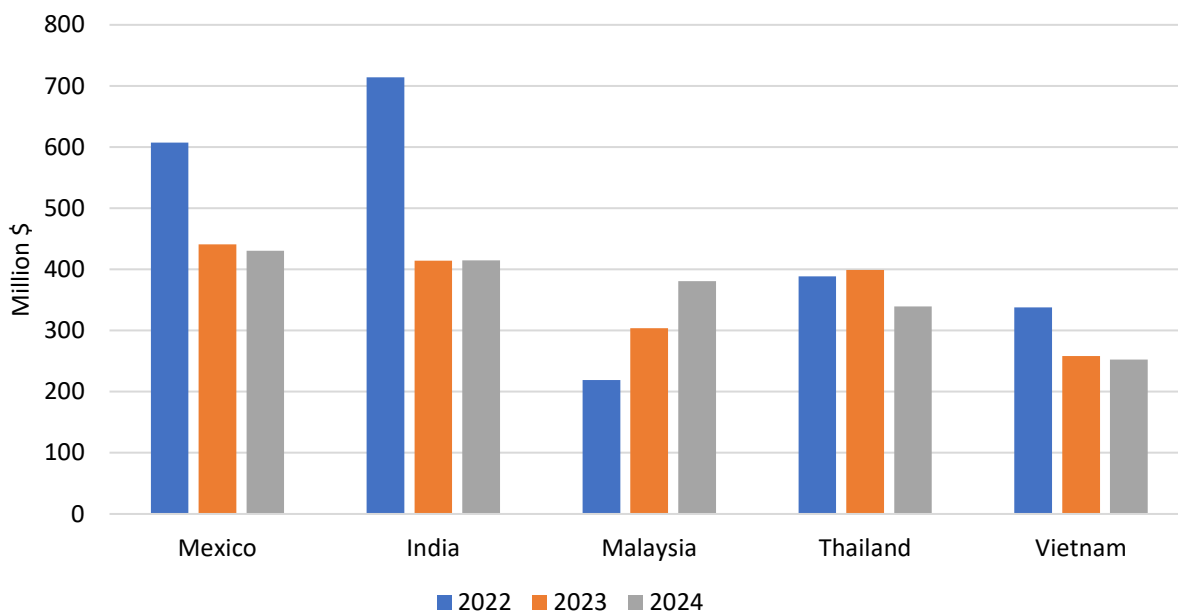
The most common grade of recovered paper is OCC, or recycled cardboard, which made up roughly 68 percent of U.S. recovered paper exports in 2024 ([figure 5.2](#)). Mixed paper includes various types of paper and paperboard, such as discarded office paper, junk mail, cereal boxes, etc. Newsprint refers to recycled newspapers, often made from lower grades of paper than those found in mixed paper. Unsorted paper may be made up of a combination of the mentioned paper grades but is exported under a separate category because not all countries have the same sorting capabilities.

U.S. exports of recovered paper have been on the decline for almost a decade.³²⁹ Following a short period of growth during 2020–21, exports began declining again before leveling out in 2024. Weak international demand for U.S. recovered paper, an increased use of recovered paper inputs in domestic manufacturing, and a lower domestic supply of recovered paper have all contributed to a decrease in exports from 2021 to 2023.

³²⁹ In 2011, U.S. exports of recovered paper peaked at 21 million metric tons and have steadily declined since. In 2024, the United States exported 12 million metric tons of recovered paper. USITC DataWeb, HS subheadings 4707.10, 4707.20, 4707.30, and 4707.40, accessed September 4, 2025.

Figure 5.3 U.S. recovered paper exports to top markets, by value, 2022–24

In millions of dollars.



Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Data include products exported under HTS subheadings 4707.10, 4707.20, 4707.30, and 4707.90.

Weak International Demand

China used to be the largest global importer of solid waste in any form, making it a popular export destination for U.S. recovered paper. In 2018, China began phasing in the “National Sword” policy, which restricted the types of waste that would be accepted into its ports.³³⁰ The policy was fully implemented in 2021, banning all solid waste imports, including recovered paper.³³¹

Since China’s import ban, the United States began sending more of its recovered paper to other Asian markets. From 2022 to 2024, India, Malaysia, Thailand, and Vietnam were four of the five top export destinations for U.S. recovered paper ([figure 5.3](#)). India was the largest export destination in 2022, but weak demand for recovered paper negatively impacted U.S. exports to India in 2023. As previously

³³⁰ Li et al., “How China’s Foreign Waste Ban Will Reshape Recycling,” 2022; Scott, “China’s Recycled Wastepaper Import Policies: Part 1,” April 2018; Scott and Ireland, “China’s Recycled Wastepaper Import Policies: Part 2,” November 2019; State Council of the People’s Republic of China, “Prohibiting the Entry of Foreign Garbage,” July 2017.

³³¹ Li et al., “How China’s Foreign Waste Ban Will Reshape Recycling,” 2022; Before the National Sword policy implementation, the United States exported more than 13 million metric tons of recovered paper to China in 2016. In 2021, once the full ban was implemented, exports dropped to 490,000 metric tons. USITC DataWeb, subheadings 4707.10, 4707.20, 4707.30, and 4707.40, accessed September 4, 2025.

mentioned, packaging overcapacity was mainly concentrated in Asia.³³² Recovered paper is the primary source of recycled fibers used in paper packaging production. As manufacturers began destocking their packaging supply in 2023 and 2024, demand for recovered paper declined as well. Malaysia is the only country that experienced an increase in demand during 2022–24 ([figure 5.3](#)).

Increased Domestic Demand, Lower Domestic Supply

Consumer demand for sustainable products in the United States has promoted an increase in paper packaging production capacity over the years. Companies are shifting toward paper over plastic packaging and using recycled paper over virgin paper for packaging production. During the past decade, U.S. recycled containerboard production capacity has increased by more than 3 million tons.³³³ As previously mentioned, consumer demand for paper packaging prompted downstream manufacturers to further invest in their packaging production capacity in 2021 and 2022 and increased domestic demand for recovered paper.³³⁴ As capacity for containerboard production has increased, more recovered paper has stayed within the domestic market.³³⁵

At the same time, the COVID-19 pandemic also affected U.S. recovered paper exports by significantly hindering domestic supply. Offices and other public gathering spaces are large sources of domestic recovered paper, and wide scale stay at home orders led to a significant decrease in the supply of recovered paper in 2020 and 2021.³³⁶ A lower supply of recovered paper, coupled with domestic capacity increases for downstream recycled paper products, resulted in less recovered paper to export to international markets.³³⁷

³³² See the “Global Overcapacity in Paper Packaging” section for more information.

³³³ This is a 30 percent increase in capacity, from 11 million metric tons in 2014 to 14 million metric tons in 2024. McNees, “ReMA 2025: More Recovered Paper Being Consumed Domestically,” June 2, 2025.

³³⁴ See the “Global Overcapacity in Paper Packaging” section for more information.

³³⁵ McNees, “ReMA 2025: More Recovered Paper Being Consumed Domestically,” June 2, 2025.

³³⁶ Staub, “OCC Supply Shortfalls Drive up Prices,” May 19, 2020. Quinn, Rachal, and Rosengren, “Resource Recycling Conference Highlights Role of Markets,” August 10, 2021.

³³⁷ Increased domestic demand from 2022 to 2024 was also supplemented by growing imports from Mexico. See the “Imports of Forest Products” section for more information.

Looking Ahead

Going forward, opportunities for growth still exist in the recovered paper market. Now that COVID-19-related closures have subsided, domestic supply is expected to rebound. U.S. exports of recovered paper stabilized in 2024, though they were still below 2022 levels (figure 5.4). The recovered paper market will continue to be tied heavily to the paper packaging market, which also began slowly rebounding in 2024.³³⁸ As destocking trends stabilize in emerging markets, paper packaging markets have an opportunity for growth going forward, prompting opportunities for upstream growth in recovered paper markets.³³⁹

³³⁸ See the “Global Overcapacity in Paper Packaging” section for more information.

³³⁹ Fastmarkets estimates that Asian markets will regain normal growth patterns (3–3.5 percent) by mid-2025. Lopez, “Five Key Factors Shaping the Global Outlook,” September 16, 2024.

Bibliography

- American Forest & Paper Association (AF&PA). “Types of Paper Packaging.” Accessed January 30, 2026. <https://www.afandpa.org/paper-wood-products/packaging>.
- Bridgit. “How Do Rising Interest Rates Affect the Construction Industry?” Accessed August 8, 2025. <https://gobridgit.com/blog/interest-rates-affect-construction/>.
- U.S. Department of Labor (USDOL). Bureau of Labor Statistics (BLS). “12-Month Percentage Change, Consumer Price Index, Selected Categories.” Accessed September 19, 2025. <https://www.bls.gov/charts/consumer-price-index/consumer-price-index-by-category-line-chart.htm>.
- Duguay, Sage. “How Rising Containerboard Capacity Has Influenced Boxplant Investments.” ResourceWise, March 28, 2022. <https://www.fisher.com/blog/how-will-new-box-plant-investments-impact-the-containerboard-sector>.
- Federal Reserve Bank of St. Louis (St. Louis Fed). “Federal Funds Effective Rate.” Data released September 2, 2025. <https://fred.stlouisfed.org/series/FEDFUNDS>.
- Fastmarkets. “Global and European Containerboard Outlook: What Does the Market Look like in the next Two Years?” May 18, 2023. <https://www.fastmarkets.com/insights/global-and-european-containerboard-short-term-outlook/>.
- Fastmarkets. “Could headwinds hinder softwood lumber markets’ return to normalcy?” January 18, 2024. <https://www.fastmarkets.com/insights/softwood-lumber-market-2024-preview/>.
- Hydropac. “What Is the Difference Between Corrugated Boxes and Carton Board Boxes?” Accessed August 8, 2025. <https://hydropac.co.uk/eco-friendly/corrugated-box-carton-board-box-difference/>.
- Ihrig, Jane, and Chris Waller. “The Federal Reserve’s Responses to the Post-Covid Period of High Inflation.” Board of Governors of the Federal Reserve System, February 14, 2024. <https://www.federalreserve.gov/econres/notes/feds-notes/the-federal-reserves-responses-to-the-post-covid-period-of-high-inflation-20240214.html>.
- Johnson Brothers. “The Magic of Millwork.” August 3, 2022. <https://jbros.com/2022/08/03/the-magic-of-millwork/>.
- Harvard University. Joint Center for Housing Studies. *The State of the Nation’s Housing 2023*, 2023. Accessed September 5, 2025. <https://www.jchs.harvard.edu/state-nations-housing-2023>.
- Li, Yali, Franklin Zambrano, Yuhan Wang, and Ronald Marquez. “How China’s Foreign Waste Ban Will Reshape the U.S. Recycling Supply Chain: Economic and Environmental Considerations towards a Circular Economy Oriented Paper Recycling Industry.” *BioResources* 17, no. 2 (2022): 3178–3201. <https://doi.org/10.15376/biores.17.2.3178-3201>.

Lopez, Alejandro Mata. "Five Key Factors Shaping the Global Outlook for Paper Packaging." *Fastmarkets*, September 16, 2024. <https://www.fastmarkets.com/insights/key-factors-in-global-outlook-paper-packaging/>.

MarketLine. *MarketLine Industry Profile: Global Containers & Packaging*. 2024. <https://research.ebsco.com/c/du6kn7/viewer/pdf/wlmjauwxlz>

Markwide Research. *US Paper Cups and Paper Plates Market—Size, Share, Trends, Analysis, and Forecast 2025–2034*. May 2025. <https://markwideresearch.com/us-paper-cups-and-paper-plates-market/>.

McNees, Marissa. "ReMA 2025: More Recovered Paper Being Consumed Domestically." *Recycling Today*, June 2, 2025. <https://www.recyclingtoday.com/news/rema-2025-more-recovered-paper-being-consumed-domestically-export-markets/>.

Milstein, Eric, and David Wessel. "What Did the Fed Do in Response to the COVID-19 Crisis?" *Brookings Institution*, January 2, 2024. <https://www.brookings.edu/articles/fed-response-to-covid19/>.

Quinn, Megan, Maria Rachal, and Cole Rosengren. "Resource Recycling Conference Highlights Role of Markets, Labor and Climate in Municipal Recycling." *Waste Dive*. August 10, 2021. <https://www.wastedive.com/news/resource-recycling-conference-2021-plastic-paper-labor-climate/604735/>.

Rachal, Maria, and Katie Pyzyk. "5 Years Later, Pandemic-Era Effects Have a Mark on the Packaging Industry." *Packaging Dive*, March 14, 2025. <https://www.packagingdive.com/news/covid19-packaging-industry-changes-automation-labor-ecommerce/741346/>.

Research Nester. *Wine, Scotch, and Whiskey Barrels Market Size & Share, Type; Sales Channel; Sales Channel—Global Supply & Demand Analysis, Growth Forecasts, Statistics Report 2025–2037*. December 4, 2024. <https://www.researchnester.com/reports/wine-scotch-and-whiskey-barrels-market/6774>.

Reuters. "APRIL Group Invests \$2.3 Billion in Paperboard Factory in Indonesia's Sumatra." March 29, 2022. <https://www.reuters.com/world/asia-pacific/april-group-invests-23-bln-paperboard-factory-indonesias-sumatra-2022-03-29/>.

Scotch Whisky Association (SWA). "Facts & Figures." Accessed September 19, 2025. <https://www.scotch-whisky.org.uk/industry-insights/facts-figures/>.

Scott, Sarah. "China's Recycled Wastepaper Import Policies: Part 1 Impact on the United States." U.S. International Trade Commission. Executive Briefing on Trade, April 2018. https://www.usitc.gov/sites/default/files/publications/332/executive_briefings/ebot_china_recycled_paper_final.pdf.

- Scott, Sarah, and Robert Ireland. "China's Recycled Wastepaper Import Policies: Part 2 Economic Effects and Implications for Associated Industries." U.S. International Trade Commission. Executive Briefing on Trade, November 2019. https://www.usitc.gov/sites/default/files/publications/332/executive_briefings/ebot_trade_in_wastepaper.pdf.
- Smithers. "World Packaging Demand to Break \$1-Trillion-Mark in 2021 and Reach \$1.22 Trillion in 2026, According to Latest Smithers Analysis." Accessed July 29, 2025. [https://www.smithers.com/resources/2021/november/world-packaging-demand-to-break-\\$1-trillion-mark](https://www.smithers.com/resources/2021/november/world-packaging-demand-to-break-$1-trillion-mark).
- State Council of the People's Republic of China. "Notice of the General Office of the State Council on Issuing the Implementation Plan for Prohibiting the Entry of Foreign Garbage and Advancing the Reform of the Solid Waste Import Administration System No. 70," July 18, 2017, <https://www.nhc.gov.cn/bgt/gwywj2/201707/1e95a95924dd41fbb35a3b6e42cb5568.shtml>
- Statista. *Paper Packaging Industry Worldwide*. 2025. <https://www.statista.com/study/109983/global-paper-packaging-industry/>.
- Statista. "Producer Price Index (PPI) of Softwood Lumber in the United States from January 1947 to June 2025." Construction. November 29, 2025. <https://www.statista.com/statistics/195406/us-producer-price-index-of-softwood-lumber/>.
- Staub, Colin. "OCC Supply Shortfalls Drive up Prices." Resource Recycling, May 19, 2020. <https://resource-recycling.com/recycling/2020/05/19/occ-supply-shortfalls-drive-up-prices/>.
- Tepper, Taylor. "Federal Funds Rate History 1990 to 2025." *Forbes Advisor*, December 10, 2025. <https://www.forbes.com/advisor/investing/fed-funds-rate-history/>.
- U.S. Census Bureau (Census). "Housing Units Started: United States", Accessed September 19, 2025. <https://www.census.gov/econ/currentdata/?programCode=RESCONST>
- U.S. International Trade Commission Interactive Tariff and Trade DataWeb (USITC DataWeb)/U.S. Census Bureau (Census). Accessed various dates. <http://dataweb.usitc.gov>.
- Uutela, Esko. "2022 Tissue Demand Was Revived in Most Regions, but China Didn't Meet Expectations." Fastmarkets, August 2, 2023. <https://www.fastmarkets.com/insights/tissue-demand-revived-globally-but-china-weak-in-2022/>.

Chapter 6: Machinery

Introduction

Machinery comprises a range of mechanical machines or equipment used in mining, manufacturing, energy, and construction sectors, as well as domestic appliances.³⁴⁰ U.S. machinery imports increased from \$279.9 billion in 2022 to \$297.2 billion in 2024, constituting a 3.0 percent average annual growth rate.³⁴¹ Mexico was the largest import source in 2024.³⁴² U.S. machinery exports decreased modestly from \$134.9 billion in 2022 to \$132.9 billion in 2024, reflecting a 1.0 percent average annual decline. Canada was the largest destination market in 2024.

Imports of Machinery Products

Increases in machinery imports were driven by imports of five categories of products: electrical transformers, static converters, and inductors; air-conditioning equipment and parts; miscellaneous machinery; industrial thermal-processing equipment and furnaces; and mineral processing machinery ([table 6.1](#)). Overall, U.S. machinery imports benefited from consistent GDP growth during the period, driven by strong domestic consumption.³⁴³ Gross output in the manufacturing industry has increased, exceeding pre-pandemic levels.³⁴⁴ As consumption has boomed, U.S. manufacturers have increased investments in machinery and in new plant construction.³⁴⁵ The machinery sector also benefited from recent transitions to automation.³⁴⁶ Beyond general macroeconomic conditions, machinery demand is closely tied to the conditions within the related industry or sector for which the machinery is used. For example, U.S. machinery imports for electrical transformers, static converters, and inductors saw the

³⁴⁰ For the purposes of this analysis, machinery excludes consumer electronics and machines used for the purpose of transportation, such as cars and trucks.

³⁴¹ Percentage changes included in trade data tables 6.1-6.4 are the average annual change during 2022–24 and not a simple percentage change in 2024 relative to 2022. The average annual change is presented in the form of compound annual growth rates and is referred to as average change or average annual change in this working paper.

³⁴² The USITC separates the machinery sector into 31 digests. Each USITC sector digest encompasses various 8-digit subheadings in the *Harmonized Tariff Schedule of the United States* (HTS). For a complete list of HTS subheadings classified in a particular sector or digest, see this data [table](#).

³⁴³ USITC, *The Year in Trade 2024: Operation of the Trade Agreements Program 76th Report*, September 2025, 32; USDOC, BEA, “Gross Domestic Product, 4th Quarter and Year 2024 (Third Estimate),” March 27, 2025. For more information on macroeconomic trends, see chapter 1.

³⁴⁴ St. Louis Fed, FRED database/BEA, “Gross Output by Industry,” September 25, 2025.

³⁴⁵ Hartman, “Businesses’ Investment in New Equipment Helped Boost GDP,” August 29, 2024; Dynan, “Investment in US Factories Has Soared,” May 1, 2024; St. Louis Fed, FRED database/Census, “Manufacturers’ New Orders,” December 4, 2025.

³⁴⁶ Global Market Insights, *Industrial Machinery Market*, April 2025; Mordor Intelligence, *Industrial Machinery Market*, July 7, 2025.

largest increase during the period because of recent domestic supply constraints for liquid dielectric transformers. The three largest increases within this category were for imports of various types of liquid dielectric transformers, which collectively increased by \$3.5 billion and have recently had domestic supply constraints.³⁴⁷ Air-conditioning equipment and parts imports also increased, supported by recent construction in the United States and a desire to replace existing units with more energy-efficient systems.³⁴⁸

Table 6.1 U.S. general imports of machinery by product group, 2022–24

In millions of dollars and percentages.

Product group (digest)	2022	2023	2024	Absolute change,	Average change,
	(million \$)	(million \$)	(million \$)	2022–24 (million \$)	2022–24 (%)
Electrical transformers, static converters, and inductors	19,991	23,897	25,985	5,994	14.0
Air-conditioning equipment and parts	28,215	28,174	30,822	2,608	4.5
Miscellaneous machinery	21,428	21,584	23,629	2,200	5.0
Industrial thermal-processing equipment and furnaces	7,185	7,336	9,153	1,969	12.9
Mineral processing machinery	6,140	7,232	7,974	1,834	14.0
Nonelectrically powered hand tools	1,674	1,345	1,347	–328	–10.3
Non-metalworking machine tools	2,873	2,625	2,518	–355	–6.4
Textile machinery	1,658	1,420	1,178	–480	–15.7
Portable electric hand tools	6,406	5,070	5,812	–595	–4.8
Farm and garden machinery and equipment	16,620	16,097	14,346	–2,274	–7.1
All other digests	167,726	164,971	174,209	6,483	1.9
Total	279,917	279,752	296,974	17,057	3.0

Source: USITC DataWeb/Census, accessed June 30, 2025.

Notes: Average change is calculated using the compound annual growth rate formula. When a sector contains more than 10 digests, digest tables display the five largest positive value changes followed by the 5 largest negative changes over 2022–24. Full digest tables are available in Appendix A.

Imports of eleven machinery categories declined, with nonelectrically powered hand tools, non-metalworking machine tools, textile machinery, portable electric hand tools, and farm and garden machinery and equipment representing the categories with the largest declines over the period ([table 6.1](#)). The general economic environment may have been beneficial for the machinery sector as a whole, but demand for these types of special-purpose machinery dropped because of conditions within their associated industries. Imports of farm and garden machinery and equipment saw the largest decrease, precipitated by a recent reduction in U.S. farm income.³⁴⁹ Imports of all types of portable electric hand tools also decreased. Likewise, imports of all products under the category non-electrically powered hand

³⁴⁷ Liquid dielectric transformers are classified under HTS subheadings 8504.21.00, 8504.22.00, and 8504.23.00. USITC DataWeb/Census, General imports, liquid dielectric transformers, accessed June 30, 2025; Ottinger and Harding, “Gridlocked: Transformer Shortage Choking US Supply Chains,” February 11, 2025.

³⁴⁸ Grand View Research, *U.S. HVAC Systems Market Size (2025–2033)*, 2025.

³⁴⁹ USDA, ERS, “Farm Income and Wealth Statistics–Data Files,” U.S. Farm Sector Financial Indicators, 2018–25,” February 6, 2025.

tools decreased, except for chainsaw parts.³⁵⁰ Declines in the imports in the hand tool market were largely driven by a decline in the imports of Chinese hand tools. Textile machinery imports saw a 15.7 percent annual reduction in growth because of a persistent downturn in business precipitated by increased competition and post-pandemic inventory and logistics issues.³⁵¹

The largest import sources between 2022 and 2024 were Mexico, China, Germany, Japan, and Canada, collectively representing \$521.6 billion in U.S. machinery imports between 2022 and 2024 (table 6.2). Of the largest sources, machinery imports from Mexico, Germany, and Canada increased during the period; those from China and Japan decreased. The largest increase was for machinery imports from Mexico, likely benefiting from a shift in production from China to Mexico and from Mexico’s proximity to the United States.³⁵² This increase in machinery imports was driven by increased imports of air-conditioning equipment (\$1.9 billion); imports of electrical transformers, static converters, and inductors (\$1.8 billion); and imports of centrifuges and filtering and purifying equipment (\$1.2 billion).³⁵³ Increases in machinery imports from South Korea were driven largely by an increase in imports of electrical transformers, static converters, and inductors (\$1.1 billion) and imports of miscellaneous machinery (\$1.0 billion).³⁵⁴ Imports of semiconductor manufacturing equipment and robotics (\$608 million) and of miscellaneous machinery (\$683 million) represented the largest increases in imports from Germany.³⁵⁵ The largest increases in machinery imports from Canada were for imports of air-conditioning equipment (\$805 million) and of electrical transformers, static converters, and inductors (\$557 million).³⁵⁶ Increased imports from Vietnam were driven largely by imports of household appliances.³⁵⁷

Table 6.2 U.S. general imports of machinery by import source, 2022–24

In millions of dollars and percentages.

Import source	2022	2023	2024	Absolute change,	Average change,
	(million \$)	(million \$)	(million \$)	2022–24 (million \$)	2022–24 (%)
Mexico	47,756	52,049	55,884	8,129	8.2
China	59,308	48,113	51,313	-7,995	-7.0
Germany	24,084	27,878	28,089	4,004	8.0
Japan	23,785	21,211	22,141	-1,645	-3.5
Canada	18,526	20,802	20,646	2,121	5.6

³⁵⁰ USITC DataWeb/Census, General imports, digest MT026, accessed June 30, 2025. Chainsaw parts are classified in HTS subheading 8467.91.01.

³⁵¹ Heilig, “2025 State Of The U.S. Textile Industry,” June 13, 2025.

³⁵² Conerly, “Near-Shoring: Can Manufacturing Move from China to Mexico?,” April 14, 2023; Kelly, *China Expands Mexico Investment but Notably Lags U.S.*, September 26, 2025; Mays and Dombek, “The Trend of Production Moving from China to Mexico,” May 16, 2022; NovaLink, “Shifting Manufacturing from China to Mexico,” January 11, 2024; Harris, “China’s Manufacturing Exodus,” July 8, 2025.

³⁵³ USITC DataWeb/Census, General imports, Mexico, digests MT002, MT024, and MT005, accessed June 30, 2025.

³⁵⁴ USITC DataWeb/Census, General imports, South Korea, digests MT024 and MT030, accessed June 30, 2025.

³⁵⁵ USITC DataWeb/Census, General imports, Germany, digests MT019 and MT030, accessed June 30, 2025.

³⁵⁶ USITC DataWeb/Census, General imports, Canada, digests MT002 and MT024, accessed June 30, 2025.

³⁵⁷ USITC DataWeb/Census, General imports, Vietnam, digest MT004, accessed June 30, 2025.

Import source	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
South Korea	13,114	14,829	18,073	4,959	17.4
Italy	11,254	12,066	12,096	842	3.7
Vietnam	7,863	7,495	9,403	1,540	9.4
Thailand	6,687	7,186	7,767	1,080	7.8
Taiwan	8,537	7,043	7,426	-1,111	-6.7
All other sources	59,003	61,080	64,136	5,134	4.3
Total	279,917	279,752	296,974	17,057	3.0

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

U.S. machinery imports from China, Japan, Taiwan, South Africa, and Israel saw the largest decreases over the period.³⁵⁸ Although China was the largest machinery import source during the period, imports of Chinese machinery saw the largest decrease. In particular, decreases in electrical transformers, static converters, and inductors (\$1.2 billion decrease) and in electric motors, generators, and related equipment (\$1.0 billion decrease) imports from China were substantial.³⁵⁹ The decrease in imports of Japanese machinery was largely related to the overall declines in U.S. imports of farm and garden machinery equipment.³⁶⁰ U.S. imports of machinery from Taiwan decreased by \$1.1 billion. In particular, U.S. imports of Taiwanese non-metalworking machine tools decreased by 23.9 percent annually and of Taiwanese nonautomotive insulated electrical wire and related products decreased by 18.8 percent annually.³⁶¹ The rest of the declines in machinery imports were modest by comparison; machinery imports from South Africa decreased by \$278 million and from Israel decreased by \$187 million.

Exports of Machinery Products

Investments in global machinery fluctuated during the period, with distinct and diverging trends depending on the underlying associated industry.³⁶² Although U.S. machinery manufacturers benefited from higher productivity and a quicker recovery from the pandemic compared to the rest of the world at the beginning of the period, the sector has faced increasing competition from emerging market countries as well as challenges with the supply chain and labor supply.³⁶³ Of the sixteen machinery categories with increased exports during 2022–24, the following five represent the categories with the largest increases: taps, cocks, valves, and similar devices; miscellaneous machinery; electric motors, generators, and related equipment; pumps for liquids; and air-conditioning equipment and parts ([table 6.3](#)). The largest increase was in taps, cocks, valves and similar devices, particularly non-hand-operated

³⁵⁸ USITC DataWeb/Census, General imports, digests MT001–31, accessed June 30, 2025.

³⁵⁹ USITC DataWeb/Census, General imports, China, digests MT023 and MT024, accessed June 30, 2025.

³⁶⁰ USITC DataWeb/Census, General imports, Japan, digest MT009, accessed June 30, 2025.

³⁶¹ USITC DataWeb/Census, General imports, Taiwan, digests MT018 and MT029, accessed June 30, 2025.

³⁶² Antonioni, “World Trade of Capital Goods,” February 17, 2025.

³⁶³ Manyika et al., *Building a More Competitive US Manufacturing Sector*, April 15, 2021, 10; Savona et al., *State of Industrial Goods North America Non-Road Equipment, 2025*; Savona et al., *State of the Industrial Goods Sector 2024, 2024*.

taps, cocks, valves and other appliances.³⁶⁴ Electric motors, generators, and related equipment exports increased by \$1.2 billion, with exports of certain multiphase AC motors driving much of this growth. Multiphase AC motors are commonly used in industrial and commercial applications because of their high efficiency, and recent trends toward energy efficiency could be motivating this increase.³⁶⁵

Table 6.3 U.S. domestic exports of machinery by product group, 2022–24
In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute	Average
				change, 2022–24 (million \$)	change, 2022– 24 (%)
Taps, cocks, valves, and similar devices	10,312	11,140	11,706	1,394	6.5
Miscellaneous machinery	10,251	11,490	11,491	1,240	5.9
Electric motors, generators, and related equipment	6,664	7,256	7,832	1,168	8.4
Pumps for liquids	6,011	6,604	6,849	838	6.7
Air-conditioning equipment and parts	7,778	8,405	8,431	652	4.1
Nonautomotive insulated electrical wire and related products	6,585	6,691	6,341	-244	-1.9
Centrifuges and filtering and purifying equipment	10,101	10,051	9,234	-866	-4.4
Household appliances, including commercial applications	7,845	7,073	6,767	-1,078	-7.1
Farm and garden machinery and equipment	12,341	13,249	10,997	-1,344	-5.6
Semiconductor manufacturing equipment and robotics	30,222	24,790	25,266	-4,955	-8.6
All other digests	26,663	28,142	27,065	403	0.8
Total	134,772	134,890	131,979	-2,793	-1.0

Source: USITC DataWeb/Census, accessed June 30, 2025.

Notes: Average change is calculated using the compound annual growth rate formula. When a sector contains more than 10 digests, digest tables display the five largest positive value changes followed by the 5 largest negative changes over 2022–24. Full digest tables are available in Appendix A.

Five product groups of the fifteen U.S. machinery exports that saw decreases during the period that saw the largest declines were: nonautomotive insulated electrical wire and related products, centrifuges and filtering and purifying equipment, household appliances, farm and garden machinery and equipment, and semiconductor manufacturing equipment and robotics ([table 6.3](#)). Although global machinery purchases were strong in 2023 as a result of continued recovery from post-pandemic demand, global purchases stalled in 2024 because of increased costs and uncertainty that stalled equipment investment.³⁶⁶

Semiconductor manufacturing equipment and robotics exports saw the largest decrease, with semiconductor manufacturing equipment (SME) declining in particular.³⁶⁷ This decline was due to a combination of factors, including the cyclical nature of the industry and the recent imposition of export

³⁶⁴ USITC DataWeb/Census, Domestic exports, HTS subheading 8481.80.90, accessed June 30, 2025.

³⁶⁵ IQS Directory, “AC Motors: Types and Uses,” accessed August 27, 2025.

³⁶⁶ Hayes et al., “Capital Goods 2024,” April 30, 2025.

³⁶⁷ USITC DataWeb/Census, Domestic exports, subdigest MT019A, accessed June 30, 2025.

controls on certain types of SME. The decline in farm and garden machinery and equipment exports was motivated by extreme weather events related to the 2023 El Niño and by a decline in global agricultural and food prices, both of which limited global farm income during the period constraining equipment purchases.³⁶⁸

The largest export destinations for U.S. machinery products were Canada, Mexico, China, South Korea, and Taiwan, collectively representing \$219.6 billion in machinery exports during 2022–24 (table 6.4). Overall, the five largest increases in U.S. machinery exports during 2022–24 were to Canada, Mexico, Saudi Arabia, the United Arab Emirates, and Malaysia. U.S. machinery exports to Canada and Mexico saw the largest increases, potentially benefiting from the United States-Mexico-Canada Agreement. Exports of miscellaneous machinery (\$407 million); pumps for liquids (\$210 million); and for electrical transformers, static converters, and inductors (\$186 million) to Canada saw the largest increases over the period.³⁶⁹ Increases in U.S. machinery exports to Mexico were driven by increases in air-conditioning equipment and parts (\$305 million), miscellaneous machinery (\$296 million), and semiconductor manufacturing equipment and robotics (\$208 million).³⁷⁰ U.S. machinery exports to Saudi Arabia increased by \$589 million between 2022 and 2024, driven by exports of electric motors, generators, and related equipment (\$169 million) and miscellaneous machinery (\$142 million).³⁷¹ U.S. machinery exports to the United Arab Emirates increased by \$467 million; those from Malaysia increased by \$423 million.

Table 6.4 U.S. domestic exports of machinery by export market, 2022–24

In millions of dollars and percentages.

Destination market	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Canada	26,424	27,557	27,893	1,470	2.7
Mexico	19,650	21,867	20,476	826	2.1
China	12,172	11,589	11,120	-1,052	-4.4
South Korea	8,608	7,509	6,767	-1,841	-11.3
Taiwan	7,943	5,100	4,949	-2,994	-21.1
Germany	5,058	5,175	4,903	-155	-1.5
Japan	4,815	4,371	4,256	-559	-6.0
United Kingdom	3,556	3,847	3,866	310	4.3
Singapore	4,763	3,573	3,834	-929	-10.3
Australia	3,521	3,794	3,348	-173	-2.5
All other markets	38,263	40,507	40,567	2,305	3.0
Total	134,772	134,890	131,979	-2,793	-1.0

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

³⁶⁸ Fiocco et al., “Global Farmer Insights 2024,” October 16, 2024; World Bank Group, *Commodity Markets Outlook*, April 2025, 20–22.

³⁶⁹ USITC DataWeb/Census, Domestic exports, Canada, digests, MT001, MT024, and MT030, accessed June 30, 2025.

³⁷⁰ USITC DataWeb/Census, Domestic exports, Mexico, digests MT002, MT030, and MT019, accessed June 30, 2025.

³⁷¹ USITC DataWeb/Census, Domestic exports, Saudi Arabia, digests MT023 and MT030, accessed June 30, 2025.

The largest decreases in U.S. machinery exports were to Taiwan, South Korea, China, Singapore, and Japan. U.S. machinery exports were largely affected by a downturn in the semiconductor machinery sector, with three of the countries with the largest decreases significantly affected. Taiwan, which had the largest overall decrease in U.S. machinery exports, saw a \$2.7 billion decrease in U.S. semiconductor manufacturing equipment and robotics exports.³⁷² Likewise, U.S. exports of semiconductor manufacturing equipment and robotics to South Korea decreased by \$1.6 billion and those to Singapore decreased by \$1.0 billion.³⁷³ The decline in U.S. machinery exports to China was driven by a decrease in exports of centrifuges and filtering and purifying equipment (\$273 million), farm and garden machinery and equipment (\$227 million), and miscellaneous machinery (\$158 million).³⁷⁴

Analytical Narratives

Power Up: How Data Centers Are Prompting a Need for More Liquid Dielectric Transformers.

Data centers have become increasingly more important because the world has shifted to the digital economy, especially with the introduction of cloud computing and artificial intelligence (AI). However, data centers require a significant and steady stream of power, which has contributed to the demand for liquid dielectric transformers. Increased demand, coupled with a recent U.S. transformer shortage, has prompted a spike in U.S. transformer imports to satisfy growing demand.

Data centers provide the critical infrastructure to facilitate the digital age. For example, they are essential for storing and processing data, hosting mobile and web-based applications, and providing necessary infrastructure for cloud computing.³⁷⁵ As of 2024, the United States was home to 5,388 data centers.³⁷⁶ Data storage capacity in primary data center markets grew by about 26 percent between 2022 and 2023 and by around 34 percent between 2023 and 2024.³⁷⁷ Recent expansion of data center capacity has been driven by the introduction of AI and its market expansion. AI relies heavily on data centers, as AI models must be trained on a significant cache of information that is stored on servers in data centers.³⁷⁸ The AI

³⁷² USITC DataWeb/Census, Domestic exports, Taiwan, digest MT019, accessed June 30, 2025.

³⁷³ USITC DataWeb/Census, Domestic exports, South Korea, digest MT019, accessed June 30, 2025; USITC DataWeb/Census, Domestic exports, Singapore, digest MT019, accessed June 30, 2025.

³⁷⁴ USITC DataWeb/Census, Domestic exports, China, digests MT005, MT009, and MT030, accessed June 30, 2025.

³⁷⁵ CLRN, "Why Are Data Centers Important?," July 2, 2025.

³⁷⁶ Kranjec, "The United States Counts 5,388 Data Centers," September 29, 2024.

³⁷⁷ Primary data center markets, characterized by a concentration of data center activity, include Northern Virginia, Atlanta, Chicago, Phoenix, Dallas-Fort Worth, Hillsboro, Silicon Valley, and the New York Tri-State area. CBRE Group, "North America Data Center Trends H2 2024," February 26, 2025.

³⁷⁸ Goldman Sachs, "AI to Drive 165% Increase in Data Center Power Demand by 2030," February 4, 2025.

market size increased by 59.9 percent between 2022 and 2024, with expectations that it will grow exponentially going forward.³⁷⁹

Transformers are used along the power transmission network to alter the voltage to required levels along the chain.³⁸⁰ Liquid dielectric transformers are a type of transformer that uses a liquid-based cooling system that enhances efficiency and power-generation potential.³⁸¹ Liquid dielectric transformers have a higher power rating than dry transformers and allow greater capacity for handling electrical energy.³⁸² Liquid dielectric transformers are most commonly used at utility substations, industrial plants that require significant power requirements, and commercial buildings that require high voltage and efficiency, such as data centers.³⁸³

Increased data center capacity has resulted in a commensurate increase in energy consumption. Modern data centers require more power, thus raising demand for transformers. Early data centers only required about 2 megawatts (MW) of power, but modern data centers require about 40 MW on average.³⁸⁴ Between 2018 and 2023, U.S. data center energy consumption increased from 76 terawatt hours (TWh) to 176 TWh, accounting for 4.4 percent of total U.S. energy consumption by 2023.³⁸⁵ Data centers require a consistent stream of power to fuel a number of simultaneous processes—in particular, operating its servers, which account for around 50–70 percent of the total power consumption of a data center.³⁸⁶ Data centers also use redundant power systems—requiring multiple transformers—to ensure uninterrupted power supply.³⁸⁷ The transformer is essential, because it adjusts voltage to step power up or down according to the energy need.³⁸⁸ The United States has boosted imports of transformers in response to rising demand and supply constraints. Demand has accelerated recently because of required updates to the domestic grid, increased reliance on electricity over other heat sources, and new projects requiring transformers, including for renewable-energy systems, electric vehicle charging stations, and data centers.³⁸⁹ At the same time, the United States faces supply challenges due to labor shortages, producer wariness due to historical cyclicity of the transformer manufacturing industry, difficulty in scale due to the need for custom products, and shortages of grain-oriented electrical steel.³⁹⁰ The supply constraints have led to significantly increased lead times for new transformers, requiring 70 additional

³⁷⁹ Statista, *Data Centers in the U.S.*, 2025, 9.

³⁸⁰ DOE, CESER, *How It Works*, accessed July 28, 2025, 1.

³⁸¹ Niagara Power Transformer, “Explaining Liquid-Filled Power Transformers,” January 13, 2025.

³⁸² Liquid transformers use oil to maintain temperature while dry-type transformers use air or a combination of air and gas. Niagara Power Transformer, “Explaining Liquid-Filled Power Transformers,” January 13, 2025.

³⁸³ UTB Transformers, “Dry-Type vs. Liquid-Filled Transformers,” July 19, 2024.

³⁸⁴ Mason et al., *The Rise of Data Centers in the Grid*, June 30, 2025.

³⁸⁵ Shehabi et al., *2024 United States Data Center Energy Usage Report*, December 20, 2024, 5.

³⁸⁶ Zhang, “Data Center Power,” March 25, 2024.

³⁸⁷ Zhang, “Data Center Power,” March 25, 2024.

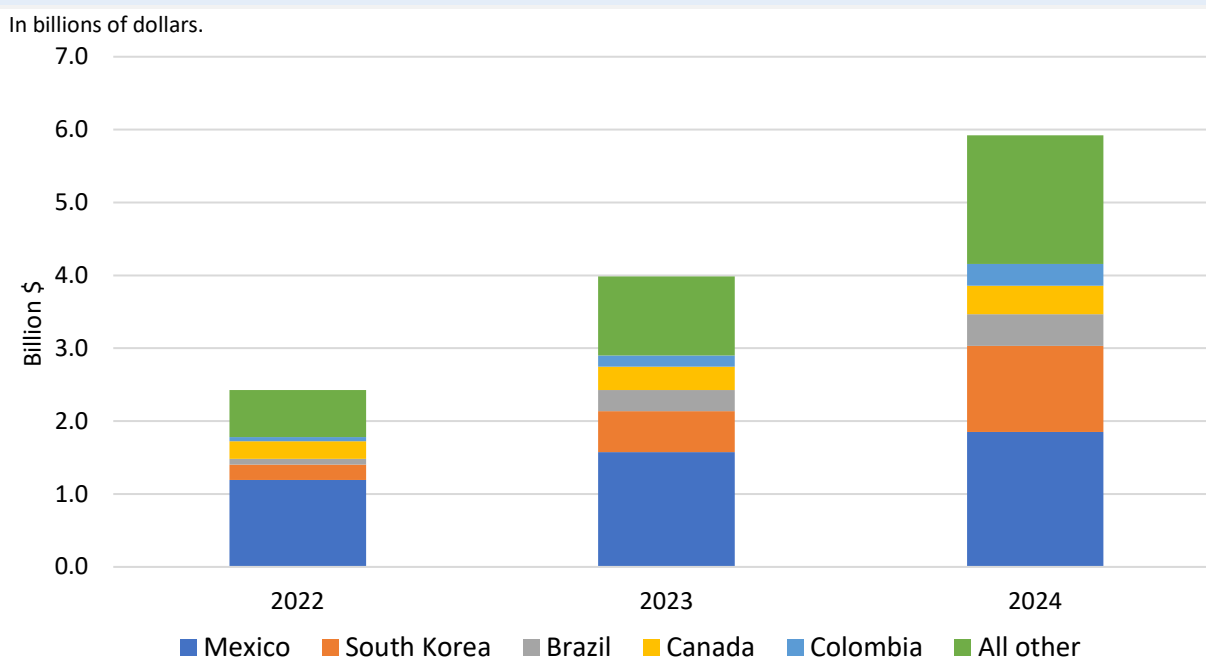
³⁸⁸ Tozzi, “Data Center Transformers,” March 18, 2025.

³⁸⁹ Ottinger and Harding, “Gridlocked: Transformer Shortage Choking US Supply Chains,” February 11, 2025.

³⁹⁰ As part of the U. S. Steel and Nippon merger, Nippon is committing to expanding grain-oriented electrical steel production in U. S. Steel’s facilities, which may eventually lessen the import demand. Ottinger and Harding, “Gridlocked: Transformer Shortage Choking US Supply Chains,” February 11, 2025; *Magnetics Business and Technology*, “Global Powerhouse in Electrical Steel Emerges,” June 18, 2025.

weeks on average between 2021 and 2024, with even longer lead times for large transformers.³⁹¹ Because of these constraints, domestic supply could only meet about 20 percent of domestic demand, resulting in a shortage.³⁹² Imports of liquid dielectric transformers, however, increased by \$3.5 billion between 2022 and 2024 (figure 6.1). The two largest sources for these transformer imports were Mexico and South Korea, which accounted for more than 50 percent of related imports during 2022–24.

Figure 6.1 U.S. imports of liquid dielectric transformers, by source, 2022–24



Source: USITC DataWeb/Census, General imports, HTS subheadings 8504.21.00, 8504.22.00, and 8504.23.00, accessed June 30, 2025.

The need for energy, and by extension transformers, is only expected to continue. Data centers are expected to expand, and their collective power demand is expected to increase by around 50 percent by 2027.³⁹³ This is especially true, because adoption of AI throughout the global economy increasingly necessitates additional data center usage. Estimates from the Lawrence Berkeley National Laboratory indicate that by 2028, annual energy usage for data centers will increase to 74–132 GWh, accounting for 6.7–12.0 percent of total U.S. electricity consumption.³⁹⁴ Data centers may increasingly turn to

³⁹¹ In 2021, the lead time for new transformers averaged 50 weeks. This increased to 120 weeks on average by 2024. Ottinger and Harding, “Gridlocked: Transformer Shortage Choking US Supply Chains,” February 11, 2025.

³⁹² Ottinger and Harding, “Gridlocked: Transformer Shortage Choking US Supply Chains,” February 11, 2025; USITC, *Large Power Transformers from South Korea*, August 2024, 22, II–7, and II–8.

³⁹³ Goldman Sachs, “AI to Drive 165% Increase,” February 4, 2025.

³⁹⁴ Shehabi et al., *2024 United States Data Center Energy Usage Report*, December 20, 2024, 6.

renewable energy sources on-site, which may relieve grid-related pressures but could also require additional transformers.³⁹⁵

The Machinery Behind the Microchip: Unpacking U.S. Semiconductor Manufacturing Equipment (SME) Exports

Although the United States remains a large manufacturer of SME, U.S. SME exports have decreased since 2022. In some markets, this is likely due to the highly cyclical nature of the semiconductor industry. However, in 2022, the U.S. introduced export controls on semiconductor-related machinery to certain Chinese companies, which constrained exports to China during the period.³⁹⁶

U.S. SME exports to some of its largest export markets have decreased significantly. Exports of the largest subheading within the SME digest decreased by \$5.2 billion from 2022 to 2024 (a 16.4 percent decrease).³⁹⁷ The largest decreases were for Taiwan (\$2.7 billion decrease), South Korea (\$1.6 billion decrease), and Singapore (\$1.0 billion decrease).³⁹⁸ Figure 6.2 shows annual billings, or total payments for SME within each market, compared to U.S. SME exports to that market. Taiwan and South Korea represented the two largest markets for U.S. SME exports in 2022. By 2024 however, China emerged as the largest market for U.S. SME exports, followed by South Korea and Taiwan ([figure 6.2](#)).

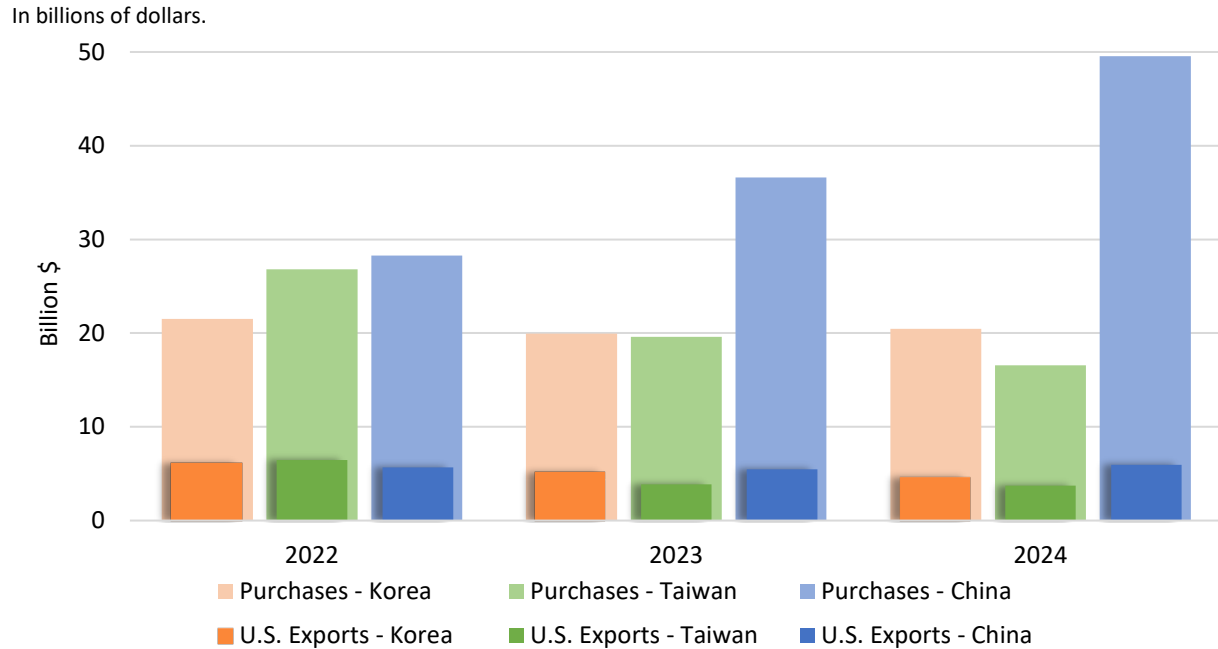
³⁹⁵ CBRE Group, “North America Data Center Trends H2 2024,” February 26, 2025.

³⁹⁶ 87 FR 62186

³⁹⁷ The largest SME digest HTS subheading is 8486.20.00, machines and apparatus for the manufacture of semiconductor devices and electronic integrated circuits. USITC DataWeb/Census, Domestic Exports of HTS subheading 8486.20.00, accessed June 30, 2025.

³⁹⁸ USITC DataWeb/Census, Domestic Exports of digest MT019, accessed June 30, 2025.

Figure 6.2 Purchases and U.S. exports of semiconductor machinery equipment for selected markets, 2022–24



Sources: SEMI, “Global Semiconductor Equipment Billings Surged,” April 9, 2025; USITC DataWeb/Census, Domestic Exports, digest MT019, accessed June 26, 2025.

Notes: Purchases refer to annual billings, or the total yearly payments on semiconductor manufacturing equipment. Some equipment used in manufacturing semiconductors may also be used in other manufacturing processes, including for photovoltaic cells, and may be represented in U.S. export values.

SME exports are affected by the cyclical nature of supply and demand conditions in the market for semiconductors, which is driven by technological innovation, economic conditions, supply chain dynamics, and consumer demand.³⁹⁹ Semiconductor industry revenue reached a peak in 2022, before declining and ultimately rebounding to another peak in 2024.⁴⁰⁰ This cyclical nature has a knock-on effect for the equipment that produces semiconductors.⁴⁰¹ Cyclical nature has impacted Taiwan’s semiconductor market—SME purchases destined for Taiwan from all countries decreased from 2022 to 2024. The Taiwan Semiconductor Manufacturing Company (TSMC) also lost revenue in late 2023; the company was particularly affected by the overcapacity associated with the increase in chipmaking following the semiconductor shortage in 2020.⁴⁰² This could have affected TSMC’s capacity and willingness to invest in new machinery.

³⁹⁹ Toxigon, “Understanding the Cyclical Nature of Semiconductor Industry,” February 12, 2025.

⁴⁰⁰ Davis, “Global Semiconductor Sales Increase 19.1% in 2024; Double-Digit Growth Projected in 2025,” February 7, 2025.

⁴⁰¹ Curtis, *Semiconductor Machinery Manufacturing in the US*, April 2025, 22, 43.

⁴⁰² Yadav, “From Shortage to Surplus,” November 10, 2023.

The United States also introduced export controls on specific SME during the period, limiting what could be exported to China. This first round of controls went into effect on October 7, 2022, restricting exports to certain Chinese firms.⁴⁰³ The impositions of these controls resulted in a 19.7 percent decrease of U.S. SME exports to China between 2021 and 2022.⁴⁰⁴ Studies have shown that complex export controls may incentivize U.S. firms to over comply and not engage in business with companies that are not subject to the controls.⁴⁰⁵ Furthermore, Chinese semiconductor manufacturers boosted investments in SME and attempted to stockpile equipment ahead of the imposition of these controls, which may have led to a surge of imports before the rules took effect, making the decline appear more significant.⁴⁰⁶ U.S. exports to China have since remained somewhat consistent, averaging \$5.6 billion during the period 2022–24. Although Chinese SME purchases have remained stable, notwithstanding the export controls, the controls have changed the composition of equipment that China has purchased toward a focus on legacy chip production, which is not covered by the controls.⁴⁰⁷

At the same time, other countries have developed significant inroads into the SME industry and increasingly compete with U.S. equipment manufacturers. Germany, with its proximity to Dutch semiconductor manufacturer ASML and a strong domestic engineering base, has attracted SME companies.⁴⁰⁸ South Korea and Taiwan, the homes of semiconductor manufacturers Samsung and TSMC, respectively, have also attracted a network of machinery manufacturers, further bolstered by lower labor costs and government incentives. In South Korea in particular, domestic production may be limiting U.S. exports. In 2023, the South Korean government launched an initiative to develop the South Korean semiconductor industry, which included a 20-year plan from Samsung to invest \$230.0 billion in the creation of an SME hub.⁴⁰⁹ This investment prompted an influx of equipment suppliers into South Korea, including U.S. firms that are setting up subsidiaries in South Korea.⁴¹⁰ The recent attraction to the South Korean market may explain why U.S. exports have decreased but annual SME purchases in South Korea have remained unchanged ([figure 6.2](#)).

Despite recent decreases in U.S. exports, imminent investments in U.S. semiconductor manufacturing and increased integration of AI within devices may benefit U.S. SME producers. SME exports have declined, but new domestic semiconductor fabrication facilities may increase domestic demand for U.S. SME. Semiconductor fabrication projects are underway in the United States, with many expected to be completed between 2025 and 2030. These projects offer new opportunities for U.S. SME producers and

⁴⁰³ Commerce, BIS, 87 Fed. Reg. 62186 (October 13, 2022).

⁴⁰⁴ S&P Global, GTAS, Chinese imports of semiconductor manufacturing equipment (digest MT019) from the United States, June 26, 2025.

⁴⁰⁵ Reinsch et al., *The Double-Edged Sword of Semiconductor Export Controls*, November 19, 2024, 13.

⁴⁰⁶ Caixin Global, “China Stockpiles Chips and Chipmaking Machines to Resist U.S.,” February 3, 2021; Bao, “China’s Binge-Buying of Chipmaking Equipment,” September 4, 2024; Shilov, “China Will Likely Reduce Purchase of Chipmaking Tools,” February 12, 2025.

⁴⁰⁷ Allen, *The True Impact of Allied Export Controls*, November 26, 2024.

⁴⁰⁸ Curtis, *Semiconductor Machinery Manufacturing in the US*, April 2025, 20.

⁴⁰⁹ Abachy, “Semicon Equipment Makers Rush to South Korea,” May 29, 2025.

⁴¹⁰ U.S. semiconductor equipment manufacturer Applied Materials has established a research and development center in South Korea to leverage proximity to Samsung. Eun-jin, “AMAT to Establish R&D Center in Korea,” June 7, 2022.

could reduce reliance on external semiconductor manufacturing markets.⁴¹¹ Furthermore, the proliferation of AI, including its integration into software systems and in virtual reality devices, will drive global demand for equipment capable of manufacturing increasingly more complex semiconductor chips.⁴¹² The need for these more complex chips is likely to also lead to increased investment in SME innovation. Resulting innovations could include increased automation and AI functionality within semiconductor manufacturing equipment itself.⁴¹³

From Wheel to Tracked: Is a Shift in the Agricultural Industry Impacting the Type of Tractors the U.S. Imports?

U.S. tractor sales have declined, affecting both imports and domestic production, driven by a decline in farmers' incomes. The number of farms in the United States and the U.S. acreage dedicated to farm activities have gradually declined as well.⁴¹⁴ Typically, the correlation between farm income and farm equipment sales is positive: When farmers' incomes decline, their ability to secure equipment is reduced. Farmers confirm that low crop prices and high interest rates have deterred large purchases, including tractors.⁴¹⁵ The 7.1 percent reduction in U.S. imports of farm and garden equipment between 2022 and 2024 reflects this deflated demand.

Despite the reduction in U.S. farms and in farm income, U.S. imports of track-type tractors—which use tracks to move—have increased. Track-type tractors are still a relatively small proportion of tractor imports, but they have been insulated from the declines experienced by imports of other tractor types. Track-type tractors run on two tracks consisting of plates joined into a continuous chain encircling two wheels.⁴¹⁶ The volume of imports of track-type tractors for agricultural use increased by 1.9 percent (a 51.1 percent increase by value) between 2022 and 2024.⁴¹⁷ Comparatively, other agricultural tractors have decreased in volume by 46.9 percent (a 26.6 percent decrease by value).⁴¹⁸

⁴¹¹ Curtis, *Semiconductor Machinery Manufacturing in the US*, April 2025, 10.

⁴¹² SEMI, "SEMI Forecasts 69% Growth in Advanced Chipmaking Capacity," June 25, 2025.

⁴¹³ SEMI, "SEMI Forecasts 69% Growth in Advanced Chipmaking Capacity," June 25, 2025; Curtis, *Semiconductor Machinery Manufacturing in the US*, April 2025, 10.

⁴¹⁴ Between 2022 and 2024, the number of U.S. farms decreased by 1.1 percent. During the same period, net farm income in the United States decreased by 23.6 percent. USDA, NASS, *Farms and Land in Farms 2024 Summary*, February 14, 2025, 5; USDA, ERS, "Farm Income and Wealth Statistics-Data Files," U.S. farm sector financial indicators, 2018-25, February 6, 2025; Glass, "Why the Decline in . . . Tractor Sales in 2024," September 14, 2024.

⁴¹⁵ Owens, "Deere Lowers Outlook as Equipment Sales Slow," May 17, 2024; Flowers and Hickman, "Focus: Too Many Tractors," May 9, 2024.

⁴¹⁶ *Encyclopaedia Britannica*, "Tractor," June 30, 2025.

⁴¹⁷ USITC DataWeb/Census, Imports for Consumption, HTS stactical reporting numbers 8701301015, 8701301030, 8701301045, 8701301060, 8701301075, and 8701301090, January 5, 2026.

⁴¹⁸ USITC DataWeb/Census, Imports for Consumption, HTS stactical reporting numbers 8701100100, 8701911000, 8701921000, 8701931000, 8701941000, and 8701951000, January 5, 2026.

Track-type tractors are perceived to have some benefits. These include better traction, especially in wet or soft terrain.⁴¹⁹ They are also perceived to reduce soil compaction, though some industry representatives contend this is not necessarily the case.⁴²⁰ Track-type tractors are also considered to be operationally more efficient.⁴²¹ Track-type tractors are generally more costly than their wheeled counterparts, however, which can limit their adoption rate.⁴²²

The emerging uptake in track-type tractors may be related to a progressive consolidation of farmland within the United States and an increase in weather events. Track-type tractors are commonly used in large-scale farming or for applications that require hitching heavy attachments.⁴²³ Consistent with a recent trend in consolidation of farming land into larger farms, the needs of these larger farms may support the import of track-type tractors.⁴²⁴ Extreme weather events, including abundant rainfall, have increased in recent years.⁴²⁵ The increase in adverse weather events has led to an increase in soil moisture within certain regions of the United States.⁴²⁶ As track-type tractors are well suited for wetter soil, the increase in extreme rainfall events and subsequent increase in soil moisture may also be driving a pivot to track-type tractors.

Drilling Down: How Trade Tensions Are Cooling Demand for Chinese Hand Tools

The powered hand tool market within the United States is experiencing an increase in sales, with tool sales revenue increasing by 10.4 percent between 2022 and 2024.⁴²⁷ Growth within the industry has been driven by increased business in the construction, mining, and manufacturing industries.⁴²⁸ For example, nonresidential and residential construction spending in the United States increased by 29.5 percent and 0.7 percent, respectively, during the period.⁴²⁹ Collectively, annual construction spending

⁴¹⁹ Immerwahr, *Tractors & Agricultural Machinery Manufacturing in the US*, April 2025, 4; Verified Market Reports, *Track Type Tractor Market Report*, February 2025.

⁴²⁰ Soil compaction occurs when heavy loads press soil particles together, increasing the density of the soil, impeding water filtration and crop growth. Tuschner, “Compare & Contrast — Making the Case for Tires vs. Tracks,” April 7, 2020; USDA, NRCS, “Soil Compaction Symptoms, Causes, Correction, & Prevention,” July 2019.

⁴²¹ Verified Market Reports, *Track Type Tractor Market Report*, February 2025.

⁴²² Tuschner, “Compare & Contrast—Making the Case for Tires vs. Tracks,” April 7, 2020.

⁴²³ FMWorld, “Types of Tractors: A Comprehensive Guide to Agricultural Machinery,” July 19, 2024.

⁴²⁴ MacDonald and Hoppe, “Examining Consolidation in U.S. Agriculture,” March 14, 2018.

⁴²⁵ While data was only available through 2021, indications are that these are continuing trends. Ritchie, “How Are Extreme Weather Events and the Climate Evolving in the United States?,” May 20, 2024.

⁴²⁶ While data was only available through 2021, indications are that these are continuing trends. Burrows, “Temperatures Are Rising, but Soil Is Getting Wetter — Why?,” February 8, 2024.

⁴²⁷ Powered hand tools include both those powered by electricity (MT025) and those powered by other means such as gasoline powered tools, pneumatic and air tools, and hydraulic tools (MT026). Statista, “Tools & Machines - United States,” accessed July 23, 2025.

⁴²⁸ Le, *Power Tool Manufacturing in the US*, April 2025, 4, 12.

⁴²⁹ St. Louis Fed, FRED database/Census, Total construction spending: nonresidential in the United States, August 1, 2025; St. Louis Fed, FRED database/Census, Total construction spending: residential in the United States, August 1, 2025.

averaged \$24.7 trillion between 2022 and 2024. The consumer segment also surged as people engaged in personal home projects during the COVID-19 pandemic.⁴³⁰

Despite the recent increased demand for powered hand tools in the United States, it is notable that imports of electric- and nonelectric-powered hand tools decreased significantly, largely driven by a decline in imports from China. The domestic market has historically been reliant on imports, which accounted for roughly 70 percent of domestic demand.⁴³¹ Chinese powered hand tools accounted for 40.0 percent of U.S. imports of both electric- and nonelectric-powered hand tools between 2022 and 2024.⁴³² Although China is still the largest import source, tool imports from China have decreased substantially. Between 2022 and 2024, U.S. imports of Chinese electric- and nonelectric-powered hand tools decreased by 21.7 percent and 27.4 percent, respectively. Overall, imports from all other countries decreased slightly by 2.8 percent during 2022–24. The next two largest import sources after China saw increases during the period: U.S. powered hand tool imports from Vietnam increased by 1.9 percent and imports from Mexico increased 17.8 percent.⁴³³

The decrease in U.S. imports of Chinese powered hand tools coincides with the introduction of section 301 duties on these products, which may have facilitated the decline.⁴³⁴ Starting in 2018, a majority of hand tool imports from China became subject to tariffs as outlined in Chapter 99 of the HTS (figure 6.3). Calculated duties for hand tools from China increased a total of 557.6 percent: going from \$23 million in 2018, peaking at \$230 million in 2021, and dropping to \$154 million in 2024.⁴³⁵ Between 2018 and 2021, the total value of imports from China remained relatively stable, suggesting that importers initially accepted the additional cost imposed by the tariff. However, after 2021, the value of powered hand tool imports from China declined. First, Chinese suppliers began to look to other markets, including Asia, Africa, and Latin America, for export, because their tariff costs have increased. Second, U.S. companies began to reduce their reliance on Chinese suppliers by shifting production to other countries such as Vietnam and Mexico.⁴³⁶

⁴³⁰ Freedonia Group, “US Power Tools Report,” accessed June 27, 2025; Statista, “Tools & Machines - United States,” accessed July 23, 2025.

⁴³¹ Le, *Power Tool Manufacturing in the US*, April 2025, 4.

⁴³² USITC DataWeb/Census, General Imports, digests MT025 and MT026, accessed July 2, 2025.

⁴³³ USITC DataWeb/Census, General Imports, digests MT025 and MT026, accessed July 2, 2025.

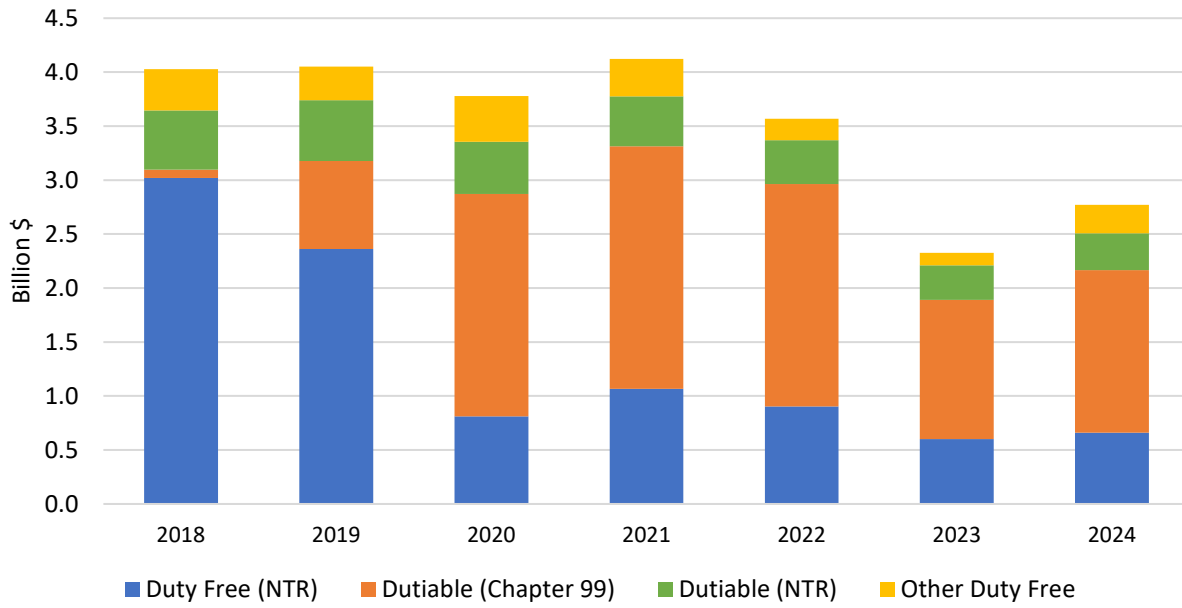
⁴³⁴ Section 301 duties are punitive duties that the United States places on imports of specific countries due to the determination that the country engaged in unfair trade practices. Congress.gov, “Section 301 of the Trade Act of 1974,” January 29, 2026.

⁴³⁵ USITC DataWeb/Census, Imports for consumption, calculated duties, China, digests MT025 and MT026, accessed August 4, 2025.

⁴³⁶ Diversitech Global, “Have US Tariffs Affected Power Tool Suppliers in China?,” February 24, 2025; Eurekor, “The Impact of Tariffs and Trade Policies,” March 10, 2025.

Figure 6.3 U.S. imports of Chinese powered hand tools by rate provision code, 2018–24

In billions of dollars.



Source: USITC DataWeb/Census, General imports, China, digests MT025 and MT026, accessed June 30, 2025.

Bibliography

- Abachy. "Semicon Equipment Makers Rush to South Korea." May 29, 2025. <https://abachy.com/news/semicon-equipment-makers-rush-south-korea>.
- Allen, Gregory C. *The True Impact of Allied Export Controls on the U.S. and Chinese Semiconductor Manufacturing Equipment Industries*. Center for Strategic and International Studies, November 26, 2024. <https://www.csis.org/analysis/true-impact-allied-export-controls-us-and-chinese-semiconductor-manufacturing-equipment>.
- Antonioni, Marcello. "World Trade of Capital Goods: Uncertainty Continues, but with Significant Sectoral Differences." *ExportPlanning*, February 17, 2025. <https://www.exportplanning.com/en/magazine/article/2025/02/17/world-trade-in-capital-goods-uncertainty-continues-but-with-significant-differences/>.
- Bao, Anniek. "China's Binge-Buying of Chipmaking Equipment Could Yield Another Overcapacity Problem." *CNBC*, September 4, 2024. <https://www.cnbc.com/2024/09/04/chinas-binge-buying-of-chipmaking-equipment-could-lead-to-another-overcapacity-problem.html>.
- Burrows, Leah. "Temperatures Are Rising, but Soil Is Getting Wetter — Why?" *Harvard University John A. Paulson School of Engineering and Applied Sciences*, February 8, 2024. <https://seas.harvard.edu/news/2024/02/temperatures-are-rising-soil-getting-wetter-why>.
- Caixin Global. "China Stockpiles Chips and Chipmaking Machines to Resist U.S." February 3, 2021. <https://www.caixinglobal.com/2021-02-03/china-stockpiles-chips-and-chipmaking-machines-to-resist-us-101659787.html>.
- California Learning Resource Network (CLRN). "Why Are Data Centers Important?" July 2, 2025. <https://www.clrn.org/why-are-data-centers-important/>.
- CBRE Group. "North America Data Center Trends H2 2024." February 26, 2025. <https://www.cbre.com/insights/reports/north-america-data-center-trends-h2-2024>.
- Conerly, Bill. "Near-Shoring: Can Manufacturing Move from China to Mexico?" *Forbes*, April 14, 2023. <https://www.forbes.com/sites/billconerly/2023/04/14/near-shoring-can-manufacturing-move-from-china-to-mexico/>.
- Congress.gov. "Section 301 of the Trade Act of 1974." January 29, 2026. <https://www.congress.gov/crs-product/IF11346>.
- Curtis, William. *Semiconductor Machinery Manufacturing in the US*. IBISWorld, April 2025. <https://www.ibisworld.com/united-states/industry/semiconductor-machinery-manufacturing/683/>.
- Davis, Shannon. "Global Semiconductor Sales Increase 19.1% in 2024; Double-Digit Growth Projected in 2025." *Semiconductor Digest*, February 7, 2025. <https://www.semiconductor-digest.com/global-semiconductor-sales-increase-19-1-in-2024-double-digit-growth-projected-in-2025/>.

- Diversitech Global. “Have US Tariffs Affected Power Tool Suppliers in China? A Reality Check.” February 24, 2025. <https://www.diversitech-global.com/post/have-us-tariffs-affected-power-tool-suppliers-in-china-a-reality-check>.
- Dynan, Karen. “Investment in US Factories Has Soared since the End of 2022.” Peterson institute for International Economics, May 1, 2024. <https://www.piie.com/research/piie-charts/2024/investment-us-factories-has-soared-end-2022>.
- Eun-jin, Kim. “AMAT to Establish R&D Center in Korea.” *BusinessKorea*, June 7, 2022. <https://www.businesskorea.co.kr/news/articleView.html?idxno=94101>.
- Eurekor. “The Impact of Tariffs and Trade Policies on Hand Tool Importing and Exporting.” March 10, 2025. https://www.eurekortools.com/article_detail/58.
- Federal Reserve Bank of St. Louis (St. Louis Fed). Federal Reserve Economic Data (FRED) database/U.S. Bureau of Economic Analysis (BEA). “Gross Output by Industry: Manufacturing.” September 25, 2025. <https://fred.stlouisfed.org/series/GOMA>.
- Federal Reserve Bank of St. Louis (St. Louis Fed). Federal Reserve Economic Data (FRED) database/U.S. Census Bureau (Census). “Total Construction Spending: Nonresidential in the United States.” August 1, 2025. <https://fred.stlouisfed.org/series/TLNRESCONS>.
- Federal Reserve Bank of St. Louis (St. Louis Fed). Federal Reserve Economic Data (FRED) database/U.S. Census Bureau (Census). “Total Construction Spending: Residential in the United States.” August 1, 2025. <https://fred.stlouisfed.org/series/TLRESCONS>.
- Federal Reserve Bank of St. Louis (St. Louis Fed). Federal Reserve Economic Data (FRED) database/U.S. Census Bureau (Census). “Manufacturers’ New Orders: Nondefense Capital Goods Excluding Aircraft.” December 4, 2025. <https://fred.stlouisfed.org/series/NEWORDER>.
- Fiocco, David, Vasanth Ganesan, Ana Luiza Mokodsi, Franziska Alesso, and Otto Gryscek. “Global Farmer Insights 2024.” *McKinsey & Company*, October 16, 2024. <https://www.mckinsey.com/industries/agriculture/our-insights/global-farmer-insights-2024>.
- Flowers, Bianca, and Renee Hickman. “Focus: Too Many Tractors: As Boom Times Fade, Farm Equipment Piles Up.” Reuters, May 9, 2024. <https://www.reuters.com/markets/commodities/too-many-tractors-boom-times-fade-farm-equipment-piles-up-2024-05-09/>.
- FMWorld. “Types of Tractors: A Comprehensive Guide to Agricultural Machinery.” July 19, 2024. <https://www.fmworldagri.com/types-of-tractors.html>.
- Glass, Charlie. “Why the Decline in the Heart of Farm Tractor Sales in 2024.” *Farm Equipment*, September 14, 2024. <https://www.farm-equipment.com/articles/22822-why-the-decline-in-the-heart-of-farm-tractor-sales-in-2024>.
- Global Market Insights. *Industrial Machinery Market Size, Forecasts Report 2025–2034*. Report ID GMI801. April 2025. <https://www.gminsights.com/industry-analysis/industrial-machinery-market>.

Goldman Sachs. “AI to Drive 165% Increase in Data Center Power Demand by 2030.” February 4, 2025. <https://www.goldmansachs.com/insights/articles/ai-to-drive-165-increase-in-data-center-power-demand-by-2030>.

Grand View Research. *U.S. HVAC Systems Market Size (2025–2033)*. 2025. <https://www.grandviewresearch.com/industry-analysis/us-hvac-systems-market>.

Harris, Dan. “China’s Manufacturing Exodus: How Mexico and the U.S. Are Gaining Ground.” Harris Sliwoski LLP, July 8, 2025. <https://harris-sliwoski.com/chinalawblog/chinas-manufacturing-exodus-how-mexico-and-the-u-s-are-gaining-ground/>.

Hartman, Mitchell. “Businesses’ Investment in New Equipment Helped Boost GDP.” Marketplace. August 29, 2024. <https://www.marketplace.org/story/2024/08/29/businesses-investment-in-new-equipment-helped-boost-gdp>.

Hayes, Gareth, Masayuki Igarashi, Sven Siepen, Daniel Tao, and Bernhard Weissensteiner. “Capital Goods 2024: Another Tough Year across the Industry but Profits Hold Up.” Roland Berger, April 30, 2025. <https://www.rolandberger.com/en/Insights/Publications/Capital-goods-2024-Another-tough-year-across-the-industry-but-profits-hold-up.html>.

Heilig, Charles. “2025 State Of The U.S. Textile Industry.” *Textile World*, June 13, 2025. <https://www.textileworld.com/textile-world/features/2025/06/2025-state-of-the-u-s-textile-industry/>.

Immerwahr, Vaughan. *Tractors & Agricultural Machinery Manufacturing in the US*. IBISWorld, April 2025. <https://www.ibisworld.com/united-states/industry/tractors-agricultural-machinery-manufacturing/672/>.

Kelly, Brendan. *China Expands Mexico Investment but Notably Lags U.S., Other G7 Economies*. Federal Reserve Bank of Dallas, September 26, 2025. <https://www.dallasfed.org/research/pubs/25trade/a2>.

U.S. Department of Commerce (Commerce). Bureau of Industry and Security (BIS). Implementation of Additional Export Controls: Certain Advanced Computing and Semiconductor Manufacturing Items; Supercomputer and Semiconductor End Use; Entity List Modification. 87 Fed. Reg. 62186. October 13, 2022. <https://www.federalregister.gov/documents/2022/10/13/2022-21658/implementation-of-additional-export-controls-certain-advanced-computing-and-semiconductor>.

IQS Directory. “AC Motors: Types and Uses.” Accessed August 27, 2025. <https://www.iqsdirectory.com/articles/electric-motor/ac-motor.html>.

Kranjec, Jastra. “The United States Counts 5,388 Data Centers, 70% More than the Next Ten Largest Markets Combined.” *Stocklytics*. September 29, 2024. <https://stocklytics.com/content/the-united-states-counts-5388-data-centers-70-more-than-the-next-ten-largest-markets-combined/>.

- Le, Valerie. *Power Tool Manufacturing in the US*. IBISWorld, April 2025. <https://www.ibisworld.com/united-states/industry/power-tool-manufacturing/4897/>.
- MacDonald, James M., and Robert A. Hoppe. "Examining Consolidation in U.S. Agriculture." *Amber Waves*, March 14, 2018. <https://www.ers.usda.gov/amber-waves/2018/march/examining-consolidation-in-u-s-agriculture>.
- Magnetics Business and Technology*. "Global Powerhouse in Electrical Steel Emerges as Nippon Steel Acquires US Steel." June 18, 2025. <https://magneticsmag.com/global-powerhouse-in-electrical-steel-emerges-as-nippon-steel-acquires-us-steel/>.
- Manyika, James, Katy George, Sree Ramaswamy, Eric Chewning, Jonathan Woetzel, and Hans-Werner Kaas. *Building a More Competitive US Manufacturing Sector*. McKinsey Global Institute, April 15, 2021. <https://www.mckinsey.com/featured-insights/americas/building-a-more-competitive-us-manufacturing-sector>.
- Mason, Kyle, Robert Freudenberg, Christine Garner, and Dave Zackin. *The Rise of Data Centers in the Grid*. Regional Plan Association (RPA), June 30, 2025. <https://rpa.org/news/lab/the-rise-of-data-centers>.
- Mays, Curtis, and Lisa Dombek. "The Trend of Production Moving from China to Mexico – Regulatory and Practical Considerations: Zai Jian Zhongguo, Bienvenidos a México." *Global Trade Law Blog*. May 16, 2022. <https://www.globaltradelawblog.com/2022/05/16/zai-jian-zhongguo-bienvenidos-a-mexico-the-trend-of-production-moving-from-china-to-mexico-regulatory-and-practical-considerations/>.
- Mordor Intelligence. *Industrial Machinery Market Size, Share Analysis & Growth Forecasts Report, 2030*. July 7, 2025. <https://www.mordorintelligence.com/industry-reports/industrial-machinery-market>.
- Niagara Power Transformer. "Explaining Liquid-Filled Power Transformers: How Do They Work?" January 13, 2025. <https://niagarapowertransformer.com/liquid-filled-power-transformers-how-do-they-work/>.
- Novalink. "Shifting Manufacturing from China to Mexico." January 11, 2024. <https://novalinkmx.com/2024/01/11/shifting-manufacturing-from-china-to-mexico/>.
- Ottinger, Lily, and Caleb Harding. "Gridlocked: Transformer Shortage Choking US Supply Chains." *ChinaTalk*, February 11, 2025. <https://www.chinatalk.media/p/gridlocked-transformer-shortage-choking>.
- Owens, Nathan. "Deere Lowers Outlook as Equipment Sales Slow Due to Declining Farm Income." *Agriculture Dive*, May 17, 2024. <https://www.agriculturedive.com/news/deere-lowers-outlook-as-equipment-sales-slow-declining-farm-income/716489/>.
- Reinsch, William Alan, Jack Whitney, and Matthew Schleich. *The Double-Edged Sword of Semiconductor Export Controls: Semiconductor Manufacturing Equipment*. Center for Strategic and International Studies, November 19, 2024. <https://www.csis.org/analysis/double-edged-sword-semiconductor-export-controls-semiconductor-manufacturing-equipment>.

Behind the Trade: An Inside Look at U.S. Industry Trends

Ritchie, Hannah. "How Are Extreme Weather Events and the Climate Evolving in the United States?" *Our World in Data* (May 20, 2024). <https://ourworldindata.org/us-weather-climate>.

S&P Global. Global Trade Analytics Suite (GTAS) database. Accessed June 26, 2025. <https://connect.spglobal.com/home>.

Savona, Nate, Michael Sharov, David Whinfrey, and Jennifer Wong. *State of the Industrial Goods Sector 2024 - North America*. Oliver Wyman, 2024. <https://www.oliverwyman.com/our-expertise/insights/2024/dec/state-of-industrial-goods-sector-2024-north-america.html>.

Savona, Nate, Michael Sharov, David Whinfrey, and Jennifer Wong. *State of Industrial Goods North America Non-Road Equipment: New Rules for the Next Horizon in Industrial Goods*. Oliver Wyman, 2025. <https://www.oliverwyman.com/our-expertise/insights/2025/nov/state-of-industrial-goods-sector-2025-outlook.html>.

SEMI. "Global Semiconductor Equipment Billings Surged to \$117 Billion in 2024, SEMI Reports." April 9, 2025. <https://www.semi.org/en/semi-press-release/global-semiconductor-equipment-billings-surged-to-117-billion-dollars-in-2024-semi-reports>.

SEMI. "SEMI Forecasts 69% Growth in Advanced Chipmaking Capacity Through 2028 Due to AI." June 25, 2025. <https://www.semi.org/en/semi-press-release/semi-forecasts-69-percent-growth-in-advanced-chipmaking-capacity-through-2028-due-to-ai>.

Shehabi, Arman, Alex Newkirk, Sarah J. Smith, et al. *2024 United States Data Center Energy Usage Report*. LBNL-2001637. Lawrence Berkeley National Lab, December 20, 2024. <https://escholarship.org/uc/item/32d6m0d1>.

Shilov, Anton. "China Will Likely Reduce Purchase of Chipmaking Tools This Year as Homegrown Toolmakers Ramp Up." *Tom's Hardware*, February 12, 2025. <https://www.tomshardware.com/tech-industry/china-will-likely-reduce-purchase-of-chipmaking-tools-this-year-as-homegrown-toolmakers-ramp-up>.

Statista. *Data Centers in the U.S.* 2025. <https://www.statista.com/study/133927/data-centers-in-the-us/>.

Statista. "Tools & Machines—United States." Accessed July 23, 2025. <https://www.statista.com/outlook/cmo/diy-hardware-store/tools-machines/united-states>.

Encyclopedia Britannica. "Tractor." June 30, 2025. <https://www.britannica.com/technology/tractor-vehicle>.

The Freedonia Group. "US Power Tools Report." Accessed June 27, 2025. <https://www.freedoniagroup.com/industry-study/power-tools-us>.

Toxigon. "Understanding the Cyclical Nature of Semiconductor Industry." February 12, 2025. <https://toxigon.com/understanding-the-cyclical-nature-of-semiconductor-industry>.

- Tozzi, Christopher. “Data Center Transformers: Functions, Importance, and How to Choose the Right One.” Data Center Knowledge, March 18, 2025. <https://www.datacenterknowledge.com/data-center-hardware/data-center-transformers-functions-importance-and-how-to-choose-the-right-one>.
- Tuschner, James. “Compare & Contrast — Making the Case for Tires vs. Tracks.” Farm Equipment, April 7, 2020. <https://www.farm-equipment.com/articles/18193-compare-contrast-making-the-case-for-tires-vs-tracks>.
- U.S. Department of Agriculture (USDA), Economic Research Service (ERS). “Farm Income and Wealth Statistics—Data Files: U.S. and State-Level Farm Incomes and Wealth Statistics.” U.S. farm sector financial indicators, 2018–25. February 6, 2025. <https://www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/data-files-us-and-state-level-farm-income-and-wealth-statistics>.
- U.S. Department of Agriculture (USDA), National Agricultural Statistics Service (NASS). *Farms and Land in Farms 2024 Summary*. February 14, 2025. <https://usda.library.cornell.edu/concern/publications/5712m6524?locale=en>.
- U.S. Department of Agriculture (USDA). National Resources Conservation Service (NRCS). “Soil Compaction Symptoms, Causes, Correction, & Prevention.” July 2019. https://efotg.sc.egov.usda.gov/references/public/MI/324_12019_compaction.pdf
- U.S. Department of Commerce (USDOC). Bureau of Economic Analysis (BEA). “Gross Domestic Product, 4th Quarter and Year 2024 (Third Estimate), GDP by Industry, and Corporate Profits.” March 27, 2025. <https://www.bea.gov/data/gdp/gross-domestic-product>.
- U.S. Department of Energy (Energy). Office of Cybersecurity, Energy Security, and Emergency Response (CESER). *How It Works: Electric Transmission & Distribution and Protective Measures*. Accessed July 28, 2025. https://www.energy.gov/sites/default/files/2023-11/FINAL_CESER%20Electricity%20Grid%20Backgrounder_508.pdf.
- U.S. International Trade Commission (USITC). *Large Power Transformers from South Korea Investigation No. 731-TA-1189 (Second Review)*. Publication 5531. August 2024. https://www.usitc.gov/sites/default/files/publications/701_731/pub5531.pdf.
- U.S. International Trade Commission (USITC). *The Year in Trade 2024: Operation of the Trade Agreements Program 76th Report*. Publication 5673. September 2025. <https://www.usitc.gov/publications/332/pub5673.pdf>.
- U.S. International Trade Commission Interactive Tariff and Trade DataWeb (USITC DataWeb)/U.S. Census Bureau (Census). Accessed various dates. <http://dataweb.usitc.gov>.
- UTB Transformers. “Dry-Type vs. Liquid-Filled Transformers : Comparing Key Differences.” July 19, 2024. <https://utbtransformers.com/liquid-filled-vs-dry-type-transformers-understanding-the-differences/>.
- Verified Market Reports. *Track Type Tractor Market Report*. 253074. February 2025. <https://www.verifiedmarketreports.com/product/track-type-tractor-market/>.

Behind the Trade: An Inside Look at U.S. Industry Trends

World Bank Group. *Commodity Markets Outlook*. April 2025.

<https://www.worldbank.org/en/news/press-release/2024/04/25/commodity-markets-outlook-april-2024-press-release>.

Yadav, Pihu. "From Shortage to Surplus: The Shifting Dynamics of the Semiconductor Market Post-COVID-19." CNBC TV18, November 10, 2023. <https://www.cnbctv18.com/technology/from-shortage-to-surplus-the-shifting-dynamics-of-the-semiconductor-market-post-covid-19-18303181.htm>.

Zhang, Mary. "Data Center Power: A Comprehensive Overview of Energy." Dgtl Infra. March 25, 2024. <https://dgtlinfra.com/data-center-power/>.

Chapter 7: Transportation Equipment

Introduction

The value of U.S. imports of transportation equipment increased by \$97.0 billion (9.3 percent average annual growth rate) between 2022 and 2024 (table 7.1) and reached \$595.0 billion in 2024.⁴³⁷ The value of U.S. exports of transportation equipment totaled \$316.4 billion in 2024 and increased by \$41.5 billion (7.3 percent average annual growth rate) during 2022–24 (table 7.2).⁴³⁸

Imports of Transportation Equipment

Within the transportation equipment sector, motor vehicles had the largest increase in imports, rising by 30.6 percent in value (\$63.4 billion) during 2022–24. This increase can partially be attributed to U.S. light vehicle sales increasing by about 15 percent during that period, from 14 million units to 16 million units.⁴³⁹ Rising inflation also likely played a role in the increase in import value.⁴⁴⁰

The digests with the next largest increase in imports by value were primary cells and batteries and electric storage batteries (\$8.8 billion); certain motor-vehicle parts (\$8.3 billion); aircraft, spacecraft, and related equipment (\$8.3 billion); and aircraft engines and gas turbines (\$7.1 billion) (table 7.1). The growing value of primary cells and batteries and electric storage batteries can largely be attributed to the increase in imports of lithium-ion batteries, which are primarily used in electric vehicles.⁴⁴¹ Lithium-ion battery imports increased by \$10.0 billion, to \$23.6 billion in 2024, which accounts for 70.5 percent of all primary cells and batteries imports.⁴⁴² China accounted for more than half of U.S. imports of the primary cell digest (56.2 percent in 2024) and is also the leading producer for lithium-ion batteries.⁴⁴³

⁴³⁷ Percentage changes included in trade data tables 7.1–7.4 are the average annual change during 2022–24 and not a simple percentage change in 2024 relative to 2022. The average annual change is presented in the form of compound annual growth rates and is referred to as average change or average annual change in this working paper.

⁴³⁸ The USITC separates the transportation equipment sector into 15 digests. Each USITC sector digest encompasses various 8-digit subheadings in the *Harmonized Tariff Schedule of the United States* (HTS). For a complete list of HTS subheadings classified in a particular sector or digest, see this data [table](#).

⁴³⁹ Omdia, “U.S. Light Vehicle Sales, December 2024,” accessed July 25, 2025; Omdia “U.S. Light Vehicle Sales, December 2023,” accessed July 25, 2025.

⁴⁴⁰ For more information on inflation during 2022–24, see chapter 1.

⁴⁴¹ See analytical narrative “Gas to Grid: Mapping the U.S. Electric Vehicle Transition.”

⁴⁴² USITC DataWeb/Census, general imports, HTS subheading 8507.60.00, accessed August 7, 2025.

⁴⁴³ USITC DataWeb/Census, general imports, China, digest TE006, accessed August 7, 2025. Rostoum, “From Mines to Motors,” July 18, 2025.

Table 7.1: U.S. general imports of transportation equipment by product group, 2022–24

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change 2022–24 (million \$)	Average change, 2022–24 (%)
Motor vehicles	207,580	258,473	271,003	63,422	14.3
Primary cells and batteries and electric storage batteries	24,643	30,832	33,422	8,779	16.5
Certain motor-vehicle parts	104,678	109,600	113,017	8,339	3.9
Aircraft, spacecraft, and related equipment	26,952	30,005	35,244	8,292	14.4
Aircraft engines and gas turbines	23,878	28,842	31,008	7,131	14.0
Ball and rollers bearings	4,654	4,183	4,422	-233	-2.5
Ships, tugs, pleasure boats, and similar vessels	4,198	4,400	3,815	-382	-4.7
Rail locomotive and rolling stock	3,042	2,853	2,447	-595	-10.3
Trailers, semi-trailers, and parts	6,554	6,735	5,511	-1,043	-8.3
Powersport vehicles	10,350	10,019	8,550	-1,801	-9.1
All other digests	81,421	89,850	86,527	5,106	3.1
Total	497,951	575,791	594,965	97,014	9.3

Source: USITC DataWeb/Census, accessed June 30, 2025

Notes: Average change is calculated using the compound annual growth rate formula. When a sector contains more than 10 digests, digest tables display the five largest positive value changes followed by the 5 largest negative changes over 2022–24. Full digest tables are available in Appendix A.

The source country that accounted for the largest increase in imports of transportation equipment was Mexico ([table 7.2](#)); imports from Mexico increased by \$31.2 billion between 2022 and 2024. The majority of this increase came from increased imports of motor vehicles, which went up by \$21.5 billion between 2022 and 2024.⁴⁴⁴ The source countries with the next largest increases in imports of transportation equipment include South Korea (\$15.0 billion), Canada (\$11.8 billion), Germany (\$10.5 billion), and Japan (\$7.5 billion). The motor vehicle digest also accounted for much of the import increase for these four countries.

Table 7.2 U.S. general imports of transportation equipment by import source, 2022–24

In millions of dollars and percentages.

Import source	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change 2022–24 (million \$)	Average change, 2022–24 (%)
Mexico	148,008	170,253	179,202	31,194	10.0
Canada	61,964	78,750	73,770	11,806	9.1

⁴⁴⁴ USITC DataWeb/Census, general imports, digest TE009, accessed August 7, 2025. See analytical narrative “Driving Change: Recent Developments in North American Automotive Trade.”

Import source	2022	2023	2024	Absolute	Average
	(million \$)	(million \$)	(million \$)	change	change,
				2022–24	2022–24
				(million \$)	(%)
Japan	64,306	71,298	71,851	7,546	5.7
South Korea	38,353	48,066	53,343	14,990	17.9
Germany	39,508	47,883	49,960	10,452	12.5
China	40,389	42,206	44,928	4,538	5.5
United Kingdom	16,313	19,251	22,660	6,346	17.9
France	12,996	12,866	14,930	1,934	7.2
Italy	9,824	11,725	10,543	719	3.6
Slovakia	5,001	6,774	6,526	1,525	14.2
All other sources	61,289	66,719	67,251	5,962	4.8
Total	497,951	575,791	594,965	97,014	9.3

Source: USITC DataWeb/Census, accessed June 30, 2025

Note: Average change is calculated using the compound annual growth rate formula.

The digests that saw the largest decreases in imports were powersport vehicles (–\$1.8 billion); trailers, semi-trailers, and parts (–\$1.0 billion); rail locomotive and rolling stock (–\$595 million); ships, tugs, pleasure boats, and similar vessels (–\$382 million); and ball and roller bearings (–\$233 million). Imports of electric motorcycles decreased by \$728 million and accounted for 40.4 percent of the decline in imports of powersport vehicles.⁴⁴⁵

The source countries with the biggest declines in value of imports to the United States were Finland (–\$999 million), Taiwan (–\$797 million), Spain (–\$750 million), Singapore (–\$496 million), and Belgium (–\$170 million). Finland saw the largest decline in imports of motor vehicles to the United States (–\$1.2 billion).⁴⁴⁶ This decrease can be attributed to Mercedes-Benz ending production of its first generation GLC model—which was produced in Finland—in 2022.⁴⁴⁷

Exports of Transportation Equipment

The digests with the largest increases in exports by value were aircraft, spacecraft, and related equipment (\$24.9 billion); primary cells and batteries (\$4.9 billion); aircraft engines and gas turbines (\$3.7 billion); certain motor-vehicle parts (\$3.3 billion); and motor vehicles (\$3.0 billion) ([table 7.3](#)). The aircraft, spacecraft, and related equipment digest contains civilian aircraft, engines, and parts, which accounted for about 93 percent of the digest’s increase (\$23.1 billion).⁴⁴⁸ The majority of the primary cell and batteries increase came from increased exports of lithium-ion batteries (\$2.9 billion).⁴⁴⁹ This

⁴⁴⁵ USITC DataWeb/Census, general imports, HTS subheading 8711.60.00, accessed September 3, 2025.

⁴⁴⁶ USITC DataWeb/Census, general imports, Finland, digest TE009, accessed August 7, 2025.

⁴⁴⁷ *Automotive News Europe*, “Mercedes to Build GLC in Finland,” November 26, 2015; All Pyrenees, “Mercedes-Benz GLC (Second Generation),” November 23, 2023.

⁴⁴⁸ USITC DataWeb/Census, domestic exports, HS subheading 8800.00, accessed August 7, 2025.

⁴⁴⁹ USITC DataWeb/Census, domestic exports, HTS subheading 8507.60.00, accessed August 7, 2025.

corresponds with increased investment in domestic battery production in the United States during the three-year period.⁴⁵⁰

Table 7.3: U.S. domestic exports of transportation equipment by product group, 2022–24

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change	Average change,
				2022–24 (million \$)	2022–24 (%)
Aircraft, spacecraft, and related equipment	87,485	105,545	112,418	24,933	13.4
Primary cells and batteries and electric storage batteries	4,948	6,221	9,852	4,904	41.1
Aircraft engines and gas turbines	9,331	10,599	12,986	3,655	18.0
Certain motor-vehicle parts	35,668	42,019	38,952	3,283	4.5
Motor vehicles	78,968	85,521	82,010	3,042	1.9
Ignition, starting, lighting, and other electrical equipment	3,316	3,698	3,606	289	4.3
Ships, tugs, pleasure boats, and similar vessels	2,319	2,527	2,450	131	2.8
Rail locomotive and rolling stock	3,123	3,200	3,185	62	1.0
Powersport vehicles	2,460	2,619	2,129	-331	-7.0
Trailers, semi-trailers, and parts	4,924	4,148	3,540	-1,383	-15.2
All other digests	42,374	46,745	45,289	2,915	3.4
Total	274,917	312,843	316,416	41,499	7.3

Source: USITC DataWeb/Census, accessed June 30, 2025.

Notes: Average change is calculated using the compound annual growth rate formula. When a sector contains more than 10 digests, digest tables display the five largest positive value changes followed by the 5 largest negative changes over 2022–24. Full digest tables are available in Appendix A.

Mexico saw the largest increase in U.S. exports, with the value increasing \$8.1 billion between 2022 and 2024 (table 7.4). Exports of primary cells and batteries accounted for 38.2 percent of this increase.⁴⁵¹ The other countries with the largest increases in U.S. exports were China (\$4.3 billion), Brazil (\$2.8 billion), the United Arab Emirates (\$2.5 billion), and Australia (\$2.4 billion).

⁴⁵⁰ Smith and Friedman, “Historic Investments in Electric Vehicle Batteries and Chargers,” July 2, 2024.

⁴⁵¹ USITC DataWeb/Census, domestic exports, Mexico, digest TE006, accessed August 7, 2025.

Table 7.4 U.S. domestic exports of transportation equipment by export market, 2022–24

In millions of dollars and percentages.

Destination market	2022	2023	2024	Absolute change	Average change,
	(million \$)	(million \$)	(million \$)	2022–24 (million \$)	2022–24 (%)
Canada	76,138	79,895	78,117	1,980	1.3
Mexico	39,055	45,095	47,194	8,139	9.9
China	13,883	15,615	18,136	4,253	14.3
Germany	16,530	19,103	17,671	1,141	3.4
United Kingdom	9,518	10,024	11,419	1,901	9.5
Brazil	8,039	8,685	10,845	2,805	16.1
France	8,689	10,088	10,482	1,793	9.8
Australia	7,375	9,043	9,813	2,439	15.4
United Arab Emirates	6,594	7,787	9,131	2,536	17.7
Japan	6,111	7,858	8,449	2,338	17.6
All other markets	82,985	99,651	95,158	12,173	7.1
Total	274,917	312,843	316,416	41,499	7.3

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Exports of transportation equipment declined in two digests: trailers, semi-trailers, and parts (–\$1.4 billion) and powersport vehicles (–\$353 million). Specifically, exports of trailers and semi-trailers, not mechanically propelled, for housing or camping made up most of the trailers, semi-trailers, and parts digest’s decline, decreasing by \$988 million.⁴⁵²

The countries that saw the largest declines in U.S. exports were South Korea (–\$753 million), Trinidad and Tobago (–\$722 million), Russia (–\$339 million), Luxembourg (–\$329 million), and Belgium (–\$303 million). Exports of motor vehicles to South Korea saw the largest decline in value during 2022–24 (–\$1.8 billion).⁴⁵³ Exports to Russia declined in almost every digest, except rail locomotive and rolling stock, which can be attributed to the U.S. institution of export controls against Russia following the 2022 invasion of Ukraine.⁴⁵⁴

Analytical Narratives

Driving Change: Recent Developments in North American Automotive Trade

The U.S. automotive industry is interconnected with Canada’s and Mexico’s automotive industries, creating what is often referred to as a highly integrated North American automotive industry. In 2024,

⁴⁵² USITC DataWeb/Census, domestic exports, HTS subheading 8716.10.00, accessed August 7, 2025.

⁴⁵³ USITC DataWeb/Census, domestic exports, South Korea, digest TE009, accessed August 7, 2025.

⁴⁵⁴ USITC DataWeb/Census, domestic exports, Russia, TE sector, accessed August 7, 2025. 87 Fed. Reg. 12226 (March 3, 2022); 87 Fed. Reg. 14785 (March 16, 2022).

motor vehicles and motor-vehicle parts together were the top digests by value for both U.S. imports and exports, to and from all countries. The top country for motor vehicle imports was Mexico; the top country for exports was Canada. Mexico and Canada were also the top two export locations for certain motor vehicle parts in 2024, totaling \$15.3 billion and \$13.9 billion, respectively.⁴⁵⁵ Additionally, most light vehicles and vehicle parts produced in Canada and Mexico were exported to the United States.⁴⁵⁶

Impact of the USMCA on the U.S. Automotive Industry

The implementation of the United States-Mexico-Canada Agreement (USMCA) in 2020 is a partial cause for sourcing changes of vehicles and parts that led to an increase in U.S. trade in vehicles and parts with Canada and Mexico. The USMCA is a free trade agreement between the United States, Mexico, and Canada. This agreement specifies automotive rules of origin (ROOs), which define the requirements for a vehicle produced in one USMCA country to qualify for duty-free treatment when exported to another USMCA country.

The automotive ROOs have three main requirements a vehicle must meet to be eligible: regional value content (RVC), labor value content, and steel and aluminum purchasing requirements. Most notably, the RVC rules require vehicle manufacturers to use a certain percentage of content originating in a USMCA country for those goods to qualify for duty-free treatment. RVC requirements for vehicles and vehicle parts range from about 60 percent to 75 percent.⁴⁵⁷ These RVC requirements are stricter than those under the North American Free Trade Agreement and, to meet these requirements, many vehicle manufacturers needed to make sourcing changes to their supply chains to increase the North American content of some of their vehicle models. Many vehicle manufacturers requested an alternative staging regime that, when approved, granted manufacturers additional time to make the necessary sourcing changes to comply with the ROOs. Almost all manufacturers that requested alternative staging asked for additional time to meet RVC requirements, and nearly all the plans were scheduled to end by mid-2025.⁴⁵⁸

Notable Sourcing Changes

Within the transportation digests, internal combustion piston engines from Japan had the largest decline in imports to the United States, decreasing by \$1.3 billion. In contrast, internal combustion piston engines from Mexico saw the largest increase in imports, increasing by \$1.2 billion.⁴⁵⁹ This change is in

⁴⁵⁵ USITC DataWeb/Census, domestic exports, digest TE010, accessed August 7, 2025.

⁴⁵⁶ USITC, *USMCA Automotive Rules of Origin, 2025 Report*, July 1, 2025, 44.

⁴⁵⁷ For a more detailed explanation of each of these requirements, see USITC, *USMCA Automotive Rules of Origin, 2025 Report*, July 1, 2025, 49–52.

⁴⁵⁸ For a more detailed explanation of alternative staging under USMCA, see USITC, *USMCA Automotive Rules of Origin, 2025 Report*, July 1, 2025, 52–54.

⁴⁵⁹ USITC DataWeb/Census, general imports, digest TE002, accessed August 7, 2025.

line with results from the Commission’s recent survey, conducted as part of its *USMCA Automotive ROOs 2025* report, in which vehicle manufacturers reported making 19 total sourcing changes specifically regarding engines to comply with the ROOs.⁴⁶⁰ When asked about sourcing changes for all motor vehicle parts and materials, the questionnaire respondents reported 16 sourcing changes from Japan to the United States, and 7 sourcing changes from Japan to Mexico that were attributable to the ROOs.⁴⁶¹ Additionally, between 2022 and 2024, U.S. imports of certain motor vehicle parts from China declined by \$1.1 billion. Mexico and Canada were the sources of the largest increases in certain motor vehicle parts imports to the United States, increasing by \$7.7 billion and \$503 million, respectively, during the period.⁴⁶²

Although the industry has made sourcing changes to comply with the ROOs, evidence suggests that some manufacturers are choosing not to pursue duty-free treatment under the USMCA. Industry representatives have said that compliance with the ROOs can result in increased administrative costs and can also be burdensome on their internal processes.⁴⁶³ One stakeholder specifically commented that the burden of performing the calculations and documentation to comply with the ROOs is so high that some suppliers choose to label parts as non-USMCA-originating, even if the parts might qualify under the USMCA.⁴⁶⁴ Generally, if the costs of altering supply chains to comply with the ROOs outweigh the cost of importing a vehicle with duties (that is, not under the USMCA), manufacturers are disincentivized from making supply changes.⁴⁶⁵ In 2023, around 11 percent of U.S. imports of light vehicles from Canada and Mexico were not imported under the USMCA and were subject to duties. This is a stark increase in comparison to 2019—under the North American Free Trade Agreement—where only around 2 percent of light vehicles were dutiable imports.⁴⁶⁶ The share of vehicle parts that were imported duty free from Canada and Mexico following the USMCA’s entry into force also declined ([figure 7.1](#)). As of 2025, this share remains below pre-USMCA levels.

⁴⁶⁰ USITC, *USMCA Automotive Rules of Origin, 2025 Report*, July 1, 2025, 97.

⁴⁶¹ USITC, *USMCA Automotive Rules of Origin, 2025 Report*, July 1, 2025, table J.9.

⁴⁶² USITC DataWeb/Census, general imports, digest TE010, accessed August 7, 2025.

⁴⁶³ USITC, *USMCA Automotive Rules of Origin, 2025 Report*, July 1, 2025, 112.

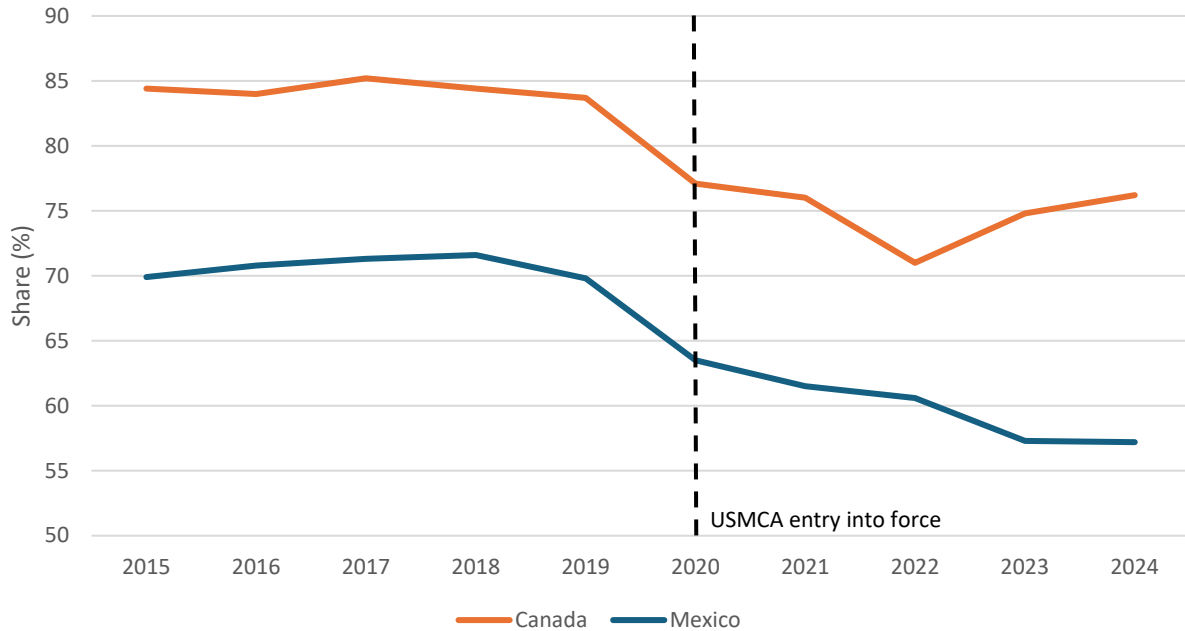
⁴⁶⁴ USTR, *Report to Congress on the Operation of the USMCA*, July 1, 2022, 9–10.

⁴⁶⁵ Normal Trade Relation duties are 2.5 percent for passenger vehicles and 25 percent for light trucks. USITC, *HTS (2026) Basic Edition*, January 2026.

⁴⁶⁶ USITC, *USMCA Automotive Rules of Origin, 2025 Report*, July 1, 2025, 113.

Figure 7.1 Share of automotive parts imported under special duty-free programs by country, 2015–24

In percentages.



Source: USITC DataWeb/Census, U.S. general imports, Canada and Mexico, HTS statistical reporting numbers for automotive parts, accessed September 5, 2025.

Note: The list of HTS statistical reporting numbers for automotive parts can be found in appendix F, table F.3 of USITC, *USMCA Automotive Rules of Origin, 2025 Report*, July 1, 2025.

2026 USMCA Review and Analyst Views

In 2026, the three involved countries are scheduled to review the USMCA. The original agreement contains a termination date of 16 years after entry into force; the review provides an opportunity for the parties to extend the termination date, as well as make amendments to the agreement.⁴⁶⁷ Industry representatives have suggested that the review will provide the opportunity for the automotive ROOs to be updated and see the upcoming review as an opportunity to strengthen the agreement and the three countries’ competitiveness.⁴⁶⁸

⁴⁶⁷ USMCA Implementation Act, Pub. L. No. 116-113, § 611, 134 Stat. 11, 79-80 (2020) (codified at 19 § U.S.C. 4611).

⁴⁶⁸ USITC, *USMCA Automotive Rules of Origin, 2025 Report*, July 1, 2025, 58–59; Bitar et al., “USMCA Review 2026,” August 18, 2025.

From Gas to Grid: Mapping the U.S. Electric Vehicle Transition

U.S. imports of electric vehicles (EVs) increased by \$34.9 billion between 2022 and 2024.⁴⁶⁹ The top import sources of EVs sold during this period were Japan, South Korea, Mexico, Canada, and Germany.⁴⁷⁰ Japan was the largest import source; U.S. sales of EVs imported from Japan made up 11 percent of all U.S. EV sales in 2024.⁴⁷¹ Additionally, imports of lithium-ion batteries, which are largely used in EVs, increased by \$10.0 billion.⁴⁷²

The increase in EV imports corresponds with a longer-term automotive industry shift toward electrification in recent years, which involves transitioning from internal combustion engine vehicles to EVs. Electrification has seen growth throughout the past decade, spurred by improvements in battery technology, development of charging stations, and evolving consumer preferences.⁴⁷³ The 2021 Investment and Jobs Act and 2022 Inflation Reduction Act (IRA) accelerated the electrification trend by providing about \$83.0 billion in the form of loans, grants, and tax credits to support EV manufacturing, EV infrastructure, and battery production.⁴⁷⁴ The IRA specifically provided incentives for battery electric vehicle (BEV) sales, including the New Clean Vehicle Credits.⁴⁷⁵ Through September 30, 2025 the credits provided up to \$7,500 for purchasing a new clean vehicle, including BEVs, plug-in hybrids, and fuel cell vehicles.⁴⁷⁶

This support led to a large amount of private investment in EVs. From 2020 to 2024, automakers announced \$160.0 billion of investment for electrification.⁴⁷⁷ By 2023, manufacturers had announced plans to invest \$330.0 billion in the shift to EVs by 2025 and expected 130 EV models to be available in the United States by 2026.⁴⁷⁸ Congruently, EV sales in the United States—from both imports and domestic production—increased by 86.6 percent during 2022–24, with over 3 million units sold in 2024 (figure 7.2). EVs also make up a growing share of all U.S. light vehicle sales, increasing from 12.3 percent in 2022 to 20.0 percent in 2024. From 2022 to 2024, the import share of all U.S. EV sales remained steady (42.0 percent in 2022 to 43.0 percent in 2024), despite increases in U.S. EV sales and domestic

⁴⁶⁹ The term electric vehicle (EV) encompasses battery electric vehicles (vehicles without an internal combustion engine) as well as hybrid and plug-in hybrid vehicles.

⁴⁷⁰ USITC, DataWeb/Census, general imports, HS subheadings 8703.40, 8703.50, 8703.60, 8703.70, and 8703.80, accessed August 7, 2025.

⁴⁷¹ Omdia, “U.S. Light Vehicle Sales, December 2024,” accessed July 25, 2025.

⁴⁷² USITC DataWeb/Census, general imports, HTS subheading 8507.60.00, accessed August 7, 2025.

⁴⁷³ Colato and Ice, “Charging into the Future,” February 2023; Capital Lease Group, “How Electric Vehicles Have Transformed Over The Last Decade,” October 15, 2020.

⁴⁷⁴ Lepre et al., *U.S. Investments in Electric Vehicle Manufacturing (2023)*, January 12, 2023.

⁴⁷⁵ IRS, “Credits and Deductions under the IRA,” October 23, 2025.

⁴⁷⁶ On July 3, 2025, Congress passed the One Big Beautiful Bill Act, which ended the new and used EV tax credits. The credits have expired for vehicles sold after September 30, 2025, and EV charging credits will be removed after June 30, 2026. Peterson, “Renewable Energy: OBBB’s Changes,” July 17, 2025.

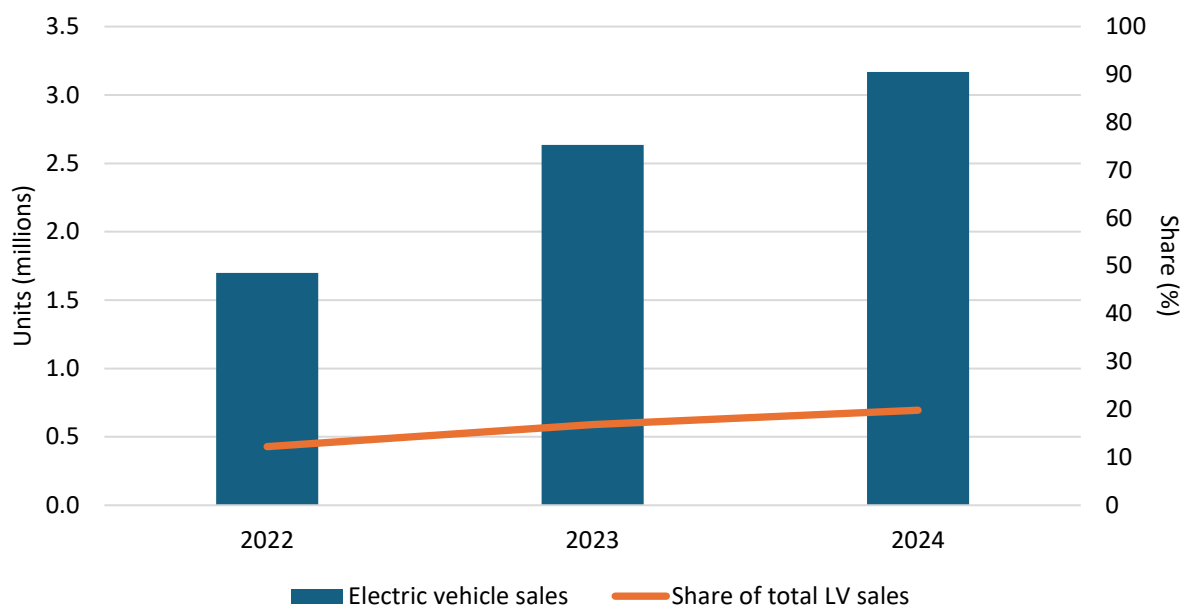
⁴⁷⁷ Ganguly et al., *Affordability: The Twenty-Five Thousand Dollar Electric Vehicle*, August 2024.

⁴⁷⁸ USITC, *USMCA Automotive Rules of Origin, 2023 Report*, June 30, 2023, 42–43.

production.⁴⁷⁹ If this trend continues, U.S. EV imports can be expected to increase at roughly the same pace as U.S. EV sales.

Figure 7.2 U.S. electric vehicle sales and share of all U.S. light vehicle sales, 2022–24

In millions of units and percentages.



Sources: Omdia, “U.S. Light Vehicle Sales, December 2024,” accessed July 23, 2025; Omdia, “U.S. Light Vehicle Sales December 2023,” accessed July 23, 2025.

Although consumer demand for EVs in the United States is growing, the rate is slower than investors anticipated. Industry representatives have indicated that the lower-than-expected consumer demand has led BEVs to miss sales targets for 2024, despite sales totals surpassing prior years.⁴⁸⁰ The low consumer demand can be partially ascribed to the high price of EVs; in 2024, the average price for a compact SUV—the most popular vehicle class—was around 33 percent lower for an internal combustion engine model compared to a BEV model.⁴⁸¹ Although the aforementioned incentives can help decrease the price gap, new EVs can still be unaffordable for lower- and middle-income consumers. Many consumers may instead choose to purchase used EVs, which are less expensive than new EVs.⁴⁸² Used EV

⁴⁷⁹ Omdia, “U.S. Light Vehicle Sales, December 2023,” accessed July 25, 2025; Omdia, “U.S. Light Vehicle Sales, December 2024,” accessed July 25, 2025; Omdia, “North American Vehicle Production by Model, 2020-2024.” Source country of vehicles from Mexico and Canada determined using production data.

⁴⁸⁰ USITC, *USMCA Automotive Rules of Origin, 2025 Report*, July 1, 2025, 68. Although forecasts of 2024 sales do not typically break out imports from domestically produced vehicles, these two sources of U.S. EV sales likely experience similar consumer demands. Therefore, sales that fell short of forecasted amounts likely mean that imports were also short of forecasted totals.

⁴⁸¹ O’Dell, “Big Gap Remains in Average Price of Electric Car vs. Gas Car,” May 8, 2024.

⁴⁸² Descant, “The Used EV Market Is Growing,” February 15, 2024.

sales have been increasing each year, up 62.6 percent in 2024 compared to 2023, and are making up an increasingly large portion of total EV sales.⁴⁸³

Other factors contributing to lower-than-expected consumer demand include concerns regarding charging infrastructure and driving range. Reports found that EV drivers regularly encounter broken or malfunctioning chargers. Studies have found that, on average, one in five charging stations in the United States does not work and overall, charging stations are less reliable than regular gas stations.⁴⁸⁴ Drivers also express concerns regarding “charging deserts,” or areas where no charging stations are available. Public charging stations tend to be concentrated in large population and wealthy areas; most rural communities have no stations available. The lack of reliable charging infrastructure contributes to “range anxiety,” a fear that EV batteries will run out of charge before reaching a destination. Most modern BEVs are capable of driving 100–500 miles on a single charge, but the lack of confidence in charging infrastructure fuels these fears.⁴⁸⁵ These concerns negatively impact both imports and domestic production of EVs.

Innovation in battery making is expected to help bring down the cost of EVs, which is expected to continue to help with consumer demand and adoption, for both domestically produced and imported EVs. Batteries currently constitute up to 40.0 percent of the cost of a BEV, but the International Energy Agency expects that the average lithium-ion battery cost will decrease by roughly 40 percent from 2023 to 2030.⁴⁸⁶ New battery chemistries such as sodium-ion batteries may also lower EV costs. Sodium is a more common mineral, which makes the battery less expensive to produce.⁴⁸⁷ Industry analysts also note that, although EVs are more expensive up-front to buy, in the long-term EVs can be cheaper than internal combustion engine vehicles because of savings on fuel and maintenance, which also helps encourage continued consumer demand.⁴⁸⁸

Navigating Turbulence: U.S.-China Aerospace Trade and Geopolitical Dynamics

Exports of aircraft, spacecraft, and related equipment to China have more than doubled, from \$5.0 billion in 2022 to \$10.2 billion in 2024.⁴⁸⁹ East Asia is a critical market for U.S. aircraft manufacturers; in 2024, East Asia was the second-largest market for Boeing’s aircraft deliveries, behind North America ([figure 7.3](#)). This increase can be attributed to China’s growing air travel market. The number of air passengers in China in 2024 increased significantly compared to 2022, signaling a substantial recovery from the pandemic, as well as the resilience of China’s aviation industry.⁴⁹⁰ China’s economic growth has also contributed to increased demand for commercial air travel, which in turn increases demand for

⁴⁸³ Najman, “Used Electric Car Prices & Market Report,” July 9, 2025.

⁴⁸⁴ DeLollis and Justice, “The State of EV Charging in America,” June 26, 2024.

⁴⁸⁵ Mazda, “Range Anxiety,” accessed August 6, 2025.

⁴⁸⁶ Ganguly et al., *Affordability: The Twenty-Five Thousand Dollar Electric Vehicle*, August 2024.

⁴⁸⁷ USITC, *USMCA Automotive Rules of Origin, 2025 Report*, July 1, 2025, 170.

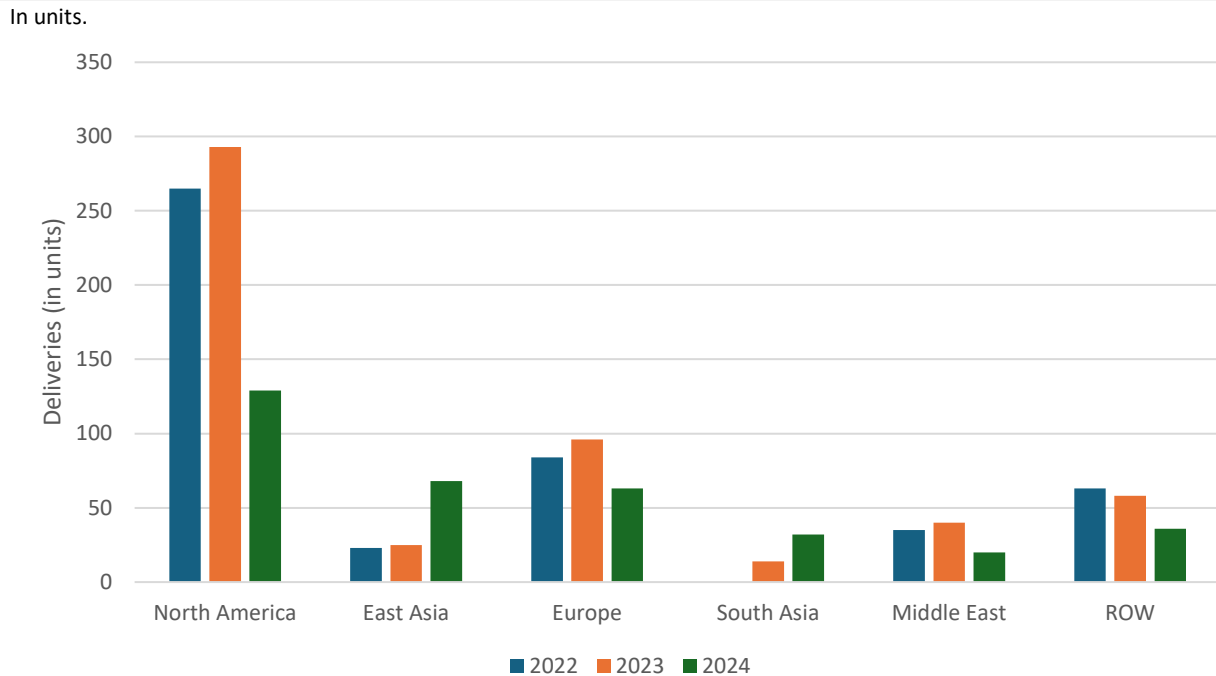
⁴⁸⁸ Wells, “What to Know about Buying Electric Vehicles,” July 3, 2025.

⁴⁸⁹ USITC DataWeb/Census, domestic exports, digest TE013, accessed August 7, 2025.

⁴⁹⁰ Government of China, CAAC, “Number of Air Passengers in China from 2010 to 2024,” May 15, 2025.

aircraft. This has driven continued growth of China’s fleet, specifically for single-aisle aircraft, which account for more than three-quarters of deliveries.⁴⁹¹

Figure 7.3 Boeing aircraft delivery numbers by region, 2022–24



Source: Statista, Boeing, “Distribution of Boeing’s aircraft deliveries from 2000 to 2024, by region (in units),” accessed July 23, 2025.

Foreign Competition

Though the United States has seen a large spike in exports of aircraft and parts in the past three years, European competition poses an ongoing challenge. European aerospace manufacturer Airbus is a longtime competitor to Boeing. In recent years, Boeing has begun to slip behind Airbus in global commercial passenger and freighter aircraft deliveries. In 2024, Boeing held only around a 30 percent share of Airbus’s and Boeing’s total deliveries.⁴⁹² This can primarily be attributed to an Alaska Airlines flight accident in January 2024, which halted further production of the 737 MAX, as well as the three-month-long Boeing machinists’ strike in fall 2024.⁴⁹³ The resulting production backlog may continue to lower deliveries in coming years. In June 2025, reports emerged that China was in talks to place a major order with Airbus of 200 to 500 aircraft. This potential order is an indicator of China’s desire to work more closely with Europe than with the United States. If the deal goes through, it will further increase

⁴⁹¹ Boeing, “China Commercial Fleet to More than Double,” August 26, 2024.

⁴⁹² Kingsley-Jones, “Shaking out the Airbus and Boeing 2024 Delivery Numbers,” January 29, 2025.

⁴⁹³ USDOT, FAA, “Updates on Boeing 737-9 MAX Aircraft,” December 5, 2024; Terlep, “Boeing Union Goes on Strike, Halting 737 Production,” September 13, 2024.

the market share gap between Airbus and Boeing, solidifying Airbus as the leading commercial aircraft supplier in China.⁴⁹⁴

Another potential competitor to Boeing is the Chinese state-owned aerospace manufacturer COMAC.⁴⁹⁵ In 2023, COMAC began commercial passenger service of the narrow-body jet named C919, which was created with the goal of competing with Boeing's and Airbus's comparable jets, the 737 and the A320 series.⁴⁹⁶ COMAC specifically intends to compete in the Chinese and Southeast Asian markets.⁴⁹⁷ Currently, COMAC's projected production rate is still behind those of Boeing and Airbus, with 780 total deliveries of the C919 expected between 2025 and 2034 (versus 6,210 of the 737 MAX and 8,413 of the A320neo).⁴⁹⁸ Despite this, the Chinese government has expressed a strong interest in self-reliance, which may provide incentive to continue to invest in COMAC and its success.⁴⁹⁹

However, despite the Chinese government efforts to solidify COMAC as a competitor in the global aviation sector, China still relies heavily on importing parts from the United States to build these aircraft. Reportedly, about 55 percent of the component suppliers for the C919 are U.S.-based companies; only around 25 percent are based in China.⁵⁰⁰ Although China is taking steps to reduce their dependence on foreign imports, such as developing aircraft engines domestically, it may be some time before the United States truly sees a downturn in exports of aircraft and parts to China.⁵⁰¹

⁴⁹⁴ Zhao, "China's Aviation Trio," June 16, 2025.

⁴⁹⁵ U.S. Department of Defense, "*Entities Identified as Chinese Military Companies*," January 7, 2025.

⁴⁹⁶ Yoon, "How China's Comac Could Reshape Aviation," May 13, 2025.

⁴⁹⁷ Forecast International, "COMAC Looks to Expand C919 Flights," January 6, 2025.

⁴⁹⁸ Pfeifer and Ho-him, "'Made in China' Airliner Faces Trade Turbulence," May 6, 2025.

⁴⁹⁹ Alim, "China's Comac Reliant on 'Captive Domestic Market' for Sales," July 20, 2022.

⁵⁰⁰ Holve, "Juneyao Air 787-9 Delivery Delay Highlights Shifting Dynamics in China's Commercial Aviation Sector," April 18, 2025.

⁵⁰¹ Schonland, "A Strategic Analysis of China's ACAE CJ-1000A," May 9, 2025.

Bibliography

- Alim, Arjun Neil. "China's Comac Reliant on 'Captive Domestic Market' for Sales." *Financial Times*, July 20, 2022. <https://www.ft.com/content/c384aa39-4766-4eea-a528-268ede01b>.
- All Pyrenees. "Mercedes-Benz GLC (Second Generation)." November 23, 2023. <https://all-andorra.com/mercedes-benz-glc-254/>.
- Automotive News Europe*. "Mercedes to Build GLC in Finland Starting in 2017." November 26, 2015. <https://www.autonews.com/article/20151126/ANE/151129896/mercedes-to-build-glc-in-finland-starting-in-2017/>.
- Bitar, Diego Marroquín, Christopher Hernandez-Roy, and Earl Anthony Wayne. "USMCA Review 2026: Pathways, Risks, and Strategic Considerations for North America's Economic Future." Center for Strategic & International Studies, August 18, 2025. <https://www.csis.org/analysis/usmca-review-2026>.
- Boeing. "Boeing: China Commercial Fleet to More than Double by 2043 for Growth and Modernization." August 26, 2024. <https://investors.boeing.com/investors/news/press-release-details/2024/Boeing-China-Commercial-Fleet-to-More-than-Double-by-2043-for-Growth-and-Modernization/default.aspx>.
- Capital Lease Group. "How Electric Vehicles Have Transformed Over The Last Decade." October 15, 2020. <https://capitalleasegroup.com/how-electric-vehicles-have-transformed-over-the-last-decade/>.
- Colato, Javier, and Lindsey Ice. "Charging into the Future: The Transition to Electric Vehicles." U.S. Department of Labor. U.S. Bureau of Labor Statistics. *Charging into the Future: The Transition to Electric Vehicles*. February 2023. <https://www.bls.gov/opub/btn/volume-12/charging-into-the-future-the-transition-to-electric-vehicles.htm>.
- DeLollis, Barbara, and Glen Justice. "The State of EV Charging in America: Harvard Research Shows Chargers 78% Reliable and Pricing like the 'Wild West.'" Harvard Business School, June 26, 2024. <https://www.hbs.edu/big/the-state-of-ev-charging-in-america>.
- Descant, Skip. "The Used EV Market is Growing, Offering Drivers More Options." GovTech, February 15, 2024. <https://www.govtech.com/fs/the-used-ev-market-is-growing-offering-drivers-more-options>.
- U.S. Department of Commerce (USDOC). Bureau of Industry and Security (BIS). Implementation of Sanctions Against Russia Under the Export Administration Regulations (EAR). 87 Fed. Reg. 12226. March 3, 2022. <https://www.federalregister.gov/documents/2022/03/03/2022-04300/implementation-of-sanctions-against-russia-under-the-export-administration-regulations-ear>.

- U.S. Department of Commerce (USDOC). Bureau of Industry and Security (BIS). Imposition of Sanctions on “Luxury Goods” Destined for Russia and Belarus and for Russian and Belarusian Oligarchs and Malign Actors Under the Export Administration Regulations (EAR). 87 Fed. Reg. 14785. March 16, 2022. <https://www.federalregister.gov/documents/2022/03/16/2022-05604/imposition-of-sanctions-on-luxury-goods-destined-for-russia-and-belarus-and-for-russian-and-belarusian-oligarchs-and-malign-actors-under-the-export-administration-regulations-ear>.
- U.S. Department of Transportation (USDOT). Federal Aviation Administration (FAA). “Updates on Boeing 737-9 MAX Aircraft.” December 5, 2024. <https://www.faa.gov/newsroom/updates-boeing-737-9-max-aircraft>.
- Forecast International. “COMAC Looks to Expand C919 Flights to Southeast Asia.” *Flight Plan*, January 6, 2025. <https://flightplan.forecastinternational.com/2025/01/06/comac-looks-to-expand-c919-flights-to-southeast-asia/>.
- Ganguly, Snehasis, Tyler Harp, Yen Chen, and K. Venkatesh Prasad. *Affordability: The Twenty-Five Thousand Dollar Electric Vehicle*. Center for Automotive Research, August 2024. <https://www.cargroup.org/publication/ev-affordability-white-paper>.
- Government of China. Civil Aviation Administration of China (CAAC). “Number of Air Passengers in China from 2010 to 2024.” Statista, May 15, 2025. <https://www.statista.com/statistics/275907/number-of-air-passengers-in-china/>.
- Holve, Grant. “Juneyao Air 787-9 Delivery Delay Highlights Shifting Dynamics in China’s Commercial Aviation Sector.” *Flight Plan*, April 18, 2025. <https://flightplan.forecastinternational.com/2025/04/18/juneyao-air-787-9-delivery-delay-highlights-shifting-dynamics-in-chinas-commercial-aviation-sector/>.
- Internal Revenue Service. “Credits and Deductions under the Inflation Reduction Act of 2022.” October 23, 2025. <https://www.irs.gov/credits-and-deductions-under-the-inflation-reduction-act-of-2022>.
- Kingsley-Jones, Max. “Shaking out the Airbus and Boeing 2024 Delivery Numbers.” Cirium, January 29, 2025. <https://www.cirium.com/thoughtcloud/ascend-consultancy-shaking-out-the-airbus-and-boeing-2024-delivery-numbers/>.
- Lepre, Nicole, Spencer Burget, and Noah Gabriel. *U.S. Investments in Electric Vehicle Manufacturing (2023)*. Atlas Public Policy, January 12, 2023. <https://atlaspolicy.com/wp-content/uploads/2023/05/U.S.-Investments-in-Electric-Vehicle-Manufacturing-2023.pdf>.
- Mazda. “Range Anxiety: What It Is & How To Overcome It.” Accessed August 6, 2025. <https://www.mazdausa.com/resource-center/range-anxiety>.
- Najman, Liz. “Used Electric Car Prices & Market Report —Q3 2025.” Recurrent, July 9, 2025. <https://www.recurrentauto.com/research/used-electric-vehicle-buying-report>.
- O’Dell, John. “Big Gap Remains in Average Price of Electric Car vs. Gas Car.” Edmunds, May 8, 2024. <https://www.edmunds.com/car-buying/average-price-electric-car-vs-gas-car.html>.

- Office of the U.S. Trade Representative (USTR). Report to Congress on the Operation of the United States-Mexico-Canada Agreement with Respect to Trade in Automotive Goods. July 1, 2022. https://ustr.gov/sites/default/files/2024%20USMCA%20Autos%20Report%20to%20Congress_0.pdf.
- Omdia. "North American Vehicle Production by Model, 2020–2024." April 13, 2025. <https://omdia.tech.informa.com/om131576/north-america-vehicle-production-by-model-20202024>
- Omdia. "U.S. Light Vehicle Sales, December 2023." January 3, 2024. <https://omdia.tech.informa.com/om132283/us-light-vehicle-sales-december-2023>
- Omdia. "U.S. Light Vehicle Sales, December 2024." January 3, 2025. <https://omdia.tech.informa.com/om132284/us-light-vehicle-sales-december-2024>
- Peterson, Lee. "Renewable Energy: OBBB's Changes to PTC, ITC, EV Credits." CohnReznick, July 17, 2025. <https://www.cohnreznick.com/insights/renewable-energy-obbb-changes-ptc-itc-ev-credits>.
- Pfeifer, Sylvia, and Chan Ho-him. "'Made in China' Airliner Faces Trade Turbulence." *Financial Times*, May 6, 2025. <https://www.ft.com/content/38c1f970-8a9e-4435-a468-401597e85e0f>.
- Rostoum, Elly. "From Mines to Motors, China Dominates EVs." Center for European Policy Analysis, July 18, 2025. <https://cepa.org/article/from-mines-to-motors-china-dominates-evs/>.
- Schonland, Addison. "A Strategic Analysis of China's ACAE CJ-1000A." AirInsight Group, May 9, 2025. <https://airinsight.com/a-strategic-analysis-of-chinas-acae-cj-1000a/>.
- Smith, Jasia, and Jamie Friedman. "Historic Investments in Electric Vehicle Batteries and Chargers Are Expanding Opportunities in Communities with High Poverty Rates." Center for American Progress, July 2, 2024. <https://www.americanprogress.org/article/historic-investments-in-electric-vehicle-batteries-and-chargers-are-expanding-opportunities-in-communities-with-high-poverty-rates/>.
- Terlep, Sharon. "Boeing Union Goes on Strike, Halting 737 Production." *The Wall Street Journal*, September 13, 2024. <https://www.wsj.com/business/boeing-strike-union-workers-walk-off-af5703df>.
- U.S. Department of Defense. *Entities Identified as Chinese Military Companies Operating in the United States in Accordance with Section 1260H of the William M. ("Mac") Thornberry National Defense Authorization Act for Fiscal Year 2021 (Public Law 116-283)*. Department of Defense, January 7, 2025. <https://media.defense.gov/2025/Jan/07/2003625471/-1/-1/1/ENTITIES-IDENTIFIED-AS-CHINESE-MILITARY-COMPANIES-OPERATING-IN-THE-UNITED-STATES.PDF>.
- U.S. International Trade Commission Interactive Tariff and Trade DataWeb (USITC DataWeb)/U.S. Census Bureau (Census). Accessed various dates. <http://dataweb.usitc.gov>.

- U.S. International Trade Commission (USITC). *Harmonized Tariff Schedule of the United States (HTS) (2026) Basic Edition*. USITC Publication 5966. January 2026. <https://hts.usitc.gov/.U.S>.
- International Trade Commission (USITC). *USMCA Automotive Rules of Origin: Economic Impact and Operation, 2023 Report*. USITC Publication 5443. June 30, 2023. <https://www.usitc.gov/publications/332/pub5443.pdf>.
- U.S. International Trade Commission (USITC). *USMCA Automotive Rules of Origin: Economic Impact and Operation, 2023 Report*. USITC Publication 5443. June 30, 2024. <https://www.usitc.gov/publications/332/pub5443.pdf>.
- U.S. International Trade Commission (USITC). *USMCA Automotive Rules of Origin: Economic Impact and Operation, 2025 Report*. USITC Publication 5642. July 1, 2025. <https://www.usitc.gov/sites/default/files/publications/332/pub5642.pdf>.
- United States-Mexico-Canada Agreement Implementation Act (USMCA Implementation Act), 19 U.S.C. §§ 4501–4732. 2020. <https://www.govinfo.gov/app/details/PLAW-116publ113>.
- Wells, Caleigh. “What to Know about Buying Electric Vehicles after the Federal Tax Incentives End.” *The Detroit News*, July 3, 2025. <https://www.detroitnews.com/story/business/autos/2025/07/03/what-to-know-about-buying-electric-vehicles-after-the-federal-tax-incentives-end/84463790007/>.
- Yoon, June. “How China’s Comac Could Reshape Aviation.” *Financial Times*, May 13, 2025. <https://www.ft.com/content/17870cd0-c15d-4cea-81c3-6a96eee91a9d>.
- Zhao, Yuanfei. “China’s Aviation Trio: Airbus and COMAC Rise While Boeing Is on the Back Foot.” Cirium, June 16, 2025. <https://www.cirium.com/thoughtcloud/ascend-consultancy-chinas-aviation-trio-airbus-and-comac-rise-while-boeing-is-on-the-back-foot/>.

Chapter 8:

Trends in E-Commerce Trade and Competitiveness

E-commerce experienced rapid growth in 2022–24, both in the United States and globally. Since the COVID-19 pandemic, the e-commerce sector has also undergone significant change amid shifting demand and technological advancement. Although U.S.-based Amazon remains dominant globally, the Asia-Pacific region has been influential in driving growth and innovation in e-commerce, with Chinese companies emerging as key players in cross-border trade. This chapter provides an in-depth look at e-commerce data and highlights recent trends in the sector.

Defining and Measuring E-Commerce

An e-commerce transaction is defined as the sale or purchase of goods or services via computer networks through specifically designed methods. Although e-commerce orders are conducted through computer networks, the payment and delivery do not necessarily occur online.⁵⁰² Cross-border e-commerce trade—also known as “digitally ordered trade”—refers to the online sale of goods and services internationally. E-commerce can be conducted through web sales (websites, apps, or marketplaces) or via Electronic Data Interchange (EDI).⁵⁰³ Businesses, consumers, governments, and other organizations may participate in e-commerce sales. Statistics presented in this chapter focus on the role of businesses, including both business-to-consumer (B2C) and business-to-business (B2B)/business-to-government (B2G) transactions.

Although e-commerce is considered a service, it is typically measured in terms of the volume of goods and services being sold, via metrics such as gross merchandise volume. United Nations Trade and Development (UNCTAD) estimates that e-commerce sales by businesses across major global economies

⁵⁰² OECD, *OECD Guide to Measuring the Information Society 2011*, July 26, 2011, 72.

⁵⁰³ Electronic Data Interchange (EDI) refers to systems for electronically transmitting business data and documents (including invoices and purchase orders) used by businesses with complex supply chains. Nosowitz and Goodwin, “What Is EDI?,” July 30, 2025; UNCTAD, *Business E-Commerce Sales*, June 13, 2024, 15. Eurostat data indicate that in the European Union, EDI-type sales accounted for 11.8 percent of total enterprise sales in 2024, versus 7.3 percent for web sales. EDI-type sales were especially prevalent in the manufacturing sector, particularly pharmaceuticals, transport equipment, and food and beverages. Eurostat, “Value of E-Commerce Sales by Size Class,” July 17, 2025; “E-Commerce Sales of Enterprises,” July 17, 2025.

reached \$27 trillion in 2022, up roughly 10 percent from the previous year.⁵⁰⁴ Another source put total B2B and B2C e-commerce revenue at \$34.1 trillion in 2024, 26.3 percent higher than UNCTAD’s 2022 estimate.⁵⁰⁵

Cross-border e-commerce tends to be considerably smaller in value than domestic sales. UNCTAD estimates that the value of digitally ordered trade across major economies reached \$2.9 trillion in 2022 (up from \$2.1 trillion in 2021), accounting for about 12–14 percent of total goods and services exports.⁵⁰⁶ Nevertheless, measuring international e-commerce trade is especially challenging because the e-commerce share of exports is not readily available for many countries, including the United States and China.⁵⁰⁷

B2B vs. B2C Sales

In most countries, e-commerce sales to businesses and other types of organizations are considerably greater in volume than B2C sales. According to UNCTAD, China and Thailand are exceptions, with larger shares of B2C sales.⁵⁰⁸ UNCTAD does not provide breakdowns of B2B and B2C sales in U.S. dollar terms.⁵⁰⁹ Data from Statista put B2B e-commerce at \$26.6 trillion in 2024, up from \$20.4 trillion in 2022 ([figure 8.1](#)). Growth reached an annual average of 14.2 percent during that period, continuing the rapid gains experienced in 2020–22.

⁵⁰⁴ Although many countries are now reporting e-commerce figures, statistics remain incomplete, with significant variations by coverage and scope. UNCTAD calculations cover 43 developed and developing economies, including the United States, the 27 EU member states, China, Japan, the UK, Australia, Canada, Singapore (services only), Malaysia, Thailand, Norway, Iceland, Serbia, Bosnia and Herzegovina, Hong Kong, Indonesia, and the Philippines, that account for about 76 percent of GDP and 73 percent of exports globally. UNCTAD, *Business E-Commerce Sales*, June 13, 2024, 3–6.

⁵⁰⁵ That figure is calculated by adding B2B sales provided by the U.S. International Trade Administration (ITA) and B2C sales from eMarketer. Capital One Shopping, “eCommerce Statistics (2025),” May 25, 2025; ITA, “2024 eCommerce Sales & Size Forecast,” accessed August 7, 2025.

⁵⁰⁶ Those figures apply to the 43 countries included in the overall e-commerce estimates. UNCTAD reports considerable uncertainty about the validity of those estimates but considers it “highly likely” that the value fell within the range of \$1.5–\$4 trillion in 2021. UNCTAD, *Business E-Commerce Sales*, June 13, 2024, 15–21. [with an en dash, we don’t need to repeat the \$. . . trillion, like 4–17%]

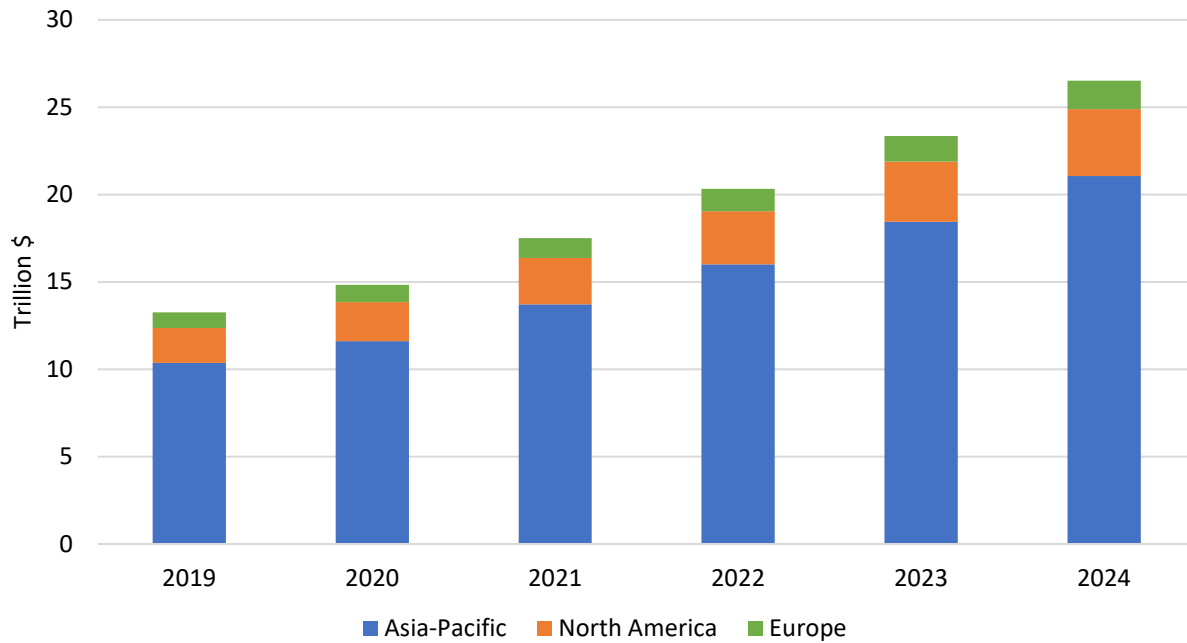
⁵⁰⁷ UNCTAD, *Business E-Commerce Sales*, June 13, 2024, 17. One factor complicating the measurement of cross-border e-commerce trade is that many transactions take place through a digital intermediation platform. The involvement of an intermediary may make it difficult to determine whether the buyer and seller are based in the same country. OECD, *Handbook on Measuring Digital Trade, Second Edition*, July 28, 2023, 35.

⁵⁰⁸ UNCTAD, *Business E-Commerce Sales*, June 13, 2024, 14.

⁵⁰⁹ UNCTAD estimates that online B2C sales rose considerably faster than total retail sales from 2017 to 2023; however, the organization does not provide estimates of total volume. Online retail sales statistics are more readily available than is the case of B2B sales, but significant differences in methodology exist across countries. UNCTAD, *Business E-Commerce Sales*, June 13, 2024, 23–28.

Figure 8.1 Gross merchandise value of business-to-business e-commerce, 2019–24

In trillions of dollars.



Source: Statista, “B2B e-commerce - In-depth Market Insights & Data Analysis,” August 27, 2025.
 Notes: Totals for 2023–24 are estimates. Data published by Statista were supplied by AgileIntel Research.

The global B2B e-commerce market is led by the Asia-Pacific region, with an estimated 79.1 percent share in 2024. The shares for North America and Europe were 14.4 percent and 6.2 percent, respectively. The rest of the world combined accounted for less than 0.5 percent of the total.⁵¹⁰

Global B2C e-commerce revenues are considerably smaller than B2B, at an estimated \$6.0 trillion in 2024. Moreover, recent growth rates have been slower, at 9.6 percent in 2023 and 7.7 percent in 2024, according to eMarketer Insider Intelligence.⁵¹¹ eMarketer estimates include both goods and services, but a similar result can be calculated when adding B2C e-commerce goods statistics from the German-based

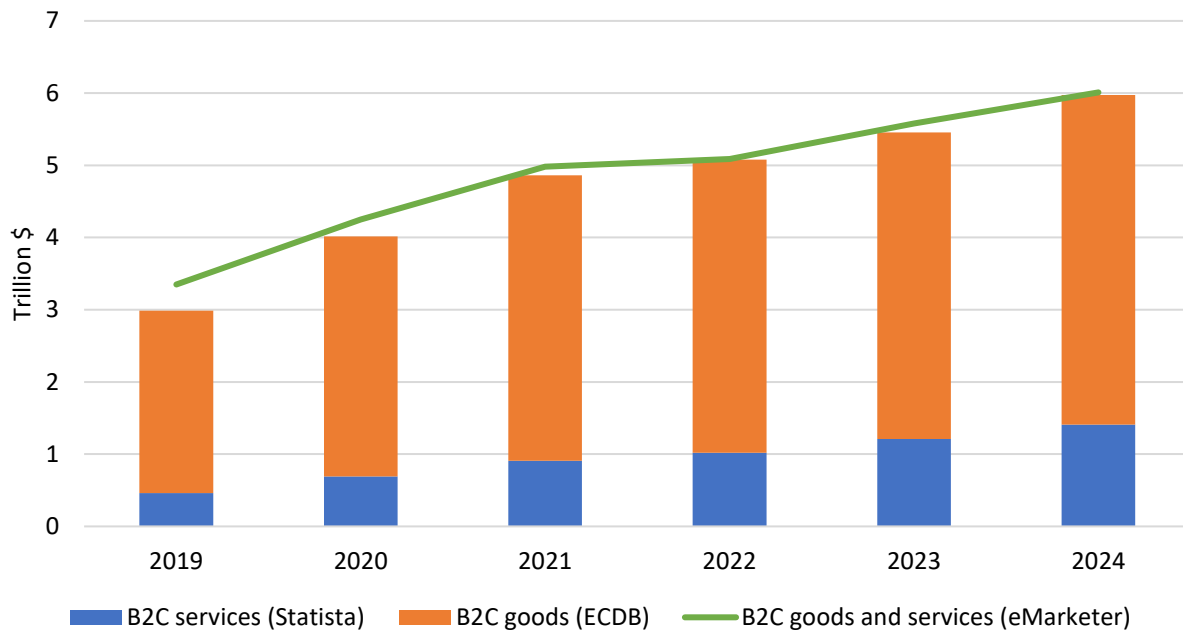
⁵¹⁰ By country, China led with a 36 percent share in 2024, followed by the United States with approximately 14 percent. Statista, *B2B E-Commerce*, August 27, 2025, 18, 25, 27.

⁵¹¹ eMarketer data include B2C e-commerce goods and services but exclude certain categories of services, such as travel and event tickets, restaurant and food services, and gambling. Estimates are based on official government data, online retailers’ revenues, consumer online purchasing trends, historical trends, and macroeconomic conditions. Capital One Shopping, “eCommerce Statistics (2025),” May 25, 2025; Feger, “Worldwide Ecommerce Sales to Break \$6 Trillion,” March 19, 2024.

e-commerce data analytics company ECDB and e-commerce services data from Statista ([figure 8.2](#)).⁵¹² Neither eMarketer nor Statista includes online accommodation and travel sales in its calculations of e-commerce services; however, in a separate dataset, Statista puts global revenues from the online travel market at \$653.6 billion in 2024.⁵¹³

Figure 8.2 Global business-to-consumer e-commerce revenue, 2019–24

In trillions of dollars.



Sources: Capital One Shopping, “eCommerce Statistics,” (sourced from eMarketer, last updated December 7, 2025); ECDB, “Global eCommerce 2025”; Statista, “eServices – Worldwide,” accessed December 8, 2025.

Notes: eMarketer data include B2C e-commerce goods and services but exclude certain services categories, such as travel and event tickets, restaurant and food services, and gambling. ECDB data include sales of physical goods but exclude services. Statista e-services figures include food delivery services, online dating, and online education but exclude digital media as well as ride-sharing and travel booking.

⁵¹² ECDB figures are calculated using transaction data from credit and debit cards, e-wallets, and bank accounts, alongside retailers’ data, website traffic, and financial revenues. ECDB, “Global eCommerce 2025,” 2025. Defined as the delivery of services through electronic means, Statista’s e-services data cover the online food delivery market, dating services, and online education. They do not include online media content, ride-sharing, or travel booking services. Statista, “eServices,” September 2025.

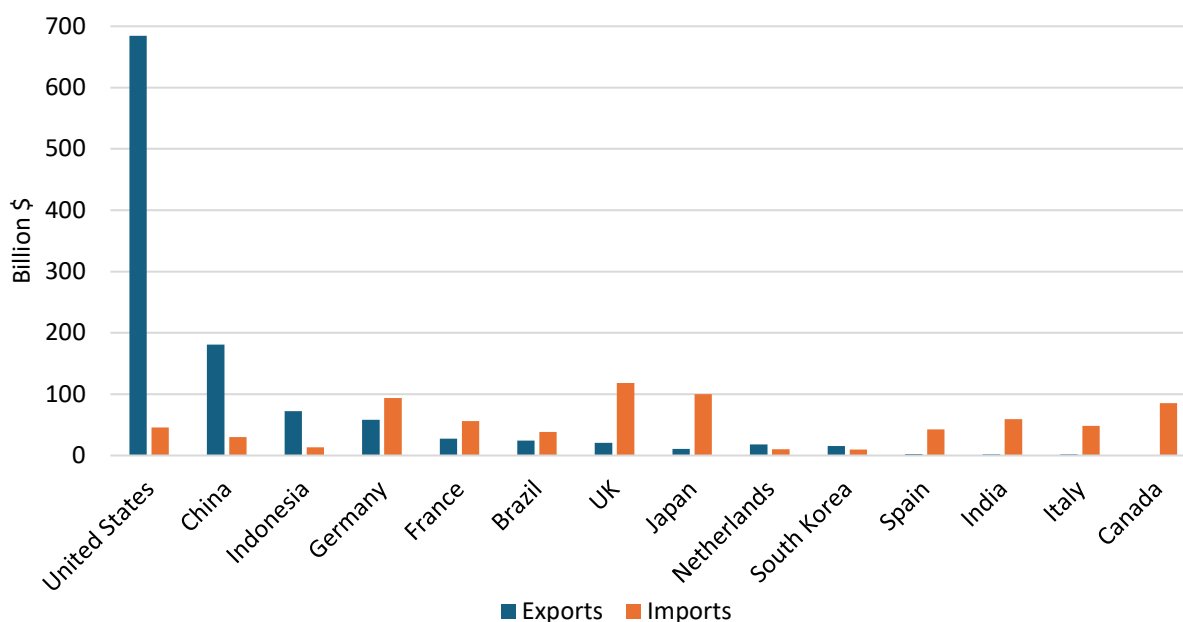
⁵¹³ Statista, “Online Travel Market Size Worldwide from 2017 to 2024,” July 21, 2025. In the European Union, accommodation was the sector with the largest share of companies reporting e-commerce sales in 2024 (79.3 percent), followed by travel agencies and tour operators (57.3 percent) and publishing and audiovisual (42.9 percent). Construction had the lowest share (7.1 percent), according to Eurostat data. Eurostat, “E-Commerce Sales of Enterprises,” July 17, 2025.

Similar to the B2B sphere, B2C e-commerce is dominated by Asia, which accounted for 55.0 percent of total goods and services revenues in 2024. That compares with 29.1 percent for the Americas and 14.3 percent for Europe.⁵¹⁴ In 2024, China and the United States combined accounted for more than 65 percent of global B2C e-commerce revenue, at 40.9 percent and 24.8 percent, respectively.

In line with UNCTAD estimates, ECDB data indicate that cross-border e-commerce sales are considerably smaller than domestic sales. According to ECDB, global cross-border B2C revenues from sales of physical goods reached \$1.14 trillion in 2024, increasing 5.8 percent in 2023 and 10.9 percent in 2024.⁵¹⁵ By country base of the exporting company, ECDB estimates that the United States and China were the leading cross-border exporters of B2C e-commerce in 2024, with revenues of \$684.5 billion and \$180.7 billion, respectively (figure 8.3). Meanwhile, the top importers of cross-border e-commerce included the United Kingdom and Japan, at \$118.4 billion and \$99.9 billion, respectively.⁵¹⁶ The United States had a large surplus in digitally ordered B2C trade in 2024; China, Indonesia, the Netherlands, and South Korea also had positive balances.

Figure 8.3 Global cross-border business-to-consumer e-commerce exports and imports, 2024

In billions of dollars.



Source: ECDB, “Cross-Border eCommerce 2025.”

Note: Cross-border e-commerce revenue represents all e-commerce revenue generated by a company outside its main country.

⁵¹⁴ These shares are calculated by adding the revenues from e-commerce goods (from ECDB) and e-services (from Statista) by region. ECDB, “Global eCommerce 2025,” 2025, 7; Statista, “eServices,” September 2025.

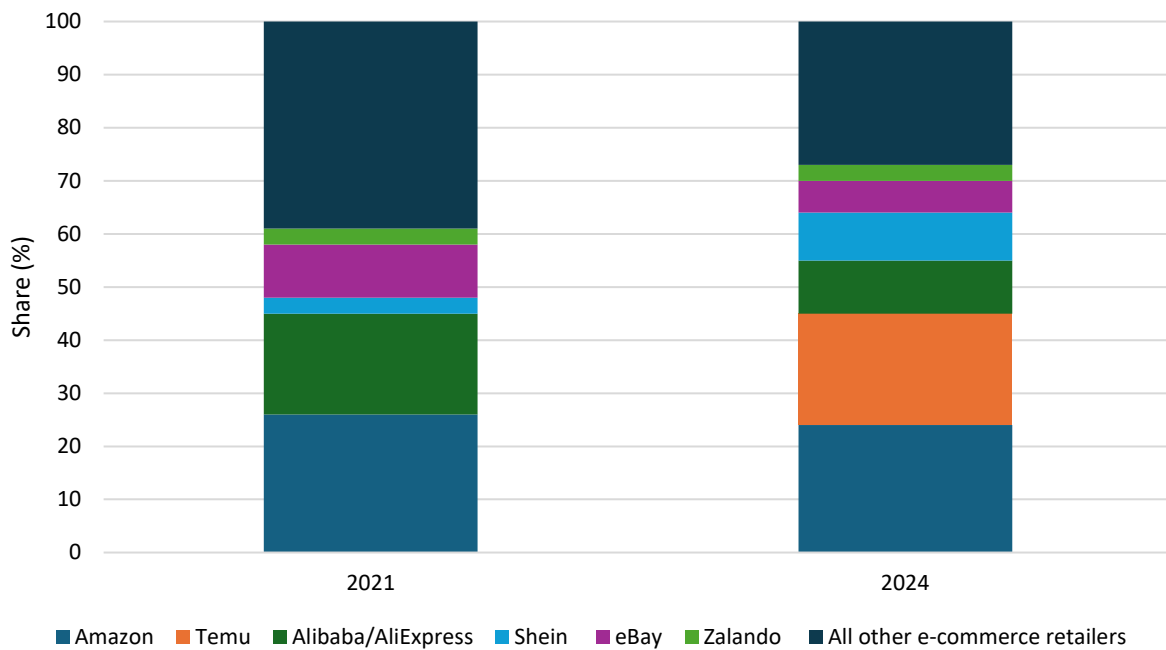
⁵¹⁵ E-commerce data on cross-border services and B2B trade are scarce. ECDB does not currently publish B2B data but plans to start in the coming years. ECDB, “Cross-Border eCommerce 2025,” 2025.

⁵¹⁶ ECDB, “Cross-Border eCommerce 2025,” 2025, 6.

The large U.S. trade surplus in e-commerce goods is a reflection of the penetration into international markets by U.S. companies such as Amazon, which in 2024–25 ranked as the top retailer in the Forbes Global 2000.⁵¹⁷ According to ECDB, Amazon had \$398.5 billion in cross-border revenue in 2024, followed by China-based Alibaba (\$131.8 billion) and Singapore-based Sea (\$72.0 billion).⁵¹⁸ Amazon was the leading source of cross-border B2C purchases among respondents to International Post Corporation’s (IPC’s) 2024 annual Cross-Border E-Commerce Shopper Survey (with around 24 percent of respondents naming the company as the e-tailer of the most recent purchase).⁵¹⁹ However, the company’s share has slipped slightly in recent years (from 26.0 percent in 2021).⁵²⁰ After launching in 2022, China-based Temu’s share had surged to 21.0 percent by 2024 (figure 8.4).⁵²¹

Figure 8.4 E-commerce retailer used for most recent cross-border purchase

In percentages.



Sources: IPC, “Cross-Border E-Commerce Shopper Survey 2024,” January 2025; IPC, “Cross-Border E-Commerce Shopper Survey 2021.” January 2022.

Note: Temu was launched in 2022 and therefore does not appear in the 2021 results.

⁵¹⁷ Santillana Linares, “The World’s Largest Retailers 2025,” June 12, 2025.

⁵¹⁸ ECDB, “Cross-Border eCommerce 2025,” 2025, 12.

⁵¹⁹ IPC Cross-Border E-Commerce Shopper Survey is a global consumer survey with a total online sample of 31,000 consumers covering 37 markets worldwide, including the United States. IPC, “Cross-Border E-Commerce Shopper Survey 2024,” January 2025, 11.

⁵²⁰ IPC, “Cross-Border E-Commerce Shopper Survey 2021,” January 2022, 12.

⁵²¹ For further information about Temu, see “Changing Market Participants: the Rising Dominance of China” in this chapter.

Since 2022, sellers on Amazon’s third-party marketplace have been the primary drivers of the company’s e-commerce growth.⁵²² China is playing a leading role, both as a source of third-party sellers and producer of goods. By 2025, more than half of Amazon’s third-party sellers, both in the United States and globally, were based in China.⁵²³ Moreover, a 2024 survey indicated that an estimated 71.0 percent of goods sold on Amazon’s platform and third-party marketplace were produced in China.⁵²⁴

In terms of products, ECDB breakdowns indicate that fashion accounted for 26.4 percent of cross-border B2C e-commerce goods purchases in 2024, followed by electronics (24.9 percent) and hobby and leisure (20.5 percent).⁵²⁵ IPC surveys reveal significant differences in purchases by country and region.

Participants indicated that clothing and footwear and consumer electronics were more commonly purchased in North America than elsewhere in the world, whereas personal care and beauty products were more popular in Asia. In Europe, respondents reported purchasing more home and garden and sport and leisure products than in other regions.⁵²⁶

Changing Market Participants: The Rising Dominance of China

Data presented above reveal the leading role of the Asia-Pacific region—and China, in particular—in global B2B and B2C e-commerce. A number of factors have helped drive Asia’s rise in the e-commerce market. These include a broad network of low-cost e-commerce suppliers, large populations, and rapid adaptation of digital technologies by consumers, with twice the number of internet users as in Europe and North America combined.⁵²⁷ On the demographic front, rapid urbanization has also been key, with the region’s population shifting from majority rural to majority urban since 2013, helping support the construction and operation of infrastructure needed for the development of e-commerce. Another demographic factor relates to higher disposable income and discretionary spending, accompanied by an increased share of middle-class households.⁵²⁸ Other advantages for Asia include a culture of online shopping (cultivated by marketplaces such as Alibaba, JD, and IndiaMart) and strong investment in B2B technology companies, led by Singapore-based firms Trax Retail, Patsnap, and Kacific.⁵²⁹

⁵²² The Paypers, “Cross-Border Payments and Ecommerce Report 2023–2024,” December 18, 2023, 11.

⁵²³ Donovan, “China Reaches Global Majority on Amazon,” September 25, 2025.

⁵²⁴ Jungle Scout, *State of the Amazon Seller Report*, 2024. 20

⁵²⁵ ECDB, “Cross-Border eCommerce 2025,” 2025, 10.

⁵²⁶ IPC, “Cross-Border E-Commerce Shopper Survey 2024,” January 2025, 10.

⁵²⁷ The share of the region’s population using the internet increased from 27 percent in 2013 to 61 percent in 2023 according to Euromonitor International. The Paypers, “Global Ecommerce Report 2025,” December 4, 2024, 54; Statista, *B2B eCommerce*, 2023, 24.

⁵²⁸ Euromonitor International reports that 28 percent of households in the Asia-Pacific region were considered middle class in 2023, up from 18 percent in 2013. The Paypers, “Global Ecommerce Report 2025,” December 4, 2024, 54.

⁵²⁹ Statista, *B2B eCommerce*, 2023, 24.

Notably, the Asia-Pacific region has emerged as the global hub of retail innovation, especially in e-commerce.⁵³⁰ Examples of innovations that originated in Asia before spreading to the rest of the world include super apps (which combine messaging, social networking, and payment) and livestreaming e-commerce.⁵³¹ Although super apps have been slow to develop in the United States, livestreaming e-commerce has been gaining popularity, through platforms such as TikTok, Facebook, and Amazon Live.⁵³²

The rising importance of China in the global e-commerce sector corresponds with the country's broader "going out" policy, as Chinese companies look externally for expansion opportunities to help compensate for slowing domestic growth.⁵³³ One example of China's rising influence in the B2C sphere is the online marketplace Temu, which was launched in September 2022 by PDD Holdings. Thanks to low prices and a huge assortment of goods, Temu's Shop Like a Billionaire app surged in popularity, becoming the most downloaded shopping app in the United States by February 2023 and the most downloaded worldwide in 2024.⁵³⁴ To keep prices down, companies like Temu and Shein have benefited from policies that allow for the duty-free import of low-value goods, both in the United States and abroad.⁵³⁵ A 2024 global DHL report indicated that 53.0 percent of shoppers buy goods from abroad because of lower prices and 40.0 percent purchase externally because the product or brand is not available in their home country.⁵³⁶

In the IPC's 2024 survey, 40.0 percent of global respondents said their most recent online purchase was from China (figure 8.5).⁵³⁷ China was the top source across most countries surveyed in the IPC report, with the exception of Austria and Luxembourg (where Germany was the leading source), Ireland (the

⁵³⁰ The Paypers, "Global Ecommerce Report 2025," December 4, 2024, 55; AnyMind, *Asia E-Commerce Landscape 2025*, January 7, 2025, 3.

⁵³¹ The Paypers, "Global Ecommerce Report 2025," December 4, 2024, 55; Capgemini, *What Matters to Today's Consumer*, 2025, 37, 51; AnyMind, "Asia Live Commerce White Paper 2025," June 30, 2025, 7, 11. One Chinese study has shown that live streaming can influence consumers' perceptions of value and purchase intention. Guo et al., "How Live Streaming Features Impact Cross-Border E-Commerce," November 4, 2021.

⁵³² Statista, *Live Commerce*, 2025, 13, 34.

⁵³³ The Paypers, "Global Ecommerce Report 2025," December 4, 2024, 55.

⁵³⁴ The 10 most downloaded shopping apps globally in 2024 included four from China (Temu, Shein, Alibaba, and AliExpress), three from India (Meesho, Flipkart, and Shopsy), one from the United States (Amazon), one from Singapore (Shopee), and one from Argentina (Mercado Libre). These data, sourced from Appmagic, include free apps downloaded from the Apple App Store and Google Play Store. Statista, "Global: Most Downloaded Shopping Apps 2024," June 24, 2025; The Paypers, "Cross-Border Payments and Ecommerce Report 2023–2024," December 18, 2023, 11.

⁵³⁵ Zonos Docs, "Country-Specific de Minimis Values," accessed September 20, 2024. The U.S. de minimis exemption, previously valued at \$800, was eliminated in 2025. Exec Order No. 14256, 90 Fed. Reg. 14899 (April 7, 2025); Ecommerce North America, "The End of de Minimis Duty-Free Imports," August 1, 2025. According to U.S. Customs and Border Patrol statistics, the United States imported \$64.6 billion worth of packages via the de minimis exemption in fiscal year 2024 (up from \$46.5 billion in 2022). CBP, "De Minimis Statistics."

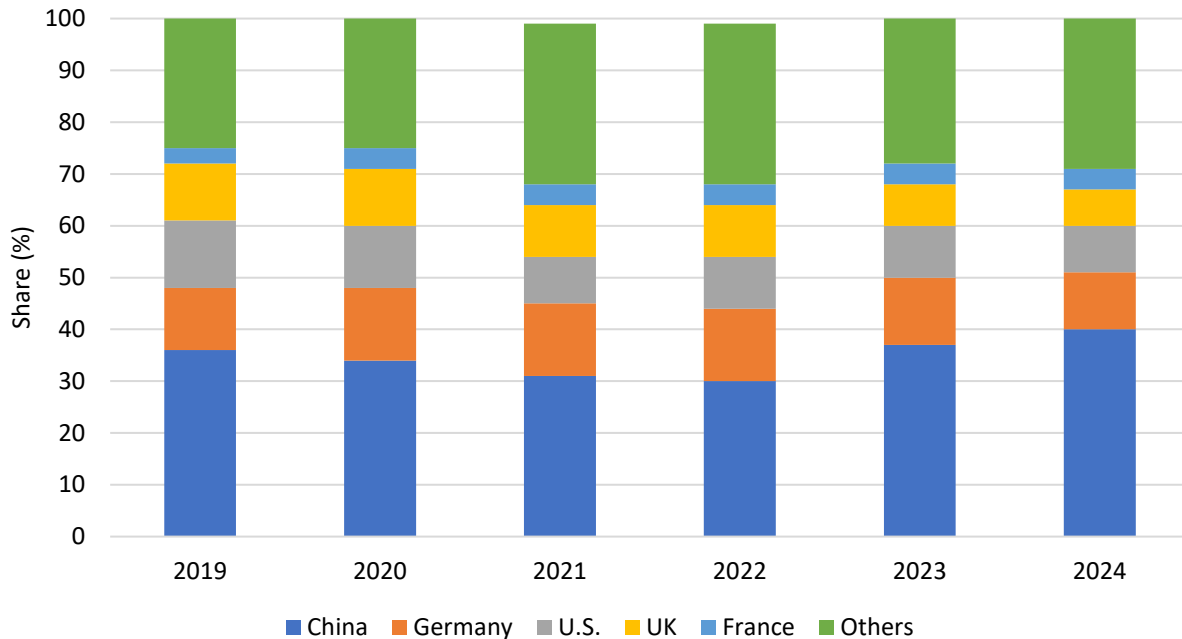
⁵³⁶ To understand consumers' online preferences, DHL surveyed 12,000 shoppers across 24 countries in 2024, and the results fed into a series of reports. DHL, *Cross-Border Buying Report 2024*, 2024, 9.

⁵³⁷ DHL's 2024 survey indicated that 57 percent of respondents buy products from China, vs. 37 percent from the United States and 23 percent from Germany. IPC, "Cross-Border E-Commerce Shopper Survey 2024," January 2025, 4, 7; DHL, *Cross-Border Buying Report 2024*, 2024, 5.

UK), and Canada, Mexico, and India (the United States). In the case of China, the most popular source countries were Japan, South Korea, and Australia.⁵³⁸

Figure 8.5 Country of latest cross-border e-commerce purchase by survey respondents

In percentage.



Source: IPC, “Cross-Border E-Commerce Shopper Survey 2024,” January 2025.

Notes: The survey asks respondents to specify the country from which they bought the most recent online cross-border purchase. The totals may not equal 100 percent due to rounding.

Shifting Demand Across the E-Commerce Sector

Consumer preferences in e-commerce are changing, as younger generations demand the integration of new technologies such as AI. Members of Generation Z (Gen Z, born between 1997 and 2012) were raised with access to smart phones and social media, providing them with a closer relationship to technology than older generations.⁵³⁹ A 2024 global consumer survey from Capgemini indicated that about 67 percent of Gen Z respondents want generative artificial intelligence (Gen AI) to provide hyper personalized content and product recommendations and about 77 percent would like to see an aggregation of product searches across search engines and platforms.⁵⁴⁰ With younger consumers driving

⁵³⁸ IPC, “Cross-Border E-Commerce Shopper Survey 2024,” January 2025, 8–9.

⁵³⁹ Braun, “Gen Z And AI,” July 28, 2025.

⁵⁴⁰ Capgemini’s consumer demand survey was conducted in October–November 2024, with 12,000 respondents across 12 countries. Capgemini, *What Matters to Today’s Consumer*, 2025, 7, 13, 18–19.

e-commerce growth in the aftermath of the COVID-19 pandemic,⁵⁴¹ businesses are increasingly integrating Gen AI into their online interfaces, enabling the use of visual and voice searches for personalized content and making it easier for consumers to research products. Capgemini's 2024 survey indicated that around 45 percent of Gen Z respondents had used Gen AI in their shopping experiences during the past year, compared with roughly 24 percent of the overall population.⁵⁴²

Alongside rising demand for AI, the use of social commerce (defined as e-commerce via social media apps) has also increased in recent years, particularly on platforms such as Instagram, TikTok, YouTube, and Facebook. According to Statista, social commerce's share in global B2C e-commerce revenue rose to around 17 percent in 2024, nearly double the 2021 figure of 9.0 percent.⁵⁴³ One element of social commerce is "shoppable ads," which allow customers to purchase a product without leaving the app.⁵⁴⁴ Another component is influencer marketing, a collaborative marketing approach between brands and influencers that uses product endorsements from influential individuals with a dedicated online following.⁵⁴⁵ Using influencers in marketing is not limited to the B2C realm; it is also picking up in the B2B sphere, mainly through platforms such as LinkedIn, Substack, and Reddit.⁵⁴⁶ The use of social commerce varies by generation and geography. The Capgemini survey cited above indicated that 53 percent of Gen Z respondents purchased new products on social media in 2024 and 45 percent bought products from influencers and celebrities, compared to 32 percent and 24 percent of the total population, respectively.⁵⁴⁷ Meanwhile, DHL's 2024 Purchasing Behavior survey indicates significant geographical differences in the use of social media in shopping. The top countries where respondents reported actively buying goods using social media for inspiration were Thailand (59 percent), China (53 percent), and Nigeria (51 percent). In contrast, the countries with the lowest reported usage of social media in shopping were in Europe.⁵⁴⁸

Another recent demand shift in the e-commerce sphere that is likely partially related to rising social commerce is the increased use of mobile devices for shopping (m-commerce).⁵⁴⁹ Statista indicates that the share of global e-commerce revenue from mobile devices rose from 40.0 percent in 2017 to 57.0 percent in 2024, surpassing revenue from desktop devices in 2022.⁵⁵⁰ Increased demand for seamless mobile commerce has been accompanied by expanded use of mobile wallets (more details are available

⁵⁴¹ Descartes Systems Group Inc, "Descartes' Annual Ecommerce Study," May 14, 2025.

⁵⁴² Capgemini, *What Matters to Today's Consumer*, 2025, 17–24.

⁵⁴³ Statista, *eCommerce: Market Data and Analysis*, December 2024, 34. A 2022 study of Indonesian social media users indicated that social networks can help to build trust, including for cross-border e-commerce. Wiyata et al., "Cross-Border Social Commerce: From a Trust Transfer Perspective," 2022.

⁵⁴⁴ The Paypers, "Global Ecommerce Report 2025," December 4, 2024, 12.

⁵⁴⁵ Influencer Marketing Hub estimated that total advertising spending on influencer marketing would reach \$32.6 billion in 2025, with businesses generating \$6.50 in revenue from every dollar spent. Influencer Marketing Hub, "What Is Influencer Marketing?," February 5, 2025.

⁵⁴⁶ Influencer Marketing Hub, "What Is Influencer Marketing?," February 5, 2025.

⁵⁴⁷ Capgemini, *What Matters to Today's Consumer*, 2025, 33–34, 44.

⁵⁴⁸ DHL, *Purchasing Behavior Report 2024*, 2024, 2, 8.

⁵⁴⁹ The Paypers, "Global Ecommerce Report 2025," December 4, 2024, 23–24.

⁵⁵⁰ Statista, *eCommerce: Market Data and Analysis*, December 2024, 22.

in “Supply-Side Factors Affecting E-Commerce” in this chapter). M-commerce has become especially prevalent in developing markets that previously lacked widespread internet access.⁵⁵¹

A final noteworthy demand trend in the e-commerce sphere relates to shifting consumer preferences toward eco-friendly and ethically made products, packaging, and delivery options. Although consumers remain focused on price and quality, a rising number are willing to pay more for greener options and to accept slower but more sustainable deliveries.⁵⁵² One global survey showed that 38 percent of consumers paid 1–5 percent more for a sustainable product in 2024 (up from 20 percent in 2020), although the share of respondents willing to pay more than 5 percent declined.⁵⁵³ Another survey indicated that a majority of shoppers globally would like more transparency about the CO₂ emissions associated with their deliveries and would sometimes or always pay more for sustainable packaging.⁵⁵⁴ Concerns about sustainability also have a generational component: products perceived as sustainable are particularly popular among Gen Z respondents.⁵⁵⁵

Supply-Side Factors Affecting E-Commerce

Along with demand shifts, the e-commerce sphere has also experienced supply-side changes in recent years. To boost competitiveness, companies have begun to offer consumers different channels for shopping (known as an omnichannel approach), including online ordering through websites, apps, or marketplaces, in addition to traditional brick-and-mortar stores.⁵⁵⁶ According to one source, e-commerce omnichannel operations may require three times more warehouse space than traditional retail.⁵⁵⁷ As a result, e-commerce operators have expanded warehousing and distribution networks, upgraded delivery systems, and leveraged new technologies to ensure real-time monitoring and tracking of goods.⁵⁵⁸

Technological advancements are changing the way customers interact with companies, through integration of AI for product recommendations, dynamic pricing, chatbots for customer service, as well as virtual fitting rooms.⁵⁵⁹ AI is also transforming the way that marketing campaigns are taking place and helping companies sell internationally by localizing content in terms of language, pricing, and content

⁵⁵¹ The Paypers, “Global Ecommerce Report 2025,” December 4, 2024, 23, 52, 54.

⁵⁵² The Paypers, “Global Ecommerce Report 2025,” December 4, 2024, 80; Statista, *eCommerce: Market Data and Analysis*, December 2024, 32.

⁵⁵³ Capgemini, *What Matters to Today’s Consumer*, 2025, 28.

⁵⁵⁴ DHL, *Purchasing Behavior Report 2024*, 2024, 12–13.

⁵⁵⁵ Capgemini, *What Matters to Today’s Consumer 2025*, 2025, 26, 28.

⁵⁵⁶ J.P. Morgan, “Global E-Commerce Trends Report,” 2021, 14; UNCTAD, *Digital Economy Report 2024*, 2024, 147.

⁵⁵⁷ UNCTAD, *Digital Economy Report 2024*, 2024, 151.

⁵⁵⁸ Kangur, “Ecommerce Logistics,” May 6, 2024; Statista, *eCommerce: Market Data and Analysis*, December 2024, 30.

⁵⁵⁹ The Paypers, “Global Ecommerce Report 2025,” December 4, 2024, 11; Statista, *eCommerce: Market Data and Analysis*, December 2024, 11.

tailoring.⁵⁶⁰ Other technologies that are shaping the consumer shopping experience include blockchain, fifth generation, and augmented reality and virtual reality.⁵⁶¹

In addition to introducing new technologies to improve the customer experience, companies have launched subscription-based or membership rewards models to build brand loyalty. This trend is not entirely new: Amazon Prime, introduced in 2005, is viewed as the benchmark. Other companies have introduced similar programs in recent years in a range of industries, including retail, streaming, and meal delivery.⁵⁶² According to DHL, 35 percent of shoppers globally had an online shopping subscription in 2024; the products most frequently purchased were clothing and accessories.⁵⁶³ One source indicated that the market value of the subscription economy was expected to reach \$1.5 trillion in 2025.⁵⁶⁴

Companies operating in the e-commerce space have also made efforts to expand payment systems to better position themselves in a shifting landscape. Simplifying the checkout and payments process has been especially important, helping to reduce the rate of abandoned shopping carts by avoiding the reentry of personal data and minimizing the number of clicks required.⁵⁶⁵ Alternative payment methods such as Apple Pay, Google Pay, and Samsung Pay reached an estimated 50 percent of global e-commerce value in 2023.⁵⁶⁶ For merchants engaged in cross-border trade, providing localized payment options has become increasingly common.⁵⁶⁷ Another recent innovation has been the expanded acceptance of cryptocurrency payments by merchants.⁵⁶⁸

⁵⁶⁰ The integration of AI has reportedly improved marketing outcomes, thanks to better influencer matching, predictive analytics, and more effective tools for optimizing strategies and measuring return on investment. In addition, AI is giving influencers the tools needed to hyperpersonalize their messages, tailoring them to allow for more authentic connections with their followers. Influencer Marketing Hub, “What Is Influencer Marketing?,” February 5, 2025; Sharabi, “The Role of AI and Automation in Localization,” September 25, 2024.

⁵⁶¹ Blockchain is being used to promote data security, prevent fraud, better manage supply chains, and ensure the authenticity of products. Fifth generation technology has improved connectivity and speeds on mobile devices; AR and VR technologies enable customers to interact with products, raising the chance of purchases. Statista, *eCommerce: Market Data and Analysis*, December 2024, 32; Blockchain Council, “Future of E-Commerce;,” November 1, 2024; Infoway, “The Impact of 5G on E-Commerce,” February 27, 2024; The Paypers, “Global Ecommerce Report 2025,” December 4, 2024, 23.

⁵⁶² These loyalty programs are expected to be integrated into digital wallets, allowing customers to earn points and other benefits. Statista, *eCommerce: Market Data and Analysis*, December 2024, 31; The Paypers, “Global Ecommerce Report 2025,” December 4, 2024, 12.

⁵⁶³ DHL, *Purchasing Behavior Report 2024*, 2024, 5.

⁵⁶⁴ The Paypers, “Global Ecommerce Report 2025,” December 4, 2024, 24.

⁵⁶⁵ Payment options such as Apple Pay and Google Pay allow users to access their address and credit or debit card information, enabling faster and easier online purchasing and eliminating errors. Statista, *eCommerce: Market Data and Analysis*, December 2024, 30; The Paypers, “Global Ecommerce Report 2025,” December 4, 2024, 12.

⁵⁶⁶ The Paypers, “Global Ecommerce Report 2025,” December 4, 2024, 9, 23.

⁵⁶⁷ The Paypers, “Cross-Border Payments and Ecommerce Report 2023–2024,” December 18, 2023, 54, 90–91.

⁵⁶⁸ The cryptocurrency payments platform BitPay lists more than 250 global merchants that currently accept crypto payments, either via gift cards or direct payments. BitPay, “Merchant Directory: 250+ Companies & Stores,” accessed August 6, 2025.

The Role of Marketplaces in E-Commerce

E-commerce logistics may be especially daunting for global small and medium-sized enterprises (SMEs), given their size and comparative lack of resources.⁵⁶⁹ Many SMEs have turned to e-commerce marketplaces, where multiple sellers can list and sell their goods and services. Marketplaces such as Amazon, eBay, and Shein give sellers access to the platforms' logistics services, thereby reducing shipping and fulfillment costs. Other benefits of marketplaces are the ability to reach a broader customer base and compete more effectively with other players, both on domestic and foreign markets.⁵⁷⁰ Marketplace usage is especially prevalent among medium-sized merchants (those generating \$5–50 million in e-commerce revenue annually). In a 2025 global Visa survey, only 9 percent of midsize merchants said they do not sell through third-party marketplaces, compared to 27 percent of small businesses and 19 percent of large firms.⁵⁷¹

Although e-commerce marketplaces have been common in the business-to-consumer (B2C) sphere for a number of years, they lagged in the business-to-business (B2B) sphere until recently. According to Digital Commerce 360, B2B marketplace sales jumped from \$56.5 billion in 2021 to \$349.9 billion in 2024; their share of total B2B e-commerce sales rose from 3.5 percent to 14.4 percent.⁵⁷² That growth was reportedly driven by the emergence of new, niche platforms focused on the vertical space, specializing in a specific segment or industry. The number of B2B marketplaces globally increased to more than 600 by 2024 (of which 500 were vertical), up from 75 five years earlier.⁵⁷³ For example, companies operating in the chemicals business can access the global platform Chemnet, allowing them to focus on industry-specific inventories across the supply chain and avoid sorting through less relevant products.⁵⁷⁴ These marketplaces may include features aimed at raising pricing transparency and improving supplier collaboration via technological tools.⁵⁷⁵ As in the case of B2C marketplaces, these vertical networks are particularly impactful for SMEs, allowing them to break into industry networks previously dominated by large companies and providing them access to a broader customer base, both domestic and across borders.⁵⁷⁶ The World Trade Organization (WTO) e-commerce moratorium—which is subject to biennial review and renewal—has kept digital trade tariff free since 1998. At the WTO's most recent ministerial conference in March 2026, no decision was made regarding renewal of the moratorium, reportedly

⁵⁶⁹ For more on SME cross-border e-commerce in the United States, see USITC, *Recent Trends in U.S. Services Trade: 2023 Annual Report*, May 2023, 70–73.

⁵⁷⁰ Statista, *eCommerce: Market Data and Analysis*, December 2024, 29; Visa, "2025 Global eCommerce Payments & Fraud Report," 2025, 15; Chen et al., "The Role of Cross-Border E-Commerce Platforms," March 21, 2025; Guo, "The Study on the Development Trends," October 15, 2024.

⁵⁷¹ Visa, "2025 Global eCommerce Payments & Fraud Report," 2025, 16.

⁵⁷² Digital Commerce 360, *2024 B2B Marketplace 750 Report*, October 2024.

⁵⁷³ Brohan, "B2B Marketplaces," October 21, 2024; Bendor-Samuel, "The Rise of Vertical Marketplaces," April 25, 2025.

⁵⁷⁴ Bendor-Samuel, "The Rise Of Vertical Marketplaces," April 25, 2025.

⁵⁷⁵ Brohan, "B2B Marketplaces," October 21, 2024.

⁵⁷⁶ Bendor-Samuel, "The Rise Of Vertical Marketplaces," April 25, 2025.

resulting in uncertainty about future duties on cross-border e-commerce transactions. Twenty-three countries, including the United States, have agreed to avoid imposing customs duties on electronic transmissions until the next WTO General Council meeting, scheduled for May 2026 in Geneva.⁵⁷⁷

⁵⁷⁷ Reuters, “Group of WTO states agrees not to impose e-commerce duties,” April 2, 2026

Bibliography

- AnyMind. *Asia E-Commerce Landscape 2025*. January 7, 2025. <https://anymindgroup.com/report/asia-e-commerce-landscape-2025>.
- AnyMind. "Asia Live Commerce White Paper 2025." June 30, 2025. <https://anymindgroup.com/report/livecommerce-report-2025>.
- Bendor-Samuel, Peter. "The Rise Of Vertical Marketplaces: Why The Future Of B2B E-Commerce Is Niche." *Forbes*, April 25, 2025. <https://www.forbes.com/sites/peterbendorsamuel/2025/04/25/the-rise-of-vertical-marketplaces-why-the-future-of-b2b-e-commerce-is-niche/>.
- BitPay. "Merchant Directory: 250+ Companies & Stores that Accept Cryptocurrency." Accessed August 6, 2025. <https://www.bitpay.com/directory>.
- Blockchain Council. "Future of E-Commerce: How Blockchain Technology Is Leading the Way." November 1, 2024. <https://www.blockchain-council.org/info/future-of-e-commerce-how-blockchain-technology-is-leading-the-way/>.
- Braun, Ken. "Gen Z And AI: How Emerging Technologies Are Shaping Consumer Behavior." *Forbes*, July 28, 2025. <https://www.forbes.com/councils/forbesagencycouncil/2025/07/28/gen-z-and-ai-how-emerging-technologies-are-shaping-consumer-behavior/>.
- Brohan, Mark. "B2B Marketplaces: From Niche to Mainstream." *Digital Commerce 360*, October 21, 2024. <https://www.digitalcommerce360.com/2024/10/21/b2b-marketplaces-from-niche-to-mainstream/>.
- Capgemini. *What Matters to Today's Consumer: 2025 Consumer Behavior Tracker for the Consumer Product and Retail Industries*. 2025. <https://www.capgemini.com/insights/research-library/what-matters-to-todays-consumer-2025/>.
- Capital One Shopping. "eCommerce Statistics." May 25, 2025. <https://capitaloneshopping.com/research/ecommerce-statistics/>.
- Chen, Yubo, Qi Wang, and Jurui Zhang. "The Role of Cross-Border E-Commerce Platforms in the Digital Economy: Empower Firms to Gain Global Market Insights to Increase Global Competitiveness." *Journal of Digital Management* 1, no. 1 (March 21, 2025): 4. <https://doi.org/10.1007/s44362-024-00003-0>.
- Descartes Systems Group Inc. "Descartes' Annual Ecommerce Study Shows Younger Consumers Driving Online Buying Growth—but 79% Have Experienced Delivery Problems." *GlobeNewswire*. Press release, May 14, 2025. <https://www.globenewswire.com/news-release/2025/05/14/3080949/0/en/Descartes-Annual-Ecommerce-Study-Shows-Younger-Consumers-Driving-Online-Buying-Growth-but-79-Have-Experienced-Delivery-Problems.html>.

- DHL. *Cross-Border Buying Report 2024*. 2024. <https://www.dhl.com/global-en/microsites/ec/ecommerce-insights/insights/reports/2024-cross-border-report.html>.
- DHL. *Purchasing Behavior Report 2024*. 2024. <https://www.dhl.com/global-en/microsites/ec/ecommerce-insights/insights/reports/2024-online-purchasing-report.html>.
- Digital Commerce 360. 2024 B2B Marketplace 750 Report. October 2024. <https://www.digitalcommerce360.com/product/b2b-marketplace-report/>.
- Donovan, Ben. "China Reaches Global Majority on Amazon." *Marketplace Pulse*, September 25, 2025. <https://www.marketplacepulse.com/articles/china-reaches-global-majority-on-amazon>.
- ECDB. "Cross-Border eCommerce 2025." 2025. <https://ecdb.com/whitepaper/cross-border-ecommerce-2025>.
- ECDB. "Global eCommerce 2025." 2025. <https://ecdb.com/whitepaper/global-ecommerce-2025>.
- Ecommerce North America. "The End of de Minimis Duty-Free Imports: What Ecommerce Operators Need to Know." August 1, 2025. <https://www.ecommercenorthamerica.org/2025/08/01/end-of-de-minimis-ecommerce-operators/>.
- Eurostat. "E-Commerce Sales of Enterprises by NACE Rev. 2 Activity." July 17, 2025. https://ec.europa.eu/eurostat/databrowser/view/isoc_ec_esel2/default/table?lang=en.
- Eurostat. "Value of E-Commerce Sales by Size Class of Enterprise." July 17, 2025. https://ec.europa.eu/eurostat/databrowser/view/isoc_ec_evals_custom_17656657/default/table.
- Executive Office of the President (EOP). Executive Order 14256, Further Amendment to Duties Addressing the Synthetic Opioid Supply Chain in the People's Republic of China as Applied to Low-Value Imports. April 7, 2025. <https://www.govinfo.gov/content/pkg/FR-2025-04-07/pdf/2025-06027.pdf>
- Feger, Arielle. "Worldwide Ecommerce Sales to Break \$6 Trillion, Make up a Fifth of Total Retail Sales." *eMarketer*, March 19, 2024. <https://www.emarketer.com/content/worldwide-ecommerce-sales-break-6-trillion>.
- Guo, Jia, Yu Li, Yujing Xu, and Kai Zeng. "How Live Streaming Features Impact Consumers' Purchase Intention in the Context of Cross-Border E-Commerce? A Research Based on SOR Theory." *Frontiers in Psychology* 12 (November 4, 2021). <https://doi.org/10.3389/fpsyg.2021.767876>.
- Guo, Yuchen. "The Study on the Development Trends of Cross-Border E-Commerce Platforms." *Highlights in Business, Economics and Management* 41 (October 15, 2024): 229–37. <https://doi.org/10.54097/8pe3n041>.
- Nosowitz, Dan, and Michael Goodwin. "What Is EDI?" IBM, July 30, 2025. <https://www.ibm.com/think/topics/edi-electronic-data-interchange>.

Behind the Trade: An Inside Look at U.S. Industry Trends

Influencer Marketing Hub. “What Is Influencer Marketing?—The Ultimate Guide for 2025.” February 5, 2025. <https://influencermarketinghub.com/influencer-marketing/>.

Infoway, Sakshi. “The Impact of 5G on E-Commerce: Faster Speeds, Better Experiences.” *Medium*. February 27, 2024. <https://medium.com/@sakshiinfoway/the-impact-of-5g-on-e-commerce-faster-speeds-better-experiences-23e95cf82>.

International Post Corporation (IPC). “Cross-Border E-Commerce Shopper Survey 2024.” January 2025. <https://www.ipc.be/services/business-framework/cross-border-shopper-survey>. International Post Corporation (IPC). “Cross-Border E-Commerce Shopper Survey 2021.” January 2022.

J.P. Morgan. “Global E-Commerce Trends Report.” 2021. <https://www.jpmorgan.com/payments/global-ecommerce-trends-report>.

Jungle Scout. *2024 State of the Amazon Seller Report*. 2024. <https://www.junglescout.com/resources/reports/amazon-seller-report-2024/>

Kangur, Karl. “Ecommerce Logistics: Challenges and Solutions for 2024.” *Global Trade Magazine*, May 6, 2024. <https://www.globaltrademag.com/ecommerce-logistics-challenges-and-solutions-for-2024/>.

Organisation for Economic Co-operation and Development (OECD). *OECD Guide to Measuring the Information Society 2011*. July 26, 2011. https://www.oecd.org/content/dam/oecd/en/publications/reports/2011/07/oecd-guide-to-measuring-the-information-society-2011_g1g139a7/9789264113541-en.pdf.

Organisation for Economic Co-operation and Development (OECD). *Handbook on Measuring Digital Trade, Second Edition*. July 28, 2023. https://www.oecd.org/en/publications/handbook-on-measuring-digital-trade-second-edition_ac99e6d3-en.html.

Reuters, “Group of WTO states agrees not to impose e-commerce duties,” April 2, 2026. <https://www.reuters.com/world/asia-pacific/group-wto-states-agrees-not-impose-e-commerce-duties-2026-04-02/>

Santillana Linares, and Maria Gracia. “The World’s Largest Retailers 2025: Amazon Tops List Of Global Retailers Ahead Of Tariff Impact.” *Forbes*, June 12, 2025. <https://www.forbes.com/sites/mariagraciasantillanalinares/2025/06/12/the-worlds-largest-retailers-2025-amazon-tops-list-of-global-retailers-ahead-of-tariff-impact/>.

Sharabi, Corinne. “The Role of AI and Automation in Localization.” *GetBlend*, September 25, 2024. <https://www.getblend.com/blog/ai-automation-in-localization/>.

Statista. *B2B eCommerce - In-Depth Market Insights & Data Analysis*. 2023. <https://www.statista.com/study/44442/in-depth-report-b2b-e-commerce/>.

Statista. *eCommerce: Market Data & Analysis*. December 2024. <https://www.statista.com/study/42335/ecommerce-report/>.

- Statista. "Global: Most Downloaded Shopping Apps 2024." June 24, 2025. <https://www.statista.com/statistics/1428596/most-downloaded-shopping-apps-worldwide/>.
- Statista. "Live Commerce." 2025 <https://www.statista.com/study/105870/live-commerce/>.
- Statista. "Online Travel Market Size Worldwide from 2017 to 2024, with a Forecast Until 2030." July 21, 2025. <https://www.statista.com/statistics/1179020/online-travel-agent-market-size-worldwide/>.
- Statista. *B2B E-Commerce - In-Depth Market Insights & Data Analysis*. August 27, 2025. <https://www.statista.com/study/44442/in-depth-report-b2b-e-commerce/>.
- Statista. "eServices." September 2025. <https://www.statista.com/outlook/emo/eservices/worldwide>.
- The Paypers. "Cross-Border Payments and Ecommerce Report 2023–2024." December 18, 2023. <https://thepayers.com/payments/reports/cross-border-payments-and-ecommerce-report-20232024>.
- The Paypers. "Global Ecommerce Report 2025." December 4, 2024. <https://thepayers.com/payments/reports/global-ecommerce-report-2025>.
- United Nations Conference on Trade and Development (UNCTAD). *Digital Economy Report 2024: Sharing an Environmentally Sustainable and Inclusive Digital Future*. 2024. <https://unctad.org/publication/digital-economy-report-2024>.
- United Nations Conference on Trade and Development (UNCTAD). *Business E-Commerce Sales and the Role of Online Platforms*. June 13, 2024. https://unctad.org/system/files/official-document/dtlecde2024d3_en.pdf.
- U.S. Customs and Border Patrol (CBP). "De Minimis Statistics." Accessed August 7, 2025. <https://www.cbp.gov/trade/basic-import-export/e-commerce>.
- U.S. Department of Commerce (USDOC). International Trade Administration (ITA). "2024 eCommerce Sales & Size Forecast." Accessed August 7, 2025. <https://www.trade.gov/ecommerce-sales-size-forecast>.
- U.S. International Trade Commission (USITC). *Recent Trends in U.S. Services Trade: 2023 Annual Report*. May 2023. https://www.usitc.gov/publications/industry_econ_analysis_332/2023/recent_trends_us_services_trade_2023_annual_report.
- Visa. *2025 Global eCommerce Payments & Fraud Report*. 2025. <https://www.visaacceptance.com/en-us/insights/fraud-report.html>.
- Wiyata, Jack Shih-Chieh Hsu, Yu Wen Hung, and Chao-Min Chiu. "Cross-Border Social Commerce: From a Trust Transfer Perspective | JECR." *Journal of Electronic Commerce Research* 23, no. 2 (2022). <http://www.jecr.org/node/659>.
- Zonos Docs. "Country-Specific de Minimis Values." Accessed September 20, 2024. <https://zonos.com/docs/guides/de-minimis-values>.

Chapter 9:

Disruptions in Maritime Services

Transportation services are essential to global goods trade, and when maritime capacity is disrupted, the effects ripple across supply chains. Ships move more than 80 percent of the world’s traded goods by volume. Blockades, extreme weather, infrastructure failures, or labor stoppages can delay deliveries, drive up costs, and force exporters and importers to find alternative routes on short notice.⁵⁷⁸ This chapter examines major maritime disruptions that occurred from 2022 to 2024 and considers their implications for both U.S. and global merchandise trade. The goal is to assess not only the direct impacts on shipping and logistics but also the indirect consequences for broader trade flows, market stability, and supply chain resilience.

This chapter explores five recent shocks to sea transport: the Black Sea blockade after Russia’s invasion of Ukraine, Houthi attacks in the Red Sea, drought-induced draft limits in the Panama Canal, the collapse of Baltimore’s Francis Scott Key Bridge, and labor disputes at U.S. East Coast and Gulf Coast ports. Each example shows how interruptions to maritime services can unsettle markets, trigger operational changes, and expose the strengths and weaknesses of supply chains.

Geopolitical and Conflict-Driven Disruptions

Geopolitical instability and armed conflict significantly disrupted global maritime trade between 2022 and 2024. Two of the most consequential developments during this period were Russia’s invasion of Ukraine and the escalation of Houthi attacks on commercial vessels transiting the Red Sea. Both events triggered substantial rerouting, increased costs, and market volatility, particularly for agricultural goods in the Black Sea region and oil and liquid natural gas (LNG) in the Red Sea.

Russia’s Invasion of Ukraine and Black Sea Shipping Disruption

Since Russia’s invasion of Ukraine in February 2022, commercial shipping in the Black Sea has faced elevated risk and uncertainty. Before the conflict, Ukraine supplied about 9 percent of global wheat exports and around 12 percent of corn exports; Russia together accounted for roughly 41 percent of global potash trade, 14 percent of urea, and 11 percent of phosphate fertilizer exports.⁵⁷⁹ Following

⁵⁷⁸ UNCTAD, “Shipping Data,” April 23, 2025.

⁵⁷⁹ USDA, FAS, “Ukraine Agricultural Production and Trade,” April 2022. Hebebrand and Glauber, “The Russia-Ukraine War after a Year,” March 9, 2023.

Russia's invasion, international food prices rose because agricultural products were stuck at Black Sea ports.⁵⁸⁰

The conflict hindered the movement of agricultural commodities, particularly grain and fertilizers, from Ukraine and southern Russia.⁵⁸¹ Russian naval blockades in the northwestern Black Sea restricted access to Ukraine's major grain-export routes, limiting shipments from ports such as Odesa, Chornomorsk, and Pivdennyi and forcing Kyiv to rely more heavily on Danube and overland alternatives ([figure 9.1](#)).⁵⁸²

Russia's deployment of drifting and moored naval mines in the Black Sea created persistent hazard zones that disrupted commercial shipping activity.⁵⁸³

Figure 9.1 Black Sea region, Russian occupied territory, and Ukrainian ports Chornomorsk, Odesa, and Pivdennyi



Source: ISW, "Russian Offensive Campaign Assessment," August 16, 2025.

⁵⁸⁰ Roche, "Black Sea Naval Ceasefire Opens Door," March 26, 2025.

⁵⁸¹ USDA, ERS, "Global Fertilizer Market Challenged by Russia's Invasion," September 18, 2023.

⁵⁸² Zagorodnyuk, "Putin's Black Sea Blockade Leaves Millions Facing Global Famine," May 18, 2022. BlackSeaNews, "Ukrainian Black Sea Corridor as Russia's Key Military Target. Part 5," January 21, 2025.

⁵⁸³ LaGrone, "Russia Lays Mines in Black Sea," July 19, 2023.

As Ukraine's Black Sea export routes were blocked, global buyers turned to other leading exporters to make up the difference. Canada, the United States, France, Argentina, and Australia all ramped up wheat shipments to vulnerable markets, helping global wheat exports quickly recover and stabilizing prices back to pre-invasion levels by the end of 2022. Many food-insecure countries in Africa and the Middle East diversified their sourcing to these suppliers; others leaned on stockpiled reserves and alternative grains (such as sorghum and buckwheat) to bridge temporary shortfalls.⁵⁸⁴

In August 2022, the Black Sea Grain Initiative was signed in Istanbul by Ukraine, Russia, Türkiye, and the United Nations to facilitate the safe export of grain, related foodstuffs, and fertilizer, including ammonia, from Chornomorsk, Odesa, and Pivdennyi.⁵⁸⁵ The deal safely funneled roughly 1,004 commercial vessels—about 2.8 ships per day—through the Ukrainian ports between August 2022 and July 2023, when Russia withdrew and the agreement collapsed.⁵⁸⁶ Ukraine swiftly established its own “maritime corridor” by deploying minehunters to clear shipping lanes and coordinating naval escorts to shepherd commercial vessels through the Black Sea—boosting average daily transits to 8.3 ships in 2024.⁵⁸⁷ By the middle of 2024, Ukraine's Black Sea ports were near pre-invasion shipping levels, enabling the country to resume large-scale grain exports.⁵⁸⁸ Russia intensified attacks on foreign-flagged merchant vessels and Ukrainian port infrastructure in early October 2024, striking multiple Greater Odesa ports over several days.⁵⁸⁹ Although Russian threats to the shipping corridor persisted through 2024, Ukrainian ports handled a 56.8 percent increase in cargo in 2024 than the previous year ([figure 9.2](#)).

⁵⁸⁴ Ulybina and Rastogi, “Global Wheat Shipments Withstood the Shock,” February 22, 2024.

⁵⁸⁵ UN, JCC, “Black Sea Grain Initiative,” July 22, 2022.

⁵⁸⁶ BlackSeaNews, “Ukrainian Black Sea Corridor as Russia's Key Military Target. Part 5,” January 21, 2025.

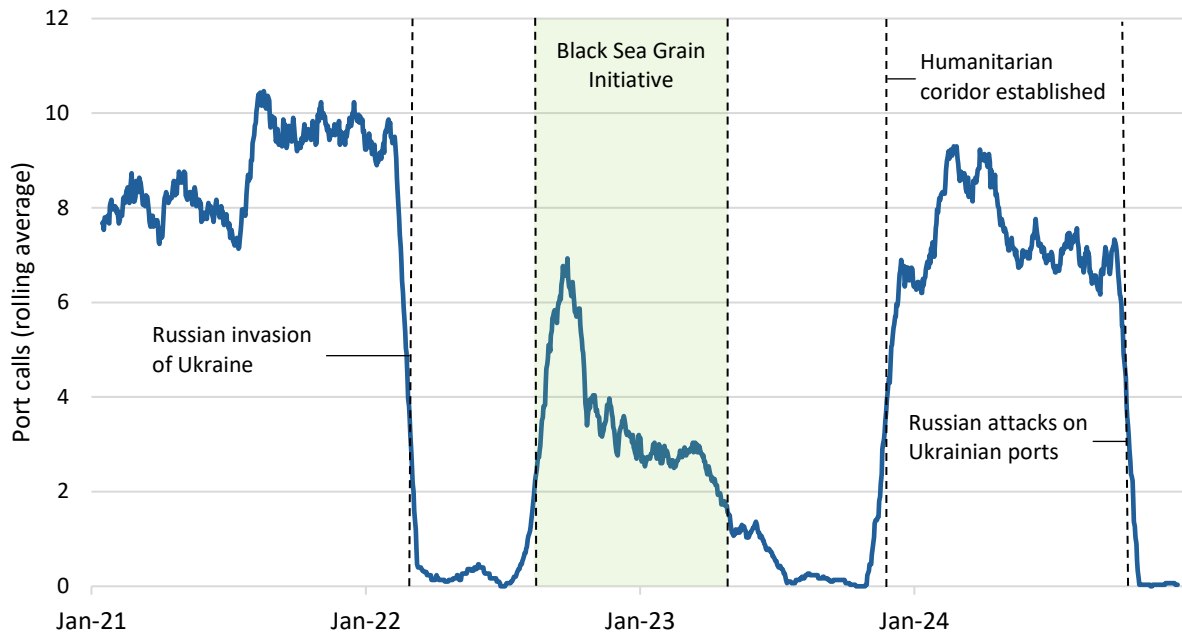
⁵⁸⁷ BlackSeaNews, “Ukrainian Black Sea Corridor as Russia's Key Military Target. Part 5,” January 21, 2025.

⁵⁸⁸ British intelligence, “Ukraine Resumes Exports from Black Sea Ports,” May 22, 2024.

⁵⁸⁹ Government of Ukraine, Shipping Administration, “Russia Relentlessly Increases Attacks,” October 14, 2024.

Figure 9.2 Daily port calls from Ukrainian ports Chornomorsk, Odesa, and Pivdennyi, 30-day rolling average, 2021–24

In number of port calls.



Source: IMF, PortWatch database, accessed August 18, 2025.

Notes: Author calculation of 30-day rolling average. For Ukrainian ports, PortWatch registers nearly zero calls after October 9, 2024, because of methodological and coverage limitations. PortWatch compiles daily port activity and trade estimates using global Automatic Identification System (AIS) vessel-tracking data, processed through United Nations Global Platform feeds and refined by the International Monetary Fund's own classification and estimation models. Gaps can occur when AIS coverage is disrupted, when vessels switch off or fail to transmit signals, or when classification rules exclude certain domestic or transit calls. Official Ukrainian Sea Ports Authority statistics show that seaports handled 97 million tons of cargo in 2024 (including 76 million tons of exports) and continued operating in 2025 despite the invasion.⁵⁹⁰

The primary U.S. exposure came about because of the initial shock of higher global food and fertilizer prices related to sanctions on Russia, which raised costs for American farmers and consumers in 2022.⁵⁹¹ The United States also played a stabilizing role by increasing wheat exports to offset global shortfalls, helping prices return to pre-invasion levels by year-end 2022.⁵⁹²

⁵⁹⁰ *Odessa Journal*, "Ukrainian Ports Handled Over 97 Million Tons of Cargo," January 21, 2025.

⁵⁹¹ St. Louis Fed, "The Russia-Ukraine War's Impact on Fertilizer Prices in 2022," April 4, 2023.

⁵⁹² Ulybina and Rastogi, "Global Wheat Shipments Withstood the Shock," February 22, 2024.

Red Sea Houthi Attacks

The Red Sea is a critical maritime corridor linking Europe and Asia via the Suez Canal at the Mediterranean Sea and the Bab al Mandab Strait at the Gulf of Aden ([figure 9.3](#)). The Red Sea also serves as an alternative route between Asia and the U.S. East Coast and Gulf Coast ports when the Panama Canal operations are limited. The Red Sea passage cuts up to four days off U.S. Gulf Coast–Asia voyages and as much as 14 days off Europe–China voyages, compared with rerouting around Africa’s Cape of Good Hope.⁵⁹³

⁵⁹³ Energy, EIA, “Red Sea Attacks Increase Shipping Times and Freight Rates,” February 1, 2024.

Figure 9.3 Maritime chokepoints in the Red Sea region



Source: Institute for the Study of War, "Russian Offensive Campaign Assessment," August 16, 2025.

In the first half of 2023, the Red Sea handled roughly 12 percent of all seaborne oil exports, crude oil, and refined petroleum products and about 8 percent of global LNG shipments, underscoring its influence

on transcontinental energy flows.⁵⁹⁴ In the same time period, around 74 percent of all oil moving south through the Suez Canal was Russian crude—up from about 30 percent in 2021 because Western sanctions redirected Russia’s exports primarily to India and China. Europe’s shift to import more oil from the Middle East as a result of Western sanctions also increased reliance on the Red Sea passage.⁵⁹⁵ During 2022 and 2023, Saudi Arabia and the United Arab Emirates bought more Russian refined products, pushing up Red Sea transit.⁵⁹⁶ In 2023, drought-induced draft restrictions at the Panama Canal forced a portion of U.S. crude oil and petroleum product exports to Asia to reroute through the Suez Canal, further increasing transit volumes in the Red Sea.⁵⁹⁷

Beginning in late 2023 and escalating through 2024, Houthi militants in Yemen launched targeted attacks on commercial shipping in the Red Sea, aiming to pressure Western-aligned nations over their support for Israel.⁵⁹⁸ The threat to vessel safety, particularly near the Bab al Mandab Strait,⁵⁹⁹ forced major shipping lines to suspend transits through the Red Sea and reroute vessels around the Cape of Good Hope.⁶⁰⁰ According to industry insurers, war-risk surcharges for Red Sea voyages jumped to roughly 0.5–1.0 percent of a vessel’s hull and machinery value, compared to 0.0001 percent in the Persian Gulf.⁶⁰¹ By mid-2024, transit through the Suez Canal and Bab al Mandab Strait had fallen by approximately 50 percent compared to late 2023 ([figure 9.4](#)).⁶⁰²

⁵⁹⁴ Energy, EIA, “Red Sea Chokepoints Are Critical,” December 4, 2023.

⁵⁹⁵ Energy, EIA, “Red Sea Chokepoints Are Critical,” December 4, 2023.

⁵⁹⁶ Energy, EIA, “Red Sea Chokepoints Are Critical,” December 4, 2023.

⁵⁹⁷ Energy, EIA, “Red Sea Attacks Increase,” February 1, 2024.

⁵⁹⁸ Taylor, “Houthi Attacks Sink Ship in Red Sea Amid Renewed Threats,” July 7, 2025.

⁵⁹⁹ USDOT, MARAD, “2024-001-Southern Red Sea . . . Threats to Commercial Vessels,” February 2, 2024.

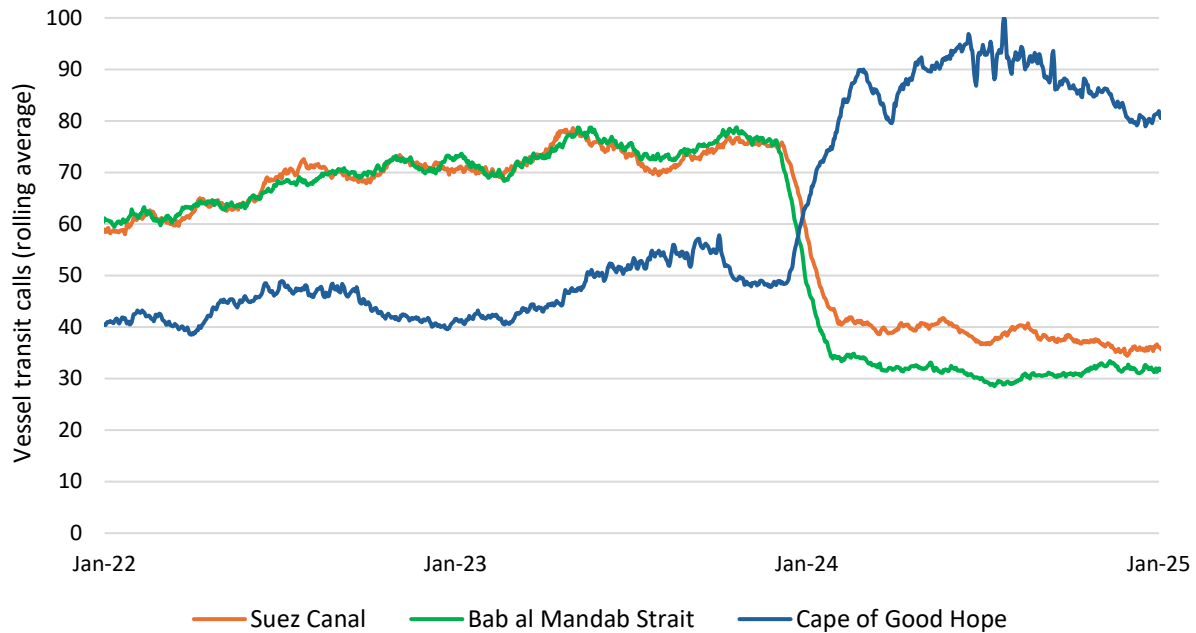
⁶⁰⁰ S&P Global, “Cape of Good Hope Reroutes Likely to Persist,” September 25, 2024.

⁶⁰¹ S&P Global, “Cape of Good Hope Reroutes Likely to Persist,” September 25, 2024.

⁶⁰² IMF, Portwatch database, accessed August 18, 2025.

Figure 9.4 Daily vessel transit calls, 30-day rolling average, January 2022–July 2025

In number of calls.



Source: IMF, PortWatch database, accessed August 18, 2025.

Note: USITC staff calculation of 30-day rolling average.

Although Houthi attacks in 2023 began by targeting container vessels carrying non-energy cargo, they intensified to the point where many tankers bypassed the Bab al Mandab Strait and Suez Canal entirely.⁶⁰³ As a result of the Red Sea insecurity, energy cargoes around the Cape of Good Hope increased in volume from an average 6 million barrels per day in 2023 to over 9 million barrels per day in the first eight months of 2024, lengthening voyages by up to two weeks and inflating freight, fuel, and war-risk premiums.⁶⁰⁴

In May 2025, with transits through the Bab al Mandab Strait and southern Red Sea still around 60 percent lower than pre-Houthi strike levels, the United States executed precision air and naval strikes against Houthi coastal launch sites to secure the corridor.⁶⁰⁵ Passage through the Red Sea showed a slight uptick in July 2025 to nearly 35 transits per day, up from roughly 32 transits per day in June, with operators readying ships for a tentative return to the route.⁶⁰⁶ Egypt's 15.0 percent canal-fee discount for large containerships and ongoing EU naval escorts further incentivized shippers to return to the Red Sea.⁶⁰⁷ However, despite U.S. military efforts to secure the shipping lanes and Egypt's incentives to use

⁶⁰³ Ghaddar et al., "Oil Tankers Divert from Red Sea" January 12, 2024.

⁶⁰⁴ Energy, EIA, "Fewer Tankers Transit the Red Sea in 2024," October 11, 2024.

⁶⁰⁵ Hatem and Dagher, "US Steps up Houthi Campaign," April 18, 2025. Lloyd's List, "Red Sea Traffic Remains 60% Lower than Normal," June 10, 2025.

⁶⁰⁶ Lloyd's List, "Red Sea Traffic Remains Unchanged," July 15, 2025.

⁶⁰⁷ Ahram Online, "Suez Canal Offers 90-Day 15% Discount on Transit Fees," May 13, 2025; EEAS, "EUNAVFOR Operation ASPIDES," February 22, 2024.

the Red Sea, CEOs of major shipping companies Maersk and Hapag-Lloyd expect that diversions around the southern tip of Africa will continue into 2026.⁶⁰⁸

The Red Sea crisis has severely disrupted Europe-Asia trade routes, though the impact on American supply chains has been limited.⁶⁰⁹ U.S. exporters of LNG to Asia have faced longer voyages and higher freight costs when forced to bypass the Suez Canal, particularly during Panama Canal restrictions.⁶¹⁰ For U.S. importers, most consumer goods still arrive via Pacific routes, meaning the disruption is indirect, felt mainly through higher global shipping rates and insurance premiums rather than outright shortages.⁶¹¹

Operational and Logistical Disruptions

Operational and infrastructure-related incidents in 2024 tested U.S. supply chain resilience. Disruptions from 2023 include the drought in Panama, the collapse of the Francis Scott Key Bridge in Baltimore, and prolonged labor tensions along the U.S. East Coast and Gulf Coast. These had notable impacts on regional trade flows, port productivity, and inland transportation networks.

Panama Canal Drought Following 2023 El Niño

El Niño events, which are characterized by periodic warming of ocean surface temperatures in the equatorial Pacific Ocean, occur every two to seven years and significantly alter the climate patterns of the Western Hemisphere. Particularly, the warm equatorial ocean surface temperature correlates with drier conditions in Central America, resulting in low water levels in Gatún Lake, the primary freshwater reservoir supplying the Panama Canal's lock system. The 2023 El Niño event brought some of the lowest rainfall to Panama since 1950, drastically reducing water levels in Gatún Lake.⁶¹²

Effective May 30, 2023, the Autoridad del Canal de Panamá (Panama Canal Authority) capped the Neopanamax locks draft—the vertical distance from a vessel's keel to the waterline—at 44 feet due to the drought, down from the normal 50 feet, restricting the volume of cargo that could be transported through the canal.⁶¹³ By January 2024, average daily transits had dropped from the normal 30–35 vessels per day to as few as 19 ([figure 9.5](#)).⁶¹⁴ Vessels that exceeded the new draft limits were forced to

⁶⁰⁸ Murray, “Red Sea Diversions to Enter a Third Year, CEO Says,” August 14, 2025.

⁶⁰⁹ JPMorgan Chase & Co. , “The Impacts of the Red Sea Shipping Crisis,” February 8, 2024.

⁶¹⁰ S&P Global, “US Exports Record Number of LNG Cargoes,” March 27, 2024.

⁶¹¹ JPMorgan Chase & Co. , “The Impacts of the Red Sea Shipping Crisis,” February 8, 2024.

⁶¹² Government of Panama, ACP, “The Driest Month of October Since 1950,” October 31, 2023.

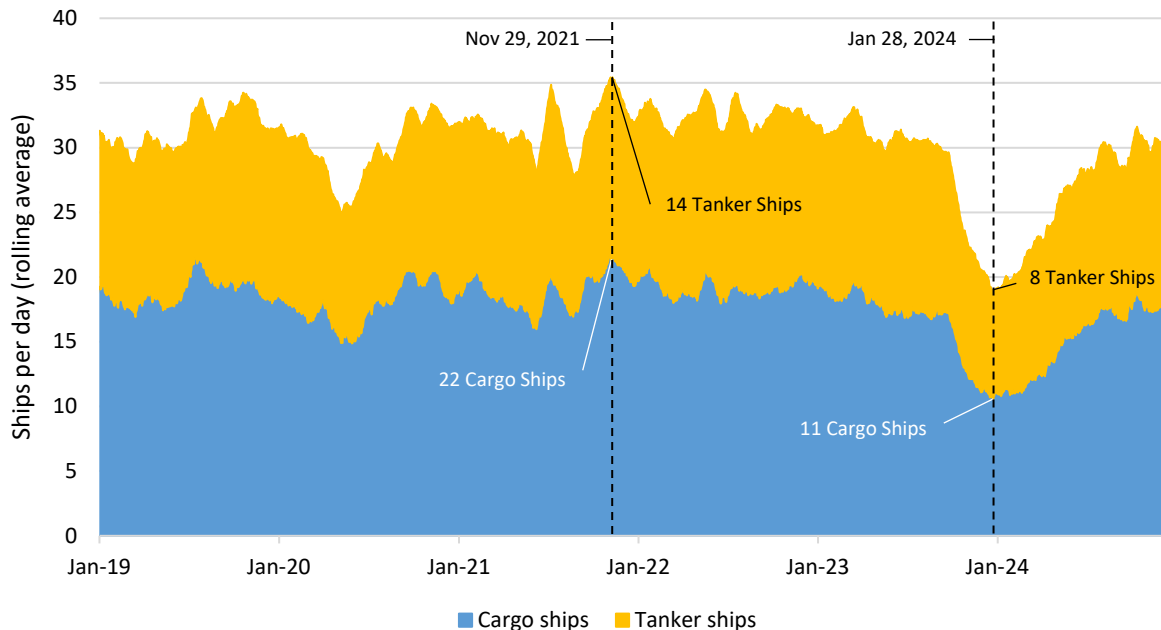
⁶¹³ The 2016 Panama Canal Expansion added a third set of lock chambers at both the Atlantic and Pacific entrances, roughly doubling the original locks' dimensions. These enlarged chambers are what accommodate “Neopanamax” vessels—ships capable of carrying up to about 14,000 twenty-foot equivalent units (TEUs)—whereas the original Panamax locks were limited to ships of roughly 5,000 TEUs. *Maritime Executive*, “Panama Canal Commemorates Seventh Anniversary of the Neopanamax Locks,” July 4, 2023. Government of Panama, ACP, “Panama Canal Maintains Competitive Draft,” July 25, 2023.

⁶¹⁴ IMF, PortWatch database, “Shipping Restrictions to Panama Canal due to Drought,” August 5, 2024.

offload cargo, delay departure, or reroute entirely—typically around South America’s Cape Horn or through intermodal land bridges.⁶¹⁵

Figure 9.5 Panama Canal vessels per day, 30-day rolling average, 2019–24

In number of ships.



Source: IMF, PortWatch database, accessed August 18, 2025.

Note: USITC staff calculation of 30-day rolling average.

The Panama Canal’s drought-era draft restrictions and reduced daily transits disrupted Asia-originated container shipments to U.S. Gulf Coast and East Coast ports.⁶¹⁶ To offset lost cargo space and low-water inefficiencies, carriers announced an additional drought surcharge and general rate increases on Asia-U.S. canal routings in mid-2023. Faced with higher transit fees and extended queues, shippers began rerouting Asia-U.S. services via the Suez Canal to avoid the Panama bottleneck.⁶¹⁷ In 2023, voyages from the United States to Asia via the Panama Canal fell approximately 7 percent year over year and Suez Canal transits rose around 35 percent.⁶¹⁸ Ports in New Orleans, and Baton Rouge saw disruptions in agricultural exports bound for Asia via the canal.⁶¹⁹ Ships carrying agriculture to Asia often opted to route through the Suez Canal, contributing to delays and higher prices.⁶²⁰ Amid escalating canal tolls—which ranged from \$15,000 for smaller “regular” vessels to up to \$300,000 for larger Neopanamax ships

⁶¹⁵ InterlogUSA, “Draft Restrictions at the Panama Canal Have Eased,” June 13, 2024.

⁶¹⁶ USDOT, BTS, “U.S. Trade and the Impact of Low Water,” December 2, 2024.

⁶¹⁷ S&P Global, “US LNG Flows to Asia Adapt in 2023,” January 17, 2024.

⁶¹⁸ S&P Global, “US LNG Flows to Asia Adapt in 2023,” January 17, 2024.

⁶¹⁹ USDOT, BTS, “U.S. Trade and the Impact of Low Water,” December 2, 2024.

⁶²⁰ USDOT, BTS, “U.S. Trade and the Impact of Low Water,” December 2, 2024.

in 2024—some carriers bypassed the Panama Canal entirely, sailing around the tip of South America.⁶²¹ The southern detour adds 15 extra days at sea.⁶²²

Francis Scott Key Bridge Collapse

On March 26, 2024, the Francis Scott Key Bridge in Baltimore, Maryland, collapsed after the container ship *Dali* lost electrical power and veered off course, striking one of the bridge’s support piers. The impact caused a substantial portion of the bridge to collapse into the Patapsco River, with portions of the pier, deck, and truss spans falling onto the vessel’s bow and forwardmost container bays.⁶²³ The collapse blocked access in and out of the Port of Baltimore, stranding vessels and forcing carriers to divert shipments to other East Coast ports.⁶²⁴

Baltimore is the top U.S. port for automobile imports and exports. In 2023, it handled nearly 400,000 automobiles—more than any other U.S. port—for the 13th consecutive year.⁶²⁵ In April 2023, the Port of Baltimore handled \$1.7 billion in automobile imports.⁶²⁶ In April 2024, with the Port of Baltimore closed due to the bridge collapse, those imports were diverted mainly to four other East Coast ports: New York and New Jersey, Charleston, Brunswick, and Jacksonville. Brunswick’s increase of \$794 million in automobile imports in April 2024, in comparison to April 2023, was the largest of the ports. New York and New Jersey saw an increase of \$546 million in April 2024, followed by Charleston (\$110 million) and Jacksonville (\$81 million). In aggregate, the four ports increased their automobile imports by \$1.5 billion in April 2024 in response to the closing of the Port of Baltimore ([figure 9.6](#)).⁶²⁷ Although rerouting added costs and extended transit times, the auto industry was cushioned by high inventory levels and softened demand due to elevated interest rates.⁶²⁸ The inventory-to-sales ratio had stabilized near its long-term average of 1.96 to 1, and sales incentives were rising, helping to absorb the disruption without triggering widespread shortages or price hikes.⁶²⁹

⁶²¹ Government of Panama, Autoridad del Canal de Panamá, “Maritime Tariff List,” January 1, 2024.

⁶²² *Maritime Executive*, “Panama Canal Commemorates Seventh Anniversary of the Neopanamax Locks,” July 4, 2023.

⁶²³ NTSB, “Contact of Containership Dali with Francis Scott Key Bridge and Subsequent Bridge Collapse,” March 20, 2025.

⁶²⁴ Grabenstein, “How Baltimore’s Key Bridge Collapse Will Affect Supply Chains and the Economy,” March 28, 2024.

⁶²⁵ Clarion Partners, “Supply Chain Impacts of Baltimore Bridge Collapse,” April 23, 2024.

⁶²⁶ U.S. Census Bureau, Economic Indicators Division, USA Trade Online, U.S. import and export merchandise trade statistics, HS 8703.

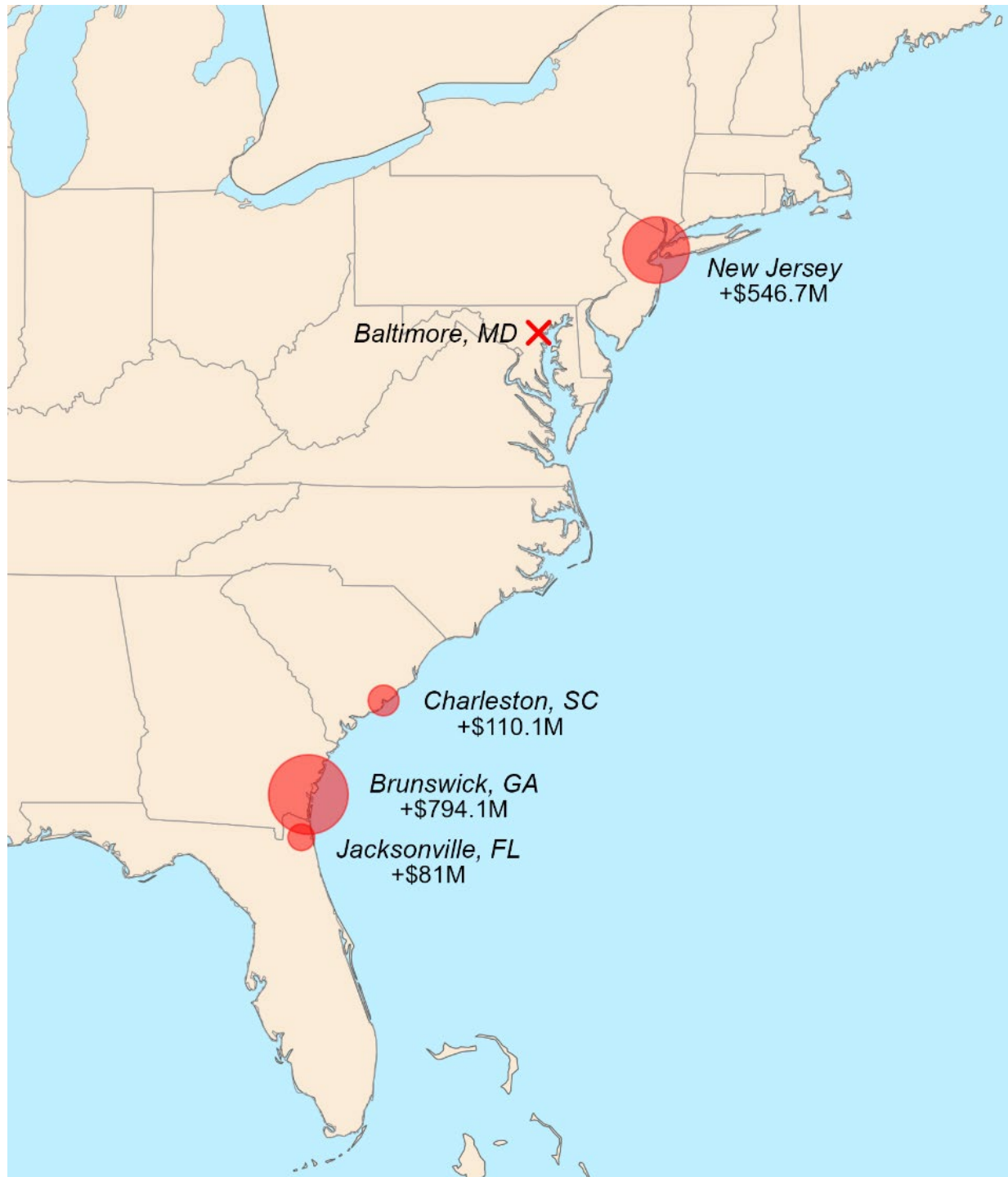
⁶²⁷ U.S. Census Bureau, Economic Indicators Division, USA Trade Online, U.S. import and export merchandise trade statistics, HS 8703.

⁶²⁸ Buchanan, “Auto Market Could Favor Buyers in 2024 as High Inventories Push Prices Down, Incentives Up,” January 17, 2024.

⁶²⁹ CCC Intelligent Solutions, “The Key Bridge Collapse and Its Impact on the Auto Industry,” April 1, 2024.

Figure 9.6 Year-over-year increase of auto imports at selected U.S. East Coast ports, customs value, April 2024 import values compared to April 2023

In millions of dollars.



Source: U.S. Census Bureau, Economic Indicators Division, USA Trade Online, U.S. import and export merchandise trade statistics, HS 8703.

Despite being the most prominent U.S. port for automotive trade, the Port of Baltimore's relatively modest container volume compared to other East Coast ports lessened the economic impact of the

bridge collapse. The port handled only 793,000 twenty-foot equivalent unit (TEU) shipping containers in 2023—far fewer than the more than 5 million processed at the Port of New York and New Jersey.⁶³⁰ Rail operators CSX and Norfolk Southern helped mitigate congestion by launching emergency services to move freight inland, so shipments could be absorbed without overwhelming rerouted shipments at receiving terminals.⁶³¹ Most sectors experienced only temporary disruptions, and added costs were minimal or nonexistent.⁶³²

Port operations at the Port of Baltimore resumed on June 11, 2024, when the Fort McHenry Federal Channel was fully restored to its original dimensions—700 feet wide and 50 feet deep—allowing two-way traffic for large commercial vessels.⁶³³

Box 9.1 Labor Disruptions and Contract Negotiations at East Coast and Gulf Coast Ports

In 2023 and 2024, labor contract negotiations between the International Longshoremen’s Association (ILA), a labor union representing longshore workers, and the U.S. Maritime Alliance (USMX), the seaport operators, raised fears of strikes and work stoppages at U.S. East Coast and Gulf Coast ports. Those concerns materialized on October 1, 2024, when the labor contract officially expired, and ILA workers launched a strike that halted operations at ports along the East Coast and Gulf Coast.^a The strike lasted three days until the ILA and the USMX agreed to a temporary extension on October 3, 2024, reopening ports the following day. On January 8, 2025, the two sides agreed to a six-year deal to keep ports open.^b In anticipation of disruption, retailers and carriers prepared to use alternative transportation networks, including air freight, transshipment, and inland rail routes from Canada, Mexico, and West Coast ports.^c Rerouting shipments creates delays and additional costs, and the major shift in logistics would strain port and rail infrastructure—inefficiencies which would create shortages and a premium on freight, contributing to inflationary prices for consumers.

The October 2024 strike raised concerns about supply chain disruptions, inventory shortages, and inflationary pressures, but its short duration ultimately yielded little economic disruption.^d Notably, the energy sector remained shielded from consequences of the strike, as key fuel shipments—including crude oil, gasoline, and natural gas—continued uninterrupted because these energy commodities are managed by separate personnel that were not participating in the strike.^e

^a Ports included Baltimore, Boston, Charleston, Houston, Jacksonville, Miami, Mobile, Montreal, New Orleans, New York and New Jersey, Norfolk, Philadelphia, Port Everglades, Port of Virginia, Savannah, Tampa, and Wilmington.

^b ILA and USMX, “ILA-USMX Joint Statement,” January 8, 2025.

^c Project44, “ILA Strike Ends after Three Days of Closures,” October 3, 2024.

^d Daco, “Economic Impact of the Ports Strike,” October 3, 2024.

^e Energy, “U.S. Department of Energy Statement on East Coast and Gulf Coast Ports,” October 1, 2024.

⁶³⁰ Clarion Partners, “Supply Chain Impacts of Baltimore Bridge Collapse,” April 23, 2024.

⁶³¹ Lester, “Ripple Effects of Baltimore Bridge Collapse,” April 3, 2024.

⁶³² Grabenstein, “How Baltimore’s Key Bridge Collapse Will Affect Supply Chains,” March 28, 2024.

⁶³³ MDOT, “Governor Moore Announces the Full Reopening,” June 12, 2024.

Bibliography

- Ahram Online. "Suez Canal Offers 90-Day 15% Discount on Transit Fees for Large Container Ships - Urban & Transport - Egypt." May 13, 2025. <https://english.ahram.org.eg/NewsContent/1/1235/546159/Egypt/Urban--Transport/UPDATED-Suez-Canal-offers-day--discount-on-transit.aspx>.
- Government of Panama. Autoridad del Canal de Panamá. "Panama Canal Maintains Competitive Draft for the Following Months." July 25, 2023. <https://pancanal.com/en/panama-canal-maintains-competitive-draft-for-the-following-months/>.
- Government of Panama. Autoridad del Canal de Panamá. "Maritime Tariff List." January 1, 2024.
- BlackSeaNews. "Ukrainian Black Sea Corridor as Russia's Key Military Target. Part 5." January 21, 2025. <https://www.blackseanews.net/en/read/226674>.
- RBC-Ukraine. "Ukraine Resumes Exports from Black Sea Ports." May 22, 2024. <https://newsukraine.rbc.ua/news/ukraine-resumes-exports-from-black-sea-ports-1716372246.html>.
- Buchanan, Naomi. "Auto Market Could Favor Buyers in 2024 as High Inventories Push Prices Down, Incentives Up." Investopedia, January 17, 2024. <https://www.investopedia.com/auto-market-could-favor-buyers-in-2024-as-high-inventories-push-prices-down-incentives-up-8425328>.
- U.S. Department of Transportation (USDOT). Bureau of Transportation Statistics (BTS). "U.S. Trade and the Impact of Low Water Levels in Gatun Lake and the Panama Canal." December 2, 2024. <https://www.bts.gov/data-spotlight/us-trade-and-impact-low-water-levels-gatun-lake-and-panama-canal>.
- CCC Intelligent Solutions. "The Key Bridge Collapse and Its Impact on the Auto Industry." April 1, 2024. <https://www.cccis.com/news-and-insights/posts/the-key-bridge-collapse-and-its-impact-on-the-auto-industry>.
- Clarion Partners. "Supply Chain Impacts of Baltimore Bridge Collapse." April 23, 2024. <https://www.clarionpartners.com:443/insights/francis-scott-key-bridge-collapse>.
- Daco, Gregory. "Economic Impact of the Ports Strike." Ernst & Young LLP, October 3, 2024. https://www.ey.com/en_us/insights/strategy/macro-economics/economic-impact-of-the-ports-strike.
- U.S. Department of Energy (Energy). "U.S. Department of Energy Statement on East Coast and Gulf Coast Ports." October 1, 2024. <https://www.energy.gov/articles/us-department-energy-statement-east-coast-and-gulf-coast-ports>.
- U.S. Department of Agriculture (USDA). Economic Research Service (ERS). "Global Fertilizer Market Challenged by Russia's Invasion of Ukraine." September 18, 2023. <https://www.ers.usda.gov/amber-waves/2023/september/global-fertilizer-market-challenged-by-russia-s-invasion-of-ukraine>.

European External Action Service (EEAS). “EUNAVFOR Operation ASPIDES.” February 22, 2024. https://www.eeas.europa.eu/eunavfor-aspides_en?s=410381.

Potter, Ben. “Why U.S. Farmers Should Still Care about Ukraine.” Farm Progress. *Farm Futures*, December 4, 2025. <https://www.farmprogress.com/commentary/why-u-s-farmers-should-still-care-about-ukraine>.

Federal Reserve Bank of St. Louis (St. Louis Fed). “The Russia-Ukraine War’s Impact on Fertilizer Prices in 2022.” April 4, 2023. <https://www.stlouisfed.org/on-the-economy/2023/apr/russia-ukraine-war-impact-fertilizer-prices-2022>.

U.S. Department of Agriculture (USDA). Foreign Agricultural Service (FAS). “Ukraine Agricultural Production and Trade.” April 2022. <https://www.fas.usda.gov/sites/default/files/2022-04/Ukraine-Factsheet-April2022.pdf>.

Ghaddar, Ahmad, Robert Harvey, and Jonathan Saul. “Oil Tankers Divert from Red Sea after US, UK Strikes in Yemen.” Reuters, January 12, 2024. <https://www.reuters.com/world/middle-east/oil-tankers-divert-red-sea-after-us-uk-strikes-yemen-2024-01-12/>.

Grabenstein, Hannah. “How Baltimore’s Key Bridge Collapse Will Affect Supply Chains and the Economy.” PBS News, March 28, 2024. <https://www.pbs.org/newshour/nation/how-baltimores-key-bridge-collapse-will-affect-supply-chains-and-the-economy>.

Hatem, Mohammed, and Sam Dagher. “US Steps up Houthi Campaign with Deadly Strikes on Red Sea Oil Port.” April 18, 2025. <https://www.bloomberg.com/news/articles/2025-04-18/us-steps-up-houthi-campaign-with-deadly-strikes-on-red-sea-oil-port>.

International Monetary Fund (IMF). PortWatch database. “Shipping Restrictions to Panama Canal due to Drought.” August 5, 2024. <https://portwatch.imf.org/pages/7d4b0062e46c5bbc862d4c3ce1d4b>.

InterlogUSA. “Draft Restrictions at the Panama Canal Have Eased, What Lies Ahead?” June 13, 2024. <https://www.interlogusa.com/answers/blog/ocean-draft-restrictions-at-the-panama-canal-have-eased-what-lies-ahead/>.

Hebebrand, Charlotte, and Joseph Glauber. “The Russia-Ukraine War after a Year: Impacts on Fertilizer Production, Prices, and Trade Flows.” International Food Policy Research Institute. *IFPRI Blog*. March 9, 2023. <https://www.ifpri.org/blog/russia-ukraine-war-after-year-impacts-fertilizer-production-prices-and-trade-flows/>.

International Longshoremen’s Association (ILA) and Maritime Alliance (USMX). “ILA-USMX Joint Statement.” January 8, 2025.

JPMorgan Chase & Co. “The Impacts of the Red Sea Shipping Crisis.” February 8, 2024. <https://www.jpmorgan.com/insights/global-research/supply-chain/red-sea-shipping>.

Kintetsu World Express. “US West Coast Port Labor Disruptions, Panama Canal Draft Restrictions Impact Supply Chains.” June 8, 2023. <https://www.kwe.com/updates/advisory/ca06082023.html>.

- LaGrone, Sam. "Russia Lays Mines in Black Sea to Block Ukrainian Ports, NSC Says." U.S. Naval Institute. *USNI News*, July 19, 2023. <https://news.usni.org/2023/07/19/russia-says-all-ships-in-the-black-sea-heading-to-ukraine-are-potential-carriers-of-military-cargo>.
- Lester, David C. "Ripple Effects of Baltimore Bridge Collapse on Rail Industry and Supply Chains." RT&S, April 3, 2024. <https://www.rtands.com/freight/ripple-effects-of-baltimore-bridge-collapse-on-rail-industry-and-supply-chains/>.
- Lloyd's List. "Red Sea Traffic Remains 60% Lower than Normal Volumes." June 10, 2025. <https://www.lloydslist.com/LL1153796/Red-Sea-traffic-remains-60-lower-than-normal-volumes>.
- Lloyd's List. "Red Sea Traffic Remains Unchanged by Resurgent Houthi Attacks." July 15, 2025. <https://www.lloydslist.com/LL1154224/Red-Sea-traffic-remains-unchanged-by-resurgent-Houthi-attacks>.
- Maryland Department of Transportation (MDOT). "Governor Moore Announces the Full Reopening of the Port of Baltimore." June 12, 2024. <https://www.mdot.maryland.gov/tso/pages/newsroomdetails.aspx?PageId=0&newsId=799>.
- Murray, Brendan. "Red Sea Diversions to Enter a Third Year, CEO Says: Supply Lines." August 14, 2025. <https://news.bloomberglaw.com/international-trade/red-sea-diversions-to-enter-a-third-year-ceo-says-supply-lines>.
- National Transportation Safety Board (NTSB). "Contact of Containership Dali with Francis Scott Key Bridge and Subsequent Bridge Collapse." March 20, 2025. <https://www.nts.gov/investigations/Pages/DCA24MM031.aspx>.
- Odessa Journal*. "Ukrainian Ports Handled Over 97 Million Tons of Cargo Last Year." January 21, 2025. <https://odessa-journal.com/ukrainian-ports-handled-over-97-million-tons-of-cargo-last-year>.
- project44. "ILA Strike Ends after Three Days of Closures." October 3, 2024. <https://www.project44.com/supply-chain-insights/strike-continues-among-east-and-gulf-coast-ports/>.
- Roche, Benjamin. "Black Sea Naval Ceasefire Opens Door for Ukraine Grain and Russian Exports." Chartered Institute for Export & International Trade, March 26, 2025. <https://www.export.org.uk/insights/trade-news/black-sea-naval-ceasefire-opens-door-for-ukraine-grain-and-russian-exports/>.
- Government of Panama. Autoridad del Canal de Panamá (ACP). "The Driest Month of October Since 1950." October 31, 2023. <https://pancanal.com/en/the-driest-month-of-october-since-1950/>.
- S&P Global. "US LNG Flows to Asia Adapt in 2023 as Bottlenecks Emerge." January 17, 2024. <https://www.spglobal.com/commodity-insights/en/news-research/latest-news/lng/011724-us-lng-flows-to-asia-adapt-in-2023-as-bottlenecks-emerge>.
- S&P Global. "US Exports Record Number of LNG Cargoes to Asia via Cape of Good Hope in March." March 27, 2024. <https://www.spglobal.com/energy/en/news-research/latest-news/lng/032724-us-exports-record-number-of-lng-cargoes-to-asia-via-cape-of-good-hope-in-march>.

S&P Global. "Cape of Good Hope Reroutes Likely to Persist Well into 2025 as Industry Adapts: ONE CEO." September 25, 2024. <https://www.spglobal.com/commodity-insights/en/news-research/latest-news/crude-oil/092524-cape-of-good-hope-reroutes-likely-to-persist-well-into-2025-as-industry-adapts-one-ceo>.

Taylor, Glenn. "Houthi Attacks Sink Ship in Red Sea Amid Renewed Threats." *Sourcing Journal*. July 7, 2025. <https://sourcingjournal.com/topics/logistics/red-sea-houthi-attacks-sink-ship-ocean-carriers-container-shipping-israel-msc-gps-jamming-1234754842/>.

Maritime Executive. "Panama Canal Commemorates Seventh Anniversary of the Neopanamax Locks." July 4, 2023. <https://maritime-executive.com/corporate/panama-canal-commemorates-seventh-anniversary-of-the-neopanamax-locks>.

Government of Ukraine. State Service for Maritime, Inland Waterways and Shipping of Ukraine (Shipping Administration). "Russia Relentlessly Increases Attacks against Foreign-Flagged Merchant Marine and Ukrainian Port Infrastructure." October 14, 2024. <https://marad.gov.ua/en/news/russia-relentlessly-increases-attacks-against-foreign-flagged-merchant-marine-and-ukrainian-port-infrastructure>.

Ulybina, Daria, and Cordula Rastogi. "Global Wheat Shipments Withstood the Shock of Russia's Invasion of Ukraine." *World Bank Blogs*, February 22, 2024. <https://blogs.worldbank.org/en/trade/global-wheat-shipments-withstood-shock-russias-invasion-ukraine>.

The United Nations Conference on Trade and Development (UNCTAD). "Shipping Data: UNCTAD Releases New Seaborne Trade Statistics." News release, April 23, 2025. <https://unctad.org/news/shipping-data-unctad-releases-new-seaborne-trade-statistics>.

United Nations (UN). Joint Coordination Centre (JCC). "Black Sea Grain Initiative." July 22, 2022. <https://www.un.org/en/black-sea-grain-initiative>.

U.S. Department of Transportation (USDOT). Maritime Administration (MARAD). "2024-001-Southern Red Sea, Bab El Mandeb Strait, Gulf of Aden, Northwestern Indian Ocean, Somali Basin, Arabian Sea, Gulf of Oman, Strait of Hormuz, and Persian Gulf-Threats to Commercial Vessels." February 2, 2024. <https://www.maritime.dot.gov/msci/2024-001-southern-red-sea-bab-el-mandeb-strait-gulf-aden-northwestern-indian-ocean-somali>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). "Red Sea Chokepoints Are Critical for International Oil and Natural Gas Flows." December 4, 2023. <https://www.eia.gov/todayinenergy/detail.php?id=61025>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). "Red Sea Attacks Increase Shipping Times and Freight Rates." February 1, 2024. <https://www.eia.gov/todayinenergy/detail.php?id=61363>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). "Red Sea Attacks Increase Shipping Times and Freight Rates." February 1, 2024. <https://www.eia.gov/todayinenergy/detail.php?id=61363>.

U.S. Department of Energy (Energy). Energy Information Administration (EIA). “Fewer Tankers Transit the Red Sea in 2024.” October 11, 2024. <https://www.eia.gov/todayinenergy/detail.php?id=63446>.

Zagorodnyuk, Andriy. “Putin’s Black Sea Blockade Leaves Millions Facing Global Famine.” Atlantic Council, May 18, 2022. <https://www.atlanticcouncil.org/blogs/ukrainealert/putins-black-sea-blockade-leaves-millions-facing-global-famine/>.

Chapter 10: Recent Developments in U.S. Foreign Direct Investment

Introduction

Foreign direct investment (FDI) plays a vital role in economic development, integration, and innovation. OECD defines FDI an ownership and controlling interest of 10.0 percent or more in a company or project in one country (an affiliate or host country) by an investor from another country (the parent).⁶³⁴ The ownership and control aspect of FDI is significant because it implies the investor can exert influence over the affiliate in the host country.

Inward FDI is investment from foreign companies into assets or companies (subsidiaries) in a domestic market; outward FDI is investment from a domestic company into assets or companies (subsidiaries) abroad.⁶³⁵ Investing abroad can create new opportunities for U.S. firms, including access to skilled or lower cost labor, lower production costs, benefits from local policies, favorable tax regimes, entry to large markets, and diversified supply chains. However, U.S. firms face multiple issues investing abroad including discriminatory policies, restrictions on foreign equity participation, local content requirements, technology transfer requirements, capital gains taxes, and royalties.⁶³⁶ Investors may also face issues related to the economic and political environment within the affiliate country, such as political instability, expropriation, corruption, and limited infrastructure.⁶³⁷

In both the United States and abroad, FDI is driven by a variety of factors, including labor and competitiveness factors as well as international agreements.⁶³⁸ U.S. inward investment is driven by access to an educated workforce, legal protections, and encouragement of innovation.⁶³⁹ Drivers of U.S. outward FDI include lower labor and production costs as well as more diversified supply chains; these cost savings can result in U.S. firms becoming more globally competitive and ultimately cutting costs to consumers.⁶⁴⁰ Both inward and outward FDI can have the added spillover effect of introducing more modern and efficient business or manufacturing practices into the affiliate country. This type of technology transfer can lead to improved productivity, human capital growth, and increased innovation. Additionally, job creation as a result of FDI can lead to the introduction of higher-wage jobs into a

⁶³⁴ OECD, "Benchmark Definition of Foreign Direct Investment," 2025.

⁶³⁵ World Bank, "What Is the Difference between Foreign Direct Investment (FDI) Net Inflows and Net Outflows?" accessed August 8, 2025.

⁶³⁶ Weiss et al., *International Investment Agreements (IIAs)*, April 30, 2015, 4–5.

⁶³⁷ Weiss et al., *International Investment Agreements (IIAs)*, April 30, 2015, 4–5.

⁶³⁸ Oldenski and Moran, "The Economic Impact of Inward FDI on the US," March 4, 2014.

⁶³⁹ Oldenski and Moran, "The Economic Impact of Inward FDI on the US," March 4, 2014.

⁶⁴⁰ Bivens, "Truth and Consequences of Offshoring," August 1, 2005.

community as well as infrastructure advancements to support a higher-wage population.⁶⁴¹ In order to address issues related to cross-border investment and create a reciprocal relationship related to protection of investors, the United States and other countries also enter into international investment agreements, including bilateral investment treaties (BITs) and investment chapters in free trade agreements (FTAs).⁶⁴² BITs and FTAs establish terms and agreements for private investment in each country.⁶⁴³ This chapter explores trends in U.S. inward and outward FDI and the drivers leading to cross-border investment.

Overview of U.S. Inward and Outward FDI

The United States has been the leading recipient of FDI since 2006 and is currently the largest source of FDI globally.⁶⁴⁴ From 1985 to 2024, U.S. outward FDI positions increased from \$238.0 billion to more than \$6 trillion and the stock of U.S. inward FDI positions increased from \$185.0 billion to more than \$5 trillion.⁶⁴⁵ In 2024, U.S. outward FDI positions surpassed inward FDI positions by \$1.12 trillion.⁶⁴⁶ U.S. outward FDI positions outpaced U.S. inward FDI positions by value during 2022–24.⁶⁴⁷ However, from 2022 to 2024, U.S. inward FDI positions experienced a growth of 11.4 percent and U.S. outward FDI positions increased by 9.3 percent ([figure 10.1](#)).⁶⁴⁸

⁶⁴¹ Oldenski and Moran, “The Economic Impact of Inward FDI on the US,” March 4, 2014.

⁶⁴² Weiss et al., *International Investment Agreements (IIAs)*, April 30, 2015.

⁶⁴³ The United States has BITs with 39 different countries and 14 FTAs with 20 different countries. Weiss et al., *International Investment Agreements (IIAs)*, April 30, 2015; LII, “Bilateral Investment Treaty,” accessed August 8, 2025; USDOC, *Bilateral Investment Treaties*, accessed August 8, 2025; USDOC, *U.S. Free Trade Agreement Partner Countries*, accessed August 8, 2025.

⁶⁴⁴ UNCTAD, “Foreign Direct Investment: Inward and Outward Flows and Stock, Annual,” accessed September 19, 2025.

⁶⁴⁵ Calculated by the U.S. Bureau of Economic Analysis, international investment positions serve to represent a statistical balance sheet between the United States and another country. It represents the accumulated value of U.S.-owned financial assets in another country while representing U.S. liabilities to residents of another country quarterly. BEA, “Direct Investment by Country and Industry, 2024,” accessed August 8, 2024; WITA, “Foreign Direct Investment,” accessed August 27, 2025, 1; USDOC, BEA, “International Trade & Investment,” accessed December 10, 2025.

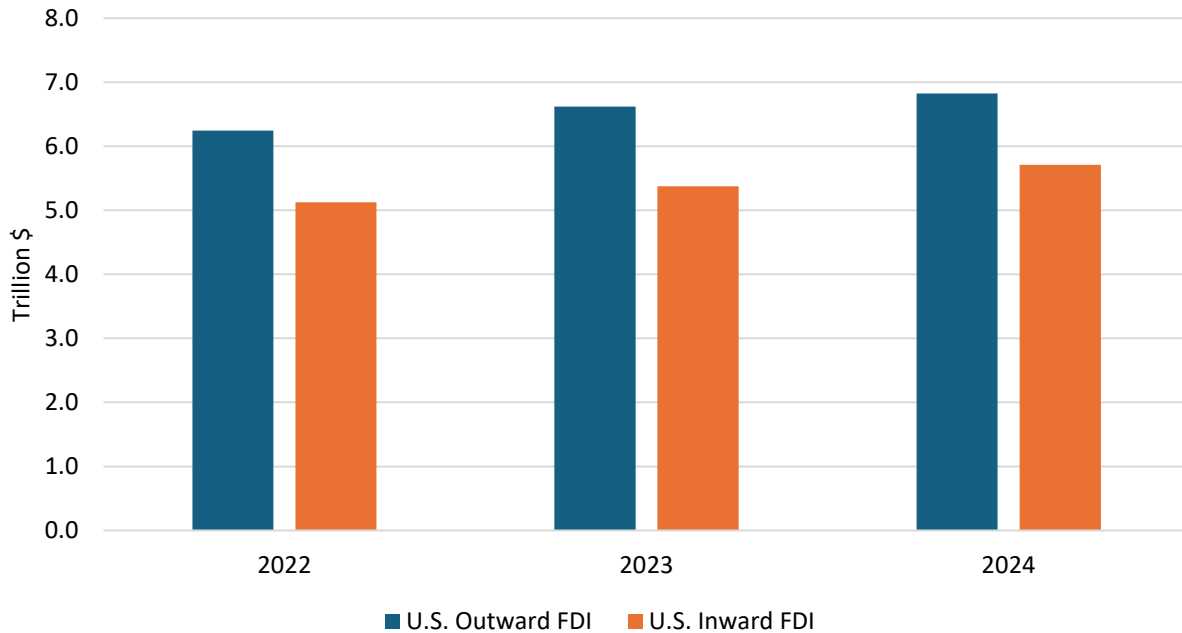
⁶⁴⁶ FDI positions, or cumulative level of investment, is the total amount of money invested in a project or asset over a set period of time. USDOC, BEA, “Direct Investment by Country and Industry, 2024,” accessed August 8, 2024.

⁶⁴⁷ Asadurian et al., *FOREIGN DIRECT INVESTMENT IN THE UNITED STATES*, September 2024, 1.

⁶⁴⁸ BEA, “Direct Investment by Country and Industry, 2024,” accessed August 8, 2024.

Figure 10.1 Total U.S. inward and outward foreign direct investment (FDI) positions, 2022–24

In trillions of dollars.



Source: USDOC, BEA, “Direct Investment by Country and Industry, 2024,” accessed August 8, 2024.

U.S. Inward FDI

The United States is a top destination for inward FDI due to its educated workforce, legal protections, and encouragement of innovation.⁶⁴⁹ Companies may also choose to invest in the United States to access a large consumer market of more than 340 million people with a high gross domestic product per capita and to take advantage of local policies that encourage investment.⁶⁵⁰ In 2024, chemicals manufacturing accounted for the largest share of U.S. inward FDI positions at 14.5 percent (\$827.5 billion), followed by other manufacturing and financial services ([table 10.1](#)).⁶⁵¹ For example, South Korea-based manufacturer Samsung made investments into its semiconductor manufacturing facilities in Taylor and Austin, Texas, from 2021 to 2023 with new expansions expected in the coming years; these investments are expected to bring \$40.0 billion to the region.⁶⁵²

⁶⁴⁹ USDOC, BEA, “Direct Investment by Country and Industry, 2024,” accessed August 8, 2024.

⁶⁵⁰ U.S. real GDP per capita was \$69,302 in the second quarter of 2025. Census, “U.S. and World Population Clock,” accessed August 8, 2025; St. Louis Fed, “Real Gross Domestic Product per Capita,” January 29, 2026.

⁶⁵¹ USDOC, BEA, “Direct Investment by Country and Industry, 2024,” accessed August 8, 2024.

⁶⁵² Samsung, “Samsung Electronics to Receive up to \$6.4 Billion,” April 15, 2024.

Table 10.1 Top U.S. inward FDI positions by industry, 2022–24

In billions of dollars.

Industry	2022	2023	2024
Chemicals	791.7	801.9	827.5
Other manufacturing	594.7	593.4	616.6
Finance (except depository institutions) and insurance	562.9	580.2	599.4
Wholesale trade	486.3	541.2	520.5
Information	238.9	251.7	272.2
Transportation equipment	231.5	243.2	267.0
Professional, scientific, and technical services	228.8	241.3	255.6
Depository institutions	213.8	218.4	231.8
Retail trade	187.4	199.0	213.2
Computers and electronic products	191.6	195.3	210.2
Real estate and rental and leasing	157.9	180.1	187.9
Machinery	115.9	137.5	158.6
All other industries	1,122.8	1,192.4	1,347.3
Total	5,124.2	5,375.6	5,707.7

Source: USDOC, BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

Notes: Table 10.1 is ordered largest to smallest, using 2024 data. The data category "other manufacturing" includes a wide range of industries, including construction and agriculture.

In 2024, Japan, the UK, and Canada were the top investors in the United States at \$754.1 billion, \$742.7 billion, and \$732.9 billion, respectively ([figure 10.2](#)).⁶⁵³ Roughly 62 percent of Japan's investment was in manufacturing—specifically chemicals (\$105.3 billion) and transportation manufacturing (\$75.4 billion)—and wholesale trade (\$148.9 billion).⁶⁵⁴ From 2022 to 2024, U.S. inward investment positions from Japan increased by 12.8 percent (or \$85.7 billion). Japan continues to invest in manufacturing and has announced multiple projects in the United States focused on steel and battery manufacturing. For example, Japan's Nippon Steel Corporation acquired U. S. Steel in June 2025, and Panasonic invested heavily in a new electric vehicle battery plant in Kansas that came online in July 2025.⁶⁵⁵

The majority of investment from the UK (58.8 percent) was in the manufacturing sector; the top manufacturing industries were chemicals (\$139.4 billion) and transportation (\$75.9 billion) manufacturing.⁶⁵⁶ In 2024, UK-based pharmaceutical manufacturer AstraZeneca announced \$3.5 billion in capital investment into the United States with a focus on research and manufacturing; these investments will take place in Massachusetts, Maryland, and Texas and are expected to be completed by year-end 2026.⁶⁵⁷ Canada was a major driver of the increase in U.S. inward investment positions with a 26.9 percent increase in investment (\$155.3 billion) from 2022 to 2024.⁶⁵⁸ The top sectors for U.S. inward

⁶⁵³ USDOC, BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

⁶⁵⁴ USDOC, BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

⁶⁵⁵ Panasonic's electric vehicle battery plant is expected to create 4,000 jobs. Panasonic, "Panasonic Energy Begins Mass Production," July 14, 2025.

⁶⁵⁶ USDOC, BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

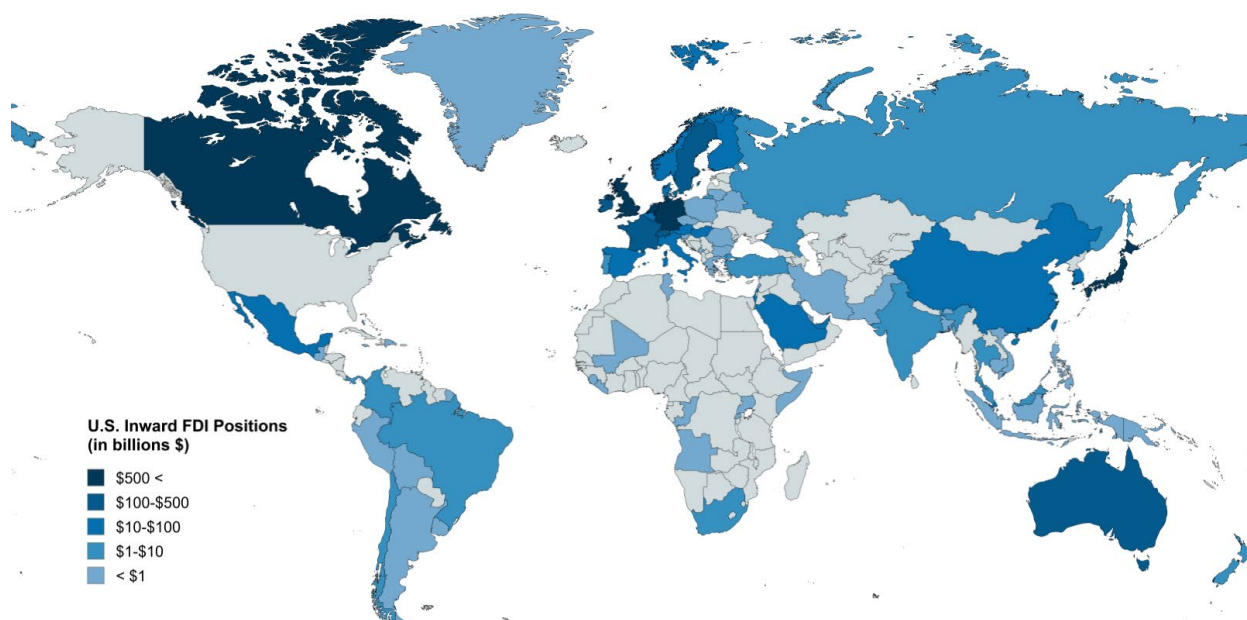
⁶⁵⁷ AstraZeneca, "AstraZeneca Invests \$3.5 Billion in R&D and Manufacturing," November 12, 2024.

⁶⁵⁸ USDOC, BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

investment positions from Canada were financial and insurance services (\$149.9 billion), depository institutions (\$100.7 billion), and manufacturing (\$83.9 billion).⁶⁵⁹

Figure 10.2 U.S. inward foreign direct investment (FDI) positions by country, 2024

In billions of dollars.



Source: USDOC, BEA, “Direct Investment by Country and Industry, 2024,” accessed August 8, 2024.

Note: This chart is limited based on data availability at the country level for 2024.

In the United States, new inward FDI positions are focused in a few states. California and Texas comprised nearly 30 percent of new inward FDI in 2022.⁶⁶⁰ In 2024, about 61 percent of jobs held by Californians working for foreign-owned enterprises were in Southern California, with the largest percentage of jobs (14.2 percent) being in UK-headquartered firms.⁶⁶¹ In addition, California is home to Silicon Valley, the major U.S. tech center, and boasts a large supply of technology workers as well as policies that increase access to venture capital funding; as such, 32.7 percent of employees of foreign-owned enterprises were in California’s San Francisco Bay area.⁶⁶² Texas has a geographical advantage with its proximity to Mexico as well as a large highway, railway, and seaport system for transporting manufactured goods. Additionally, Texas does not have a state corporate income tax—using gross receipt

⁶⁵⁹ USDOC, BEA, “Direct Investment by Country and Industry, 2024,” accessed August 8, 2024.

⁶⁶⁰ USDOC, OUSA, Foreign Direct Investment in the United States, September 2024, 2–3; USDOC, “Foreign Direct Investment (FDI): California,” accessed September 5, 2025.

⁶⁶¹ World Trade Center Los Angeles, *Foreign Direct Investment in California 2024*, 2024, 3–4.

⁶⁶² California has a flat corporate tax of 8.84 percent. USDOC, OUSA, *Foreign Direct Investment in the United States*, September 2024, 2–3; NSF, NCSSES, “Millions of Venture Capital Dollars Disbursed per Venture Capital Deal,” accessed August 8, 2025. USDOC, ITA, “Foreign Direct Investment (FDI): Texas,” accessed September 5, 2025; Loughhead, “State Corporate Income Tax Rates and Brackets, 2024,” January 23, 2024.

taxes instead.⁶⁶³ With nearly 2,170 foreign-owned enterprises doing business in Texas in 2023, the top FDI source countries were the UK, Switzerland, and Germany. Texas’s major metropolitan hubs Austin, Dallas, and Houston host large manufacturing, research and development, and energy development operations from foreign firms.⁶⁶⁴

U.S. Outward FDI

The United States leads the world in outward FDI positions. Investments in holding companies (\$3.2 trillion), financial and insurance services (\$969.2 billion), and information services (\$389.6 billion) served as key drivers of U.S. outward FDI positions in 2024 (table 10.2).⁶⁶⁵ Additionally, roughly 77.5 percent of U.S. outward investment positions were concentrated in three sectors; holding companies (47.3 percent), manufacturing (16.0 percent), and financial and insurance services (14.2 percent) in 2024. Additionally, U.S. outward investment positions in each of these sectors increased during 2022–24.⁶⁶⁶

Table 10.2 Top U.S. outward foreign direct investment (FDI) positions by industry, 2022–24

In billions of dollars.

Industry	2022	2023	2024
Holding companies (nonbank)	3,034.1	3,209.8	3,231.5
Finance (except depository institutions) and insurance	857.1	948.0	969.2
Information	347.2	378.1	389.6
Other manufacturing	239.0	259.2	258.1
Chemicals	236.0	237.1	257.7
Wholesale trade	229.2	240.8	249.7
Computers and electronic products	195.6	196.1	218.1
Professional, scientific, and technical services	159.7	152.1	177.9
Depository institutions	135.2	149.9	157.1
Mining	143.3	140.5	150.0
Transportation equipment	100.6	101.1	107.1
Machinery	53.2	57.4	78.1
All other industries	514.7	550.4	582.6
Total	6,244.7	6,620.5	6,826.8

Source: USDOC, BEA, “Direct Investment by Country and Industry, 2024,” accessed August 8, 2024.

Notes: Table 10.2 is ordered largest to smallest using 2024 data. The data category “other manufacturing” includes a wide range of industries including construction and agriculture.

⁶⁶³ Gross receipts are taxes on the total revenue of a business instead of a flat corporate tax rate, which is levied on gross taxable income. In Texas, gross receipt taxes are applied to businesses earning over \$2.47 million a year with other changes in tax rates based on the population of the city where business is done. Comptroller of Texas, “Miscellaneous Gross Receipts Tax,” accessed September 2, 2025; Loughhead, “State Corporate Income Tax Rates and Brackets, 2024,” January 23, 2024.

⁶⁶⁴ Office of the Governor of Texas, EDT, *Texas Trade and FDI*, February 2025.

⁶⁶⁵ Holding companies are parent companies that own controlling stake or oversea subsidiaries. USDOC, BEA, “Direct Investment by Country and Industry, 2024,” accessed August 8, 2024. Lauterbach Borschow, “Exploring Holding Companies,” May 9, 2024.

⁶⁶⁶ USDOC, BEA, “Direct Investment by Country and Industry, 2024,” accessed August 8, 2024.

Holding companies comprised nearly half of U.S. outward investment in 2024, and the Netherlands, Luxembourg, and the UK were the top destinations for U.S. outward FDI positions in this sector.⁶⁶⁷ In 2024, More than half (53.5 percent) of U.S. outward investment positions in manufacturing were concentrated in chemicals, electronics, and transportation manufacturing; from 2022 to 2024, these manufacturing sectors saw an increase in U.S. outward FDI positions of 9.2 percent, 11.5 percent, and 6.5 percent, respectively.⁶⁶⁸ 62.5 percent of U.S. outward investment positions in machinery were invested in Europe; some European nations are popular for U.S. firms to offshore some or all manufacturing operations because they have more favorable tax regimes, an educated workforce, and better access to the European market.⁶⁶⁹ For financial and insurance services, U.S. outward investment positions increased by 13.1 percent (or \$112.2 billion) from 2022 to 2024.⁶⁷⁰ Finally, 33.8 percent of U.S. outward investment positions in financial and insurance services were in the UK, where national and local regulations and the business environment are favorable for U.S. investors.⁶⁷¹

In 2024, 58.2 percent (nearly \$4 trillion) of U.S. outward FDI positions were concentrated in Europe. The highest concentration of investment were in the UK at \$1.02 trillion (15.0 percent), the Netherlands at \$1.01 trillion (14.8 percent), Luxembourg at \$569.6 billion (8.3 percent), and Ireland at \$466.8 billion (6.8 percent) (figure 10.3).⁶⁷² Each of these countries benefits from stable political and economic environments resulting in limited regulatory or political risk for investors and provide access to other EU markets. The UK is considered a business-friendly environment with a consumer market of more than 67 million people, a wide range of suppliers and partners, and an educated labor force. These attributes make the UK a popular destination for U.S. firms interesting in offshoring parts or all of their business operations.⁶⁷³ Much of U.S. investment in the UK is in electronics, chemicals, and biotechnology manufacturing. For example, in 2023, Sherlock Biosciences opened a new biomanufacturing campus in Cambridge, UK, focused on developing over-the-counter diagnostics.⁶⁷⁴

⁶⁶⁷ USDOC, BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

⁶⁶⁸ USDOC, BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

⁶⁶⁹ USDOC, BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

⁶⁷⁰ USDOC, BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

⁶⁷¹ USDOC, BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

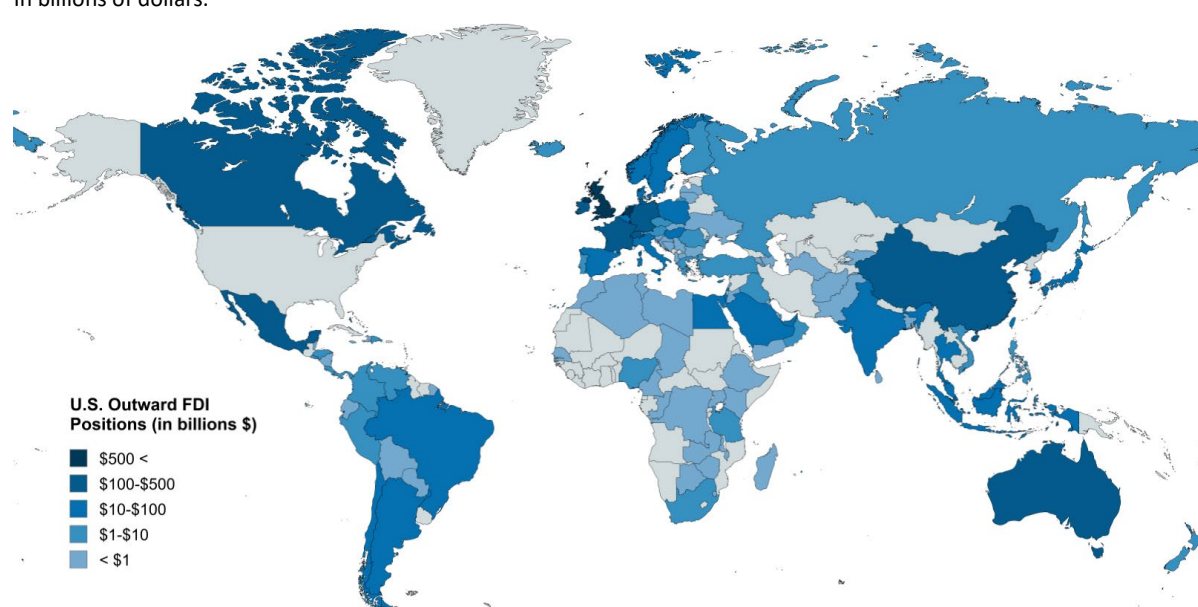
⁶⁷² U.S. outward FDI positions to Europe accounted for 37.8 percent of the increase in investment from 2022 to 2024 with the Netherlands, Ireland, and Germany, accounting for 72.1 percent of U.S. outward investment positions in Europe. U.S. outward investment positions to the Netherlands, Ireland, and Germany increased by \$58.7 billion, \$52.3 billion, and \$47.8 billion, respectively. USDOC, BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

⁶⁷³ USDOS, "2024 Investment Climate Statements: United Kingdom," accessed August 8, 2025.

⁶⁷⁴ Sherlock Biosciences, "Sherlock Biosciences Unveils State-of-the-Art UK Biomanufacturing Facility," August 15, 2023.

Figure 10.3 U.S. outward foreign direct investment (FDI) positions by country, 2024

In billions of dollars.



Source: USDOC, BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

Note: This chart is limited as a result of data availability at the country level for 2024.

Located on the North Sea and situated near some of Europe's most high-income economies, the Netherlands ranks high in U.S. outward investment positions due to its favorable tax regime and developed financial sector. The top form of U.S. outward investment positions in 2024 in the Netherlands was in holding companies (\$800.7 billion), partly because of corporate tax strategies.⁶⁷⁵ In Luxembourg, U.S. outward investment positions are focused in holding companies at \$482.3 billion in 2024, because Luxembourg is considered to have transparent economic practices, a favorable tax regime, and impactful regulations against money laundering and terrorist financing.⁶⁷⁶

Finally, Ireland has one of the lowest corporate tax rates in the European Union, with a productive labor force and a favorable geographic location with access to the United States and Europe.⁶⁷⁷ The top industry attracting U.S. outward investment in Ireland is holding companies at \$287.0 billion in 2024 with manufacturing also comprising a large share of investment positions at \$64.9 billion.⁶⁷⁸ For example, Intel, the largest semiconductor (or chips) manufacturer in the world, opened the FAB34 semiconductor fabrication plant in Ireland to supply chips to the European region.⁶⁷⁹

⁶⁷⁵ USDOC, BEA, "Direct Investment by Country and Industry," accessed September 2, 2025.

⁶⁷⁶ USDOS, "2023 Investment Climate Statements: Luxembourg," accessed September 3, 2025. BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

⁶⁷⁷ Ireland's corporate tax rate is 12.5 percent for companies that carry on trade in Ireland, 25 percent for companies with passive or investment income and profits from assets outside of Ireland, and a 33 percent capital gains tax. Quinn et al., "Corporate Tax 2025: Ireland," March 18, 2025.; USDOS, "2023 Investment Climate Statements: Ireland," accessed August 8, 2025.

⁶⁷⁸ USDOC, BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

⁶⁷⁹ Intel, "Intel in Ireland," accessed August 8, 2025.

Mexico is the largest recipient of U.S. outward investment in Latin America at \$159.2 billion in 2024.⁶⁸⁰ Mexico offers a strategic geographic location for logistics and a skilled and lower cost labor force.⁶⁸¹ For example, in 2024, Microsoft and Alphabet completed multiple large scale data center campuses in Mexico driving investment in that sector; Mexico is expected to see the development of 73 new data centers in the next five years with investment from U.S. companies including Amazon Web Services and Equinix.⁶⁸² Additionally, in 2023, U.S. electric vehicle manufacturer Tesla announced an investment of \$5.0 billion to build a gigafactory in Nuevo León. The project is expected to bring Nuevo León \$15.0 billion from Tesla and its suppliers. However, this new factory has seen delays, in part because of infrastructure investment delays in the state's rail, highway, water, and power infrastructure ahead of the completion of the gigafactory, which the state government had previously committed to completing.⁶⁸³ Despite strong local government support, Tesla has yet to break ground on the new gigafactory as of 2025.⁶⁸⁴ Brazil ranks among the top 20 destinations for U.S. outward investment positions in 2024 with investments seen in the mining (\$14.2 billion) and financial and insurance services (\$14.3 billion) as well as the professional, scientific, and technical services sectors (\$3.8 billion).⁶⁸⁵ For example, investments in the professional, scientific, and technical services sectors include GE Aerospace which has committed to a nearly \$80 million expansion in their facility in Rio de Janeiro where the company manufactures airplane engines and engine parts.⁶⁸⁶

Singapore saw the largest increase in U.S. investment positions by value at \$106.5 billion (or 29.5 percent) from 2022 to 2024.⁶⁸⁷ With business-friendly laws, high levels of transparency, intellectual property protections, and well-developed infrastructure, Singapore's diversified economy attracts large amounts of U.S. investment in manufacturing (including chemicals, energy, and machinery manufacturing) as well as professional services.⁶⁸⁸ The top industry for U.S. outward investment positions in Singapore was holding companies, in part because of favorable tax policies, including double taxation treaties with over 100 countries.⁶⁸⁹ Additionally, Singapore has seen advancements in the

⁶⁸⁰ USDOC, BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

⁶⁸¹ USDOS, "2023 Investment Climate Statements: Mexico," accessed August 8, 2025.

⁶⁸² Mexico News Daily, "With Dozens of Data Centers in the Works," April 22, 2024; Queretaro Post, "Microsoft Announced that its Data Center Region," June 11, 2024.

⁶⁸³ These investments are critical for Tesla's manufacturing operations because rail and highway infrastructure is used to move parts and automotives to and from the plant, and water plays a vital role in the cleaning and cooling of electric vehicle batteries. Cota, "Nuevo León's Lack of Budget and Delays," October 11, 2023; Solomon, "Tesla Factory Permits Almost Ready in Mexico," October 5, 2023.

⁶⁸⁴ Economist, "Will Elon Musk Scrap His Plan to Invest in a Gigafactory in Mexico?," January 16, 2025.

⁶⁸⁵ USDOC, BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

⁶⁸⁶ GE Aerospace, "GE Aerospace to Increase MRO Capability with Brazil Plant Upgrade," May 29, 2025.

⁶⁸⁷ USDOC, BEA, "Direct Investment by Country and Industry, 2024," accessed August 8, 2024.

⁶⁸⁸ World Bank Group, Ease of Doing Business in Singapore, World Bank, accessed May 4, 2026; USDOS, "2023 Investment Climate Statements: Singapore," accessed August 8, 2025.

⁶⁸⁹ Government of Singapore, IRAS, "List of DTAs, Limited DTAs and EOI Arrangements," accessed September 3, 2025.

information technology sector. In 2024, Alphabet expanded plans to build data centers in Singapore from \$850 million to \$5.0 billion signaling a potential for further investment in the country's digital infrastructure.⁶⁹⁰

⁶⁹⁰ Burgos, "Singapore Investments Jump over Fivefold," June 3, 2024.

Bibliography

- Academy of Tax Law. "Understanding Double Tax Treaties: A Comprehensive Guide." August 28, 2024. https://academyoftaxlaw.com/understanding-double-tax-treaties/#elementor-toc_heading-anchor-0.
- U.S. Department of Commerce (USDOC). Office of the Under Secretary for Economic Affairs (OUSEA). *Foreign Direct Investment in the United States*. September 2024. <https://www.commerce.gov/sites/default/files/2024-10/FDI-Report-Final.pdf>.
- AstraZeneca. "AstraZeneca Invests \$3.5 Billion in R&D and Manufacturing in the United States." November 12, 2024. <https://www.astrazeneca.com/media-centre/press-releases/2024/astrazeneca-invests-3bn-500mn-in-us.html>.
- U.S. Department of Commerce (USDOC). Bureau of Economic Analysis (BEA). "Direct Investment by Country and Industry." (U.S. Bureau of Economic Analysis). Accessed September 2, 2025.
- U.S. Department of Commerce (USDOC). Bureau of Economic Analysis (BEA). Bureau of Economic Analysis. "Direct Investment by Country and Industry, 2024." Accessed August 8, 2024. <https://www.bea.gov/data/intl-trade-investment/direct-investment-country-and-industry>.
- U.S. Department of Commerce (USDOC). Bureau of Economic Analysis (BEA). "International Trade & Investment." Accessed December 10, 2025. <https://www.bea.gov/resources/learning-center/what-to-know-international-trade-investment>.
- Bivens, Josh. "Truth and Consequences of Offshoring." Economic Policy Institute. Briefing Paper 155. August 1, 2005. <https://www.epi.org/publication/bp155/>.
- Burgos, Jonathan. "Singapore Investments Jump over Fivefold to 5 Billion with Data Center Expansion." *Forbes*, June 3, 2024. <https://www.forbes.com/sites/jonathanburgos/2024/06/03/googles-singapore-investments-jump-over-fivefold-to-5-billion-with-data-center-expansion/>.
- Comptroller of Texas. "Miscellaneous Gross Receipts Tax." Accessed September 2, 2025. <https://comptroller.texas.gov/taxes/misc-gross-receipts/>.
- Cota, Isabella. "Nuevo León's Lack of Budget and Delays in Environmental Permits Endanger the Construction of a Tesla Plant in Mexico." *El Pais*, October 11, 2023. <https://english.elpais.com/economy-and-business/2023-10-11/nuevo-leons-lack-of-budget-and-delays-in-environmental-permits-endanger-the-construction-of-a-tesla-plant-in-mexico.html>.
- Federal Reserve Bank of St. Louis (St. Louis Fed). "Real Gross Domestic Product per Capita." August 28, 2025. <https://fred.stlouisfed.org/series/A939RX0Q048SBEA/>.
- GE Aerospace. "GE Aerospace to Increase MRO Capability with Brazil Plant Upgrade." May 29, 2025. <https://www.geaerospace.com/news/press-releases/ge-aerospace-increase-mro-capability-brazil-plant-upgrade>.

- Government of Singapore. Inland Revenue Authority of Singapore (IRAS). “List of DTAs, Limited DTAs and EOI Arrangements.” Accessed September 3, 2025. <https://www.iras.gov.sg/taxes/international-tax/international-tax-agreements-concluded-by-singapore/list-of-dtas-limited-dtas-and-eoi-arrangements?pg=1&indexCategories=all>.
- Intel. “Intel in Ireland.” Accessed August 8, 2025. <https://www.intel.ie/content/www/ie/en/company-overview/intel-in-ireland.html>.
- Kelly, Jack. “The Globalization And Offshoring Of U.S. Jobs Have Hit Americans Hard.” *Forbes*, October 15, 2024. <https://www.forbes.com/sites/jackkelly/2024/10/15/the-globalization-and-offshoring-of-us-jobs-have-hit-americans-hard/>.
- Lauterbach Borschow. “Exploring Holding Companies: How They Work and Why They Matter.” May 9, 2024. <https://lb-cpa.com/exploring-holding-companies-how-they-work-and-why-they-matter/>.
- Legal Information Institute (LII). “Bilateral Investment Treaty.” Cornell Law School, accessed August 8, 2025. https://www.law.cornell.edu/wex/bilateral_investment_treaty.
- Loughead, Katherine. “State Corporate Income Tax Rates and Brackets, 2024.” The Tax Foundation. January 23, 2024. <https://taxfoundation.org/data/all/state/state-corporate-income-tax-rates-brackets-2024/>.
- Queretaro Post*. “Microsoft Announced That Its Data Center Region in Queretaro Should Begin Operations This Year.” June 11, 2024. <https://thequeretaropost.com/2024/06/11/microsoft-announced-that-its-data-center-region-in-queretaro-should-begin-operations-this-year/>.
- Mexico News Daily*. “With Dozens of Data Centers in the Works, Could Mexico Be a New Digital Services Hub?” April 22, 2024. <https://mexiconewsdaily.com/business/data-centers-mexico-digital-services-hub/>.
- National Science Foundation (NSF). National Center for Science and Engineering Statistics (NCSES). “Millions of Venture Capital Dollars Disbursed per Venture Capital Deal.” Accessed August 8, 2025. <https://nces.nsf.gov/indicators/states/indicator/venture-capital-per-deal/>.
- OECD, “*OECD Benchmark Definition of Foreign Direct Investment*,” 2025, https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/03/oecd-benchmark-definition-of-foreign-direct-investment-fifth-edition_38a25baf/7f05c0a3-en.pdf.
- Oldenski, Lindsay, and Theodore Moran. “The Economic Impact of Inward FDI on the US.” *Vox EU CEPR*. March 4, 2014. <https://cepr.org/voxeu/columns/economic-impact-inward-fdi-us>.
- Panasonic. “Panasonic Energy Begins Mass Production at New Automotive Lithium-Ion Battery Factory in Kansas, Aiming for Annual Capacity of 32 GWh to Accelerate U.S. Local Production.” *Panasonic*. July 14, 2025. <https://na.panasonic.com/news/panasonic-energy-begins-mass-production-at-new-automotive-lithium-ion-battery-factory-in-kansas-aiming-for-annual-capacity-of-32-gwh-to-accelerate-us-local-production>.
- Quinn, Andrew, William Fogarty, and David Burke. “Corporate Tax 2025: Ireland.” March 18, 2025. <https://practiceguides.chambers.com/practice-guides/corporate-tax-2025/ireland>.

- Samsung. "Samsung Electronics to Receive up to \$6.4 Billion in Direct Funding under the CHIPS and Science Act." News release, April 15, 2024. <https://news.samsung.com/us/samsung-electronics-to-receive-up-to-6-4-billion-in-direct-funding-under-the-chips-and-science-act/>.
- Sherlock Biosciences. "Sherlock Biosciences Unveils State-of-the-Art UK Biomanufacturing Facility." *Sherlock Biosciences*. August 15, 2023. <https://sherlock.bio/sherlock-biosciences-unveils-state-of-the-art-uk-biomanufacturing-facility/>.
- Solomon, Daina Beth. "Tesla Factory Permits Almost Ready in Mexico, as State Launches Infrastructure Work." *Reuters*. October 5, 2023. <https://www.reuters.com/business/autos-transportation/tesla-requests-infrastructure-ahead-mexico-factory-construction-state-govt-says-2023-10-05/>.
- Office of the Governor of Texas. Texas Economic Development and Tourism Office (EDT). *Texas Trade and FDI*. February 2025. https://businessintexas.com/wp-content/uploads/2025/04/Trade_FDI.pdf.
- Economist*. "Will Elon Musk Scrap His Plan to Invest in a Gigafactory in Mexico?" *The Economist*. January 16, 2025. <https://www.economist.com/business/2025/01/16/will-elon-musk-scrap-his-plan-to-invest-in-a-gigafactory-in-mexico>.
- World Bank. "What Is the Difference between Foreign Direct Investment (FDI) Net Inflows and Net Outflows?" Accessed August 8, 2025. <https://datahelpdesk.worldbank.org/knowledgebase/articles/114954-what-is-the-difference-between-foreign-direct-inve/>.
- United Nations Trade & Development (UNCTAD). "Foreign Direct Investment: Inward and Outward Flows and Stock, Annual." Accessed September 19, 2025. <https://unctadstat.unctad.org/datacentre/dataviewer/US.FdiFlowsStock>.
- U.S. Census Bureau (Census). "U.S. and World Population Clock." Accessed August 8, 2025. <https://www.census.gov/popclock/>.
- U.S. Department of Commerce (USDOC). *Bilateral Investment Treaties*. U.S. Department of Commerce. Accessed August 8, 2025. <https://www.trade.gov/bilateral-investment-treaties>.
- U.S. Department of Commerce (USDOC). "Foreign Direct Investment (FDI): California." Accessed September 5, 2025. <https://www.trade.gov/sites/default/files/2023-09/California.pdf>.
- U.S. Department of Commerce (USDOC). International Trade Administration (ITA). "Foreign Direct Investment (FDI): Texas." Accessed September 5, 2025. <https://www.trade.gov/sites/default/files/2023-09/Texas.pdf>.
- U.S. Department of Commerce (USDOC). *U.S. Free Trade Agreement Partner Countries*. Accessed August 8, 2025. <https://www.trade.gov/us-free-trade-agreement-partner-countries>.
- U.S. Department of State (USDOS). "2023 Investment Climate Statements: Ireland." Accessed August 8, 2025. <https://www.state.gov/reports/2023-investment-climate-statements/ireland/>.

- U.S. Department of State (USDOS). “2023 Investment Climate Statements: Luxembourg.” Accessed September 3, 2025. <https://www.state.gov/reports/2023-investment-climate-statements/luxembourg/>.
- U.S. Department of State (USDOS). “2023 Investment Climate Statements: Mexico.” Accessed August 8, 2025. <https://www.state.gov/reports/2023-investment-climate-statements/mexico/>.
- U.S. Department of State (USDOS). “2023 Investment Climate Statements: Singapore.” Accessed August 8, 2025. <https://www.state.gov/reports/2023-investment-climate-statements/singapore/>.
- U.S. Department of State (USDOS). “2024 Investment Climate Statements: United Kingdom.” Accessed August 8, 2025. <https://www.state.gov/reports/2024-investment-climate-statements/united-kingdom/>.
- U.S. International Trade Commission (USITC). *U.S. Trade and Investment with Sub-Saharan Africa: Recent Trends and New Developments*. USITC Publication 5043, March 2020. <https://www.usitc.gov/publications/332/pub5043.pdf>.
- Weiss, Martin A., Shayerah Ilias Akhtar, Brandon J. Murrill, and Daniel T. Shedd. *International Investment Agreements (IIAs)*. Congressional Research Service, April 30, 2015. https://uscib.org/docs/2015_04_30_CRS_Investment_Agreements.pdf.
- World Bank Group, Ease of Doing Business in Singapore, World Bank, accessed May 4, 2026. <https://archive.doingbusiness.org/en/data/exploreconomies/singapore>.
- World Trade Center Los Angeles. *Foreign Direct Investment in California 2024*. 2024. <https://business.ca.gov/wp-content/uploads/2024/07/2024-FDI-Report-ADA.pdf>.

Appendix A: Complete Digest Trade Data, 2022–24

Table A.1: Agricultural products:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Animal or vegetable fats and oils	14,082	15,163	16,592	2,509	8.5
Pasta, cereals, and other bakery goods	12,583	13,663	15,100	2,516	9.5
Cattle and beef	9,992	11,332	14,135	4,143	18.9
Fresh, chilled, or frozen vegetables	12,127	12,884	13,880	1,754	7.0
Distilled spirits	12,717	11,198	11,963	-755	-3.0
Shellfish	14,406	11,218	11,410	-2,995	-11.0
Cocoa, chocolate, and confectionery	8,918	9,320	11,305	2,386	12.6
Fresh or frozen fish	12,449	11,227	11,015	-1,434	-5.9
Coffee and tea	10,988	9,512	10,646	-342	-1.6
Other fresh fruit	8,138	8,875	9,062	924	5.5
Tropical fruit	7,590	7,613	8,675	1,085	6.9
Infant formulas, malt extracts, and other edible preparations	9,864	8,506	8,520	-1,344	-7.1
Malt beverages	6,728	6,866	7,534	806	5.8
Wine and certain other fermented beverages	7,874	7,173	7,368	-506	-3.3
Prepared or preserved vegetables, mushrooms, and olives	6,049	6,451	7,020	972	7.7
Animal feeds	5,458	5,093	5,333	-126	-1.2
Dairy products	4,323	4,463	4,878	555	6.2
Sugar and other sweeteners	4,019	4,073	4,318	299	3.6
Nonalcoholic beverages, excluding fruit and vegetable juices	4,182	3,970	4,047	-134	-1.6
Fruit and vegetable juices	3,008	3,157	3,963	956	14.8
Certain miscellaneous animals and meats	4,249	3,707	3,960	-288	-3.5
Prepared or preserved fruit	3,439	3,401	3,575	136	2.0
Sauces, condiments, and soups	2,627	2,948	3,429	803	14.3
Edible nuts	3,344	2,893	3,310	-33	-0.5
Miscellaneous vegetable substances	3,301	2,748	3,036	-264	-4.1
Cereals	2,928	3,224	2,979	51	0.9
Citrus fruit	2,191	2,228	2,358	167	3.7
Milled grains, malts, and starches	2,498	2,485	2,327	-171	-3.5
Cigars and certain other manufactured tobacco	1,977	2,161	2,293	316	7.7
Cut flowers	1,941	2,070	2,257	317	7.9
Spices	2,125	1,919	2,161	36	0.8
Swine and pork	2,444	1,884	2,096	-349	-7.4
Canned fish	1,892	1,707	1,743	-149	-4.0
Sheep and meat of sheep	1,472	1,113	1,352	-120	-4.2
Frozen fruit	1,523	1,281	1,275	-248	-8.5
Seeds	1,206	1,238	1,139	-66	-2.8
Live plants	1,054	1,055	1,092	38	1.8
Oilseeds	1,492	1,222	1,002	-490	-18.0
Poultry	1,044	872	991	-54	-2.6
Cured and other fish	930	896	947	16	0.9

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Unmanufactured tobacco	549	626	787	238	19.7
Deciduous fruit	565	550	490	-74	-6.8
Hides, skins, and leather	547	453	448	-99	-9.5
Dried fruit other than tropical	446	395	432	-14	-1.6
Ethyl alcohol for nonbeverage purposes	498	347	345	-154	-16.9
Cigarettes	256	257	255	-2	-0.3
Eggs	140	129	110	-29	-11.2
Furskins	53	40	37	-16	-16.6
Wool and other animal hair	23	23	23	0	-1.0
Cotton, not carded or combed	2	2	2	0	6.8
Total	222,251	215,634	233,015	10,764	2.4

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.2: Agricultural products:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Oilseeds	34,597	28,056	24,802	-9,795	-15.3
Cereals	31,035	22,784	23,738	-7,297	-12.5
Animal feeds	17,774	18,364	16,983	-791	-2.3
Edible nuts	9,706	9,712	10,758	1,052	5.3
Cattle and beef	11,645	9,875	10,520	-1,125	-5.0
Infant formulas, malt extracts, and other edible preparations	7,693	7,141	8,026	333	2.1
Dairy products	8,986	7,492	7,744	-1,242	-7.2
Swine and pork	6,386	7,045	7,452	1,066	8.0
Poultry	5,998	5,516	5,595	-403	-3.4
Cotton, not carded or combed	8,823	5,923	4,965	-3,858	-25.0
Pasta, cereals, and other bakery goods	4,337	4,473	4,656	318	3.6
Prepared or preserved vegetables, mushrooms, and olives	3,655	4,147	4,491	836	10.8
Ethyl alcohol for nonbeverage purposes	3,588	3,794	4,319	732	9.7
Certain miscellaneous animals and meats	3,770	3,675	3,717	-54	-0.7
Sauces, condiments, and soups	2,797	3,006	3,237	440	7.6
Cocoa, chocolate, and confectionery	2,458	2,601	3,181	723	13.8
Fresh, chilled, or frozen vegetables	2,869	2,764	2,973	104	1.8
Fresh or frozen fish	3,319	2,948	2,795	-523	-8.2
Distilled spirits	2,096	2,264	2,515	419	9.5
Animal or vegetable fats and oils	3,794	2,274	2,178	-1,615	-24.2
Deciduous fruit	1,559	1,744	1,960	402	12.1

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Other fresh fruit	1,683	1,694	1,912	228	6.6
Seeds	1,730	1,765	1,787	57	1.6
Nonalcoholic beverages, excluding fruit and vegetable juices	1,505	1,675	1,773	269	8.6
Sugar and other sweeteners	1,198	1,394	1,736	538	20.4
Shellfish	1,280	1,349	1,382	102	3.9
Coffee and tea	1,325	1,360	1,358	33	1.2
Hides, skins, and leather	1,645	1,448	1,334	-311	-9.9
Wine and certain other fermented beverages	1,470	1,228	1,269	-201	-7.1
Unmanufactured tobacco	846	981	1,057	211	11.8
Miscellaneous vegetable substances	1,146	990	1,011	-135	-6.1
Milled grains, malts, and starches	918	940	1,000	82	4.4
Fruit and vegetable juices	912	892	910	-3	-0.1
Prepared or preserved fruit	827	809	869	42	2.5
Citrus fruit	790	801	831	41	2.5
Eggs	682	729	720	39	2.8
Dried fruit other than tropical	482	372	379	-102	-11.3
Live plants	363	345	345	-18	-2.5
Malt beverages	492	323	324	-168	-18.8
Cigars and certain other manufactured tobacco	198	236	276	78	18.0
Cured and other fish	287	260	257	-29	-5.2
Frozen fruit	239	223	236	-2	-0.5
Spices	212	222	224	12	2.8
Tropical fruit	167	150	167	0	0.0
Canned fish	208	166	136	-71	-19.0
Cigarettes	40	72	122	82	74.6
Furskins	77	61	76	-1	-0.7
Wool and other animal hair	18	15	20	2	5.6
Cut flowers	22	17	16	-5	-13.0
Sheep and meat of sheep	16	14	13	-4	-12.1
Total	197,662	176,131	178,146	-19,516	-5.1

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.3: Chemicals and related products:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Medicinal chemicals	197,275	207,642	250,801	53,526	12.8
Miscellaneous plastic products	57,280	49,426	53,671	-3,609	-3.2
Tires and tubes	19,930	18,976	19,460	-471	-1.2
Perfumes, cosmetics, and toiletries	13,337	14,598	16,956	3,620	12.8
Miscellaneous inorganic chemicals	19,245	18,955	16,899	-2,346	-6.3
Organic specialty chemicals	24,064	19,537	16,196	-7,867	-18.0
Miscellaneous chemicals and specialties	11,178	11,092	10,799	-378	-1.7
Fertilizers	15,782	11,030	10,491	-5,291	-18.5
Certain organic chemicals	11,991	8,475	8,988	-3,003	-13.4
Other plastics in primary forms	11,304	8,415	8,793	-2,511	-11.8
Miscellaneous rubber products	8,555	8,456	8,682	126	0.7
Essential oils and other flavoring materials	6,171	5,499	6,278	107	0.9
Paints, inks, and related items, and certain components thereof	5,604	4,781	5,201	-403	-3.7
Soaps, detergents, and surface-active agents	4,177	4,146	4,696	519	6.0
Polyethylene resins in primary forms	5,192	4,072	4,281	-911	-9.2
Pesticide products and formulations	6,691	5,359	4,188	-2,503	-20.9
Organic commodity chemicals	2,657	3,135	2,915	258	4.7
Saturated polyester resins	3,264	2,416	2,498	-766	-12.5
Synthetic rubber	2,545	2,015	1,998	-546	-11.4
Primary aromatics	1,718	2,082	1,962	245	6.9
Natural rubber	2,073	1,323	1,683	-390	-9.9
Styrene polymers in primary forms	1,746	1,180	1,292	-454	-14.0
Explosives, propellant powders, and related items	1,213	1,074	1,170	-43	-1.8
Polypropylene resins in primary forms	1,015	862	1,098	83	4.0
Inorganic acids	1,350	1,154	1,051	-299	-11.8
Adhesives and glues	753	667	743	-9	-0.6
Chlor-alkali chemicals	720	604	598	-122	-8.9
Major primary olefins	966	566	512	-454	-27.2
Polyvinyl chloride resins in primary forms	753	521	503	-250	-18.3
Photographic chemicals and preparations	576	453	495	-81	-7.3
Synthetic organic pigments	592	387	435	-157	-14.3
Other olefins	577	483	326	-251	-24.8
Synthetic dyes and azoic couplers	447	294	314	-133	-16.2
Gelatin	450	359	300	-150	-18.4
Natural tanning and dyeing materials	245	247	242	-4	-0.7
Synthetic tanning agents	11	10	10	0	-2.0
Total	441,444	420,292	466,526	25,082	2.8

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.4: Chemicals and related products:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Medicinal chemicals	81,173	87,305	91,001	9,828	5.9
Miscellaneous plastic products	31,455	30,832	32,214	759	1.2
Miscellaneous inorganic chemicals	20,688	19,664	18,522	-2,166	-5.4
Certain organic chemicals	22,438	20,419	18,468	-3,969	-9.3
Other plastics in primary forms	18,352	16,398	16,313	-2,039	-5.7
Polyethylene resins in primary forms	16,737	15,473	15,968	-769	-2.3
Perfumes, cosmetics, and toiletries	9,474	9,803	10,009	535	2.8
Miscellaneous chemicals and specialties	9,482	8,931	8,851	-631	-3.4
Organic specialty chemicals	9,605	7,973	7,686	-1,919	-10.5
Paints, inks, and related items, and certain components thereof	7,734	7,043	7,150	-584	-3.8
Soaps, detergents, and surface-active agents	7,043	6,658	6,806	-238	-1.7
Pesticide products and formulations	7,497	6,401	5,547	-1,950	-14.0
Tires and tubes	4,855	5,064	4,902	47	0.5
Miscellaneous rubber products	4,375	4,548	4,563	188	2.1
Fertilizers	7,748	4,755	4,466	-3,282	-24.1
Essential oils and other flavoring materials	3,454	3,351	3,665	210	3.0
Synthetic rubber	3,722	3,310	3,438	-285	-3.9
Polypropylene resins in primary forms	3,499	3,198	3,361	-138	-2.0
Organic commodity chemicals	3,844	3,348	3,163	-681	-9.3
Polyvinyl chloride resins in primary forms	4,005	3,173	3,154	-851	-11.3
Chlor-alkali chemicals	4,087	3,729	3,135	-952	-12.4
Saturated polyester resins	1,978	1,498	1,950	-29	-0.7
Adhesives and glues	1,795	1,671	1,674	-121	-3.4
Styrene polymers in primary forms	1,685	1,289	1,343	-342	-10.7
Major primary olefins	2,016	1,522	1,301	-716	-19.7
Other olefins	1,024	983	1,080	56	2.7
Explosives, propellant powders, and related items	670	776	953	283	19.3
Synthetic dyes and azoic couplers	764	659	735	-29	-1.9
Photographic chemicals and preparations	702	625	641	-60	-4.4
Inorganic acids	759	696	590	-169	-11.9
Primary aromatics	429	283	236	-193	-25.8
Synthetic organic pigments	259	229	234	-25	-5.0
Natural tanning and dyeing materials	156	169	180	24	7.4
Gelatin	89	87	57	-32	-20.1
Natural rubber	37	34	30	-7	-10.2
Synthetic tanning agents	30	9	12	-18	-37.6
Total	293,660	281,905	283,398	-10,262	-1.8

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.5: Electronic products:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Computers, peripherals, and parts	173,253	151,152	212,136	38,882	10.7
Telecommunications equipment	126,609	119,313	116,122	-10,487	-4.2
Medical goods	62,734	66,409	71,816	9,082	7.0
Semiconductors and integrated circuits	61,017	62,400	63,420	2,403	2.0
Consumer electronics	52,558	46,510	47,884	-4,674	-4.5
Measuring, testing, and controlling instruments	31,662	33,199	34,148	2,486	3.9
Circuit apparatus assemblies	15,891	18,429	19,846	3,955	11.8
Blank and prerecorded media	17,431	11,003	19,194	1,763	4.9
Miscellaneous electrical equipment	19,235	17,710	18,324	-910	-2.4
Circuit apparatus not exceeding 1000V	14,090	13,414	14,750	660	2.3
Optical goods, including ophthalmic goods	14,911	13,973	14,484	-426	-1.4
Watches and clocks	6,636	6,944	7,581	945	6.9
Navigational instruments and remote control apparatus	6,086	6,486	6,682	595	4.8
Electrical capacitors and resistors	3,894	3,294	4,400	505	6.3
Electric sound and visual signaling apparatus	3,988	3,857	4,215	227	2.8
Parts of circuit apparatus	3,941	4,104	4,166	225	2.8
Optical fibers, optical fiber bundles and cables	3,212	2,506	2,678	-534	-8.7
Printed circuits	2,751	2,370	2,593	-158	-2.9
Radio and television broadcasting equipment	3,042	2,586	2,397	-645	-11.2
Circuit apparatus exceeding 1000V	1,198	1,387	1,629	431	16.6
Office machines	1,492	1,341	1,280	-212	-7.4
Photographic film and paper	1,031	932	1,074	44	2.1
Photographic cameras and equipment	843	769	804	-39	-2.3
Drawing, drafting, and calculating instruments	398	348	375	-23	-2.9
Electron tubes	264	245	241	-23	-4.5
Total	628,168	590,681	672,240	44,072	3.4

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.6: Electronic products:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Medical goods	38,312	41,487	40,543	2,230	2.9
Semiconductors and integrated circuits	29,110	24,396	30,709	1,599	2.7
Computers, peripherals, and parts	18,112	18,892	26,381	8,269	20.7
Measuring, testing, and controlling instruments	25,671	26,373	26,259	588	1.1
Telecommunications equipment	12,483	14,190	14,271	1,789	6.9
Circuit apparatus not exceeding 1000V	7,344	7,859	7,882	539	3.6
Optical goods, including ophthalmic goods	6,825	6,632	6,940	115	0.8
Circuit apparatus assemblies	4,225	5,197	5,812	1,586	17.3
Consumer electronics	3,455	4,169	4,542	1,087	14.7
Miscellaneous electrical equipment	3,142	3,831	4,041	898	13.4
Navigational instruments and remote control apparatus	3,417	3,583	3,813	396	5.6
Parts of circuit apparatus	3,666	3,630	3,247	-419	-5.9
Photographic film and paper	1,449	1,435	1,767	318	10.4
Optical fibers, optical fiber bundles and cables	1,507	1,440	1,748	241	7.7
Blank and prerecorded media	1,672	1,480	1,612	-60	-1.8
Electric sound and visual signaling apparatus	1,332	1,637	1,564	232	8.4
Electrical capacitors and resistors	1,351	1,259	1,183	-168	-6.4
Circuit apparatus exceeding 1000V	699	888	997	297	19.4
Photographic cameras and equipment	853	824	854	1	0.0
Printed circuits	901	790	751	-150	-8.7
Radio and television broadcasting equipment	659	754	721	62	4.6
Office machines	350	341	472	122	16.1
Electron tubes	262	303	288	26	4.9
Watches and clocks	270	294	271	0	0.1
Drawing, drafting, and calculating instruments	237	221	236	-1	-0.2
Total	167,303	171,904	186,902	19,599	5.7

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.7: Energy-related products:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Crude petroleum	198,257	165,070	167,705	-30,552	-8.0
Petroleum products	84,577	69,784	61,058	-23,519	-15.0
Natural gas and components	21,870	12,605	9,434	-12,436	-34.3
Nuclear materials	4,164	5,563	7,308	3,144	32.5
Electrical energy	4,428	3,159	2,290	-2,138	-28.1
Coal, coke, and related chemical products	2,598	2,216	2,007	-591	-12.1
Total	315,893	258,395	249,802	-66,091	-11.1

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.8: Energy-related products:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Petroleum products	151,624	125,210	125,210	-26,413	-9.1
Crude petroleum	114,119	113,610	114,958	839	0.4
Natural gas and components	101,602	72,312	68,745	-32,857	-17.7
Coal, coke, and related chemical products	20,640	18,005	15,453	-5,187	-13.5
Nuclear materials	631	810	1,515	884	54.9
Electrical energy	732	1,187	890	158	10.3
Total	389,347	331,133	326,772	-62,576	-8.4

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.9: Forest products:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022– 24 (million \$)	Average change, 2022–24 (%)
Industrial papers and paperboards	8,628	8,184	9,125	497	2.8
Wood veneer and wood panels	10,817	6,716	7,346	-3,471	-17.6
Lumber	12,269	7,407	7,295	-4,974	-22.9
Printed matter	5,392	4,807	5,290	-102	-1.0
Wood pulp and recovered paper	4,991	3,915	4,554	-437	-4.5
Moldings, millwork, and joinery	5,605	4,271	4,212	-1,393	-13.3
Miscellaneous paper products	3,777	3,578	3,955	177	2.3

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022– 24 (million \$)	Average change, 2022–24 (%)
Paper boxes and bags	3,491	3,141	3,261	-230	-3.4
Printing and writing papers	4,217	2,936	3,137	-1,080	-13.8
Miscellaneous articles of wood	2,522	1,990	2,055	-468	-9.7
Certain specialty papers	1,089	998	1,051	-38	-1.7
Cork and rattan	1,067	849	883	-183	-9.0
Wooden containers	930	829	819	-111	-6.2
Logs and rough wood products	823	755	684	-140	-8.9
Tools and tool handles of wood	584	443	473	-111	-10.0
Newsprint	658	520	435	-223	-18.7
Total	66,859	51,338	54,573	-12,286	-9.7

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.10: Forest products:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022– 24 (million \$)	Average change, 2022–24 (%)
Industrial papers and paperboards	10,333	9,011	9,521	-812	-4.0
Wood pulp and recovered paper	10,658	8,556	8,121	-2,538	-12.7
Logs and rough wood products	3,898	3,787	3,951	53	0.7
Printed matter	3,708	3,490	3,237	-471	-6.6
Lumber	3,446	2,754	2,831	-616	-9.4
Miscellaneous paper products	2,675	2,482	2,528	-148	-2.8
Paper boxes and bags	2,318	2,243	2,242	-76	-1.6
Wood veneer and wood panels	1,206	1,023	987	-219	-9.5
Printing and writing papers	905	763	847	-58	-3.3
Moldings, millwork, and joinery	858	845	738	-119	-7.2
Wooden containers	478	573	611	133	13.0
Certain specialty papers	503	447	452	-51	-5.2
Miscellaneous articles of wood	164	170	156	-8	-2.6
Newsprint	40	44	61	20	22.8
Cork and rattan	36	37	31	-6	-8.3
Tools and tool handles of wood	43	30	27	-15	-20.2
Total	41,270	36,256	36,341	-4,929	-6.2

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Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.11: Minerals and metals:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Precious metals and non- numismatic coins	37,033	37,082	32,825	-4,208	-5.9
Steel mill products	42,230	34,464	31,780	-10,450	-13.3
Miscellaneous products of base metal	25,878	23,381	24,600	-1,278	-2.5
Natural and synthetic gemstones	26,964	22,512	18,631	-8,333	-16.9
Copper and related articles	14,869	14,008	16,826	1,957	6.4
Unwrought aluminum	16,546	12,950	12,403	-4,143	-13.4
Cement, stone, and related products	11,900	10,928	11,155	-745	-3.2
Metal construction components	7,885	8,112	8,341	456	2.9
Nonpowered handtools	8,768	7,848	8,174	-595	-3.5
Aluminum mill products	10,583	7,175	7,610	-2,973	-15.2
Certain base metals and chemical elements	9,100	8,343	7,513	-1,587	-9.1
Industrial fasteners of base metal	8,002	6,525	6,859	-1,143	-7.4
Certain builders' hardware	7,658	6,270	6,692	-965	-6.5
Cooking and kitchen ware	5,794	4,714	5,591	-203	-1.8
Wire products of base metal	5,142	4,202	4,007	-1,135	-11.7
Flat glass	3,040	3,037	3,362	322	5.2
Fabricated structurals	2,529	2,821	3,277	748	13.8
Steel pipe and tube fittings and certain cast products	3,384	2,983	3,205	-178	-2.7
Primary iron products	3,918	2,721	2,737	-1,181	-16.4
Ferrous alloys	5,051	2,918	2,655	-2,397	-27.5
Metal and ceramic sanitary ware	2,454	1,953	2,264	-190	-4.0
Certain cutlery, sewing implements, and related products	2,477	2,190	2,240	-237	-4.9
Certain ores, concentrates, ash, and residues	2,003	1,990	2,130	127	3.1
Metallic containers	2,449	2,075	2,075	-373	-7.9
Zinc and related articles	2,965	2,545	2,062	-903	-16.6
Industrial ceramics	2,060	2,019	1,982	-77	-1.9
Ceramic floor and wall tiles	2,215	1,975	1,953	-262	-6.1
Iron and steel waste and scrap	2,467	2,220	1,945	-522	-11.2
Ceramic household articles	2,471	1,848	1,905	-566	-12.2
Glass containers	1,912	1,666	1,667	-245	-6.6

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Abrasive and ferrous products	1,597	1,503	1,505	-92	-2.9
Household glassware	1,429	1,232	1,350	-80	-2.8
Miscellaneous glass products	1,247	1,121	1,094	-153	-6.4
Lead and related articles	1,525	1,234	952	-574	-21.0
Clays and related mineral products	680	781	890	210	14.4
Iron ores and concentrates	967	820	761	-206	-11.3
Table flatware and related products	855	636	663	-192	-11.9
Fiberglass insulation products	214	234	296	81	17.5
Fluorspar and miscellaneous mineral substances	272	247	246	-26	-5.0
Construction castings and other cast-iron articles	323	216	226	-98	-16.4
Lead ores, concentrates, and residues	11	30	89	79	186.9
Ceramic bricks and similar articles	93	86	87	-6	-3.0
Zinc ores, concentrates, and residues	32	35	45	13	19.1
Precious metal ores and concentrates	3	1	5	2	23.5
Copper ores and concentrates	123	35	0	-122	-94.9
Total	289,117	251,686	246,674	-42,443	-7.6

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.12: Minerals and metals:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Precious metals and non-numismatic coins	39,868	27,207	34,121	-5,747	-7.5
Steel mill products	14,707	14,878	14,148	-559	-1.9
Miscellaneous products of base metal	10,794	10,966	11,303	509	2.3
Copper and related articles	8,938	8,942	10,278	1,340	7.2
Iron and steel waste and scrap	7,684	6,786	6,450	-1,233	-8.4
Certain base metals and chemical elements	4,799	5,790	6,270	1,471	14.3
Aluminum mill products	5,470	5,464	5,324	-145	-1.3
Unwrought aluminum	4,410	4,463	5,291	881	9.5
Industrial fasteners of base metal	4,143	4,832	4,943	800	9.2
Cement, stone, and related products	4,224	4,468	4,568	343	4.0
Nonpowered handtools	3,373	3,304	3,168	-205	-3.1

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Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Copper ores and concentrates	2,960	2,577	2,810	-150	-2.6
Flat glass	2,691	2,839	2,783	92	1.7
Wire products of base metal	2,252	2,441	2,552	299	6.4
Metallic containers	2,243	2,264	2,334	91	2.0
Natural and synthetic gemstones	1,880	3,604	2,102	222	5.7
Steel pipe and tube fittings and certain cast products	1,772	1,798	1,787	15	0.4
Industrial ceramics	1,916	1,800	1,673	-243	-6.6
Certain ores, concentrates, ash, and residues	1,610	2,144	1,665	55	1.7
Zinc ores, concentrates, and residues	1,679	1,110	1,479	-201	-6.2
Metal construction components	1,405	1,439	1,450	45	1.6
Clays and related mineral products	1,446	1,347	1,421	-24	-0.9
Certain builders' hardware	1,379	1,384	1,333	-46	-1.7
Iron ores and concentrates	1,140	1,103	1,084	-56	-2.5
Miscellaneous glass products	1,043	1,030	989	-54	-2.6
Abrasive and ferrous products	1,010	964	970	-40	-2.0
Lead ores, concentrates, and residues	734	773	877	143	9.3
Certain cutlery, sewing implements, and related products	679	630	653	-25	-1.9
Primary iron products	341	538	397	56	7.9
Fabricated structurals	377	331	369	-8	-1.1
Precious metal ores and concentrates	217	222	317	100	20.9
Glass containers	444	339	310	-135	-16.5
Cooking and kitchen ware	366	320	301	-65	-9.4
Zinc and related articles	493	345	289	-204	-23.4
Lead and related articles	173	202	234	62	16.5
Household glassware	197	179	168	-29	-7.6
Metal and ceramic sanitary ware	235	165	158	-78	-18.1
Fluorspar and miscellaneous mineral substances	105	111	131	26	11.6
Fiberglass insulation products	98	95	118	20	9.7
Ceramic household articles	134	104	98	-36	-14.5
Ferroalloys	112	124	96	-17	-7.7
Construction castings and other cast-iron articles	113	111	91	-22	-10.3
Ceramic bricks and similar articles	44	46	51	7	8.1
Ceramic floor and wall tiles	53	54	47	-6	-6.0

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Table flatware and related products	32	26	26	-6	-9.5
Total	139,783	129,657	137,026	-2,758	-1.0

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.13: Miscellaneous manufactures:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Furniture	52,426	41,650	44,116	-8,311	-8.3
Toys and games	36,528	30,789	28,663	-7,864	-11.4
Silverware and related articles of precious metal	16,730	14,201	21,191	4,462	12.5
Works of art and miscellaneous manufactured goods	20,090	18,673	18,070	-2,020	-5.2
Precious jewelry and related articles	14,031	13,970	15,439	1,407	4.9
Luggage, handbags, and flat goods	13,622	11,256	11,442	-2,179	-8.3
Lamps and lighting fittings	10,935	8,870	9,244	-1,691	-8.1
Sporting goods	10,955	7,941	8,447	-2,508	-12.2
Arms, ammunition, and armored vehicles	5,003	4,739	4,858	-145	-1.5
Brooms, brushes, and hair grooming articles	2,429	2,164	2,344	-85	-1.8
Musical instruments and accessories	1,870	1,549	1,567	-304	-8.5
Writing instruments and related articles	1,664	1,327	1,559	-105	-3.2
Bicycles and certain parts	3,100	1,754	1,532	-1,568	-29.7
Costume jewelry and related articles	1,077	973	937	-141	-6.7
Prefabricated buildings	644	725	802	158	11.6
Certain other leather goods	1,006	711	711	-296	-16.0
Umbrellas, whips, riding crops, and canes	807	586	637	-169	-11.1
Smokers' articles	370	286	260	-110	-16.1
Apparel fasteners	77	61	56	-21	-14.7
Total	193,363	162,225	171,874	-21,489	-5.7

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.14: Miscellaneous manufactures:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Arms, ammunition, and armored vehicles	5,778	6,617	8,114	2,336	18.5
Precious jewelry and related articles	5,944	7,177	6,618	674	5.5
Works of art and miscellaneous manufactured goods	6,543	6,309	6,169	-373	-2.9
Furniture	4,725	4,831	4,933	208	2.2
Toys and games	2,442	2,618	2,305	-137	-2.8
Sporting goods	1,830	1,581	1,590	-241	-6.8
Lamps and lighting fittings	1,112	1,094	1,089	-23	-1.0
Silverware and related articles of precious metal	2,109	1,234	955	-1,153	-32.7
Luggage, handbags, and flat goods	699	702	740	41	2.9
Musical instruments and accessories	711	731	684	-27	-1.9
Prefabricated buildings	563	527	499	-64	-5.8
Brooms, brushes, and hair grooming articles	376	368	367	-8	-1.1
Writing instruments and related articles	270	347	309	39	7.1
Bicycles and certain parts	219	184	186	-33	-7.8
Smokers' articles	144	126	136	-8	-2.9
Apparel fasteners	149	138	133	-16	-5.4
Costume jewelry and related articles	137	128	127	-10	-3.9
Certain other leather goods	97	98	83	-15	-7.8
Umbrellas, whips, riding crops, and canes	43	37	33	-10	-12.3
Total	33,889	34,848	35,069	1,180	1.7

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.15: Machinery:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022– 24 (%)
Household appliances, including commercial applications	40,472	38,264	40,444	-28	0.0
Air-conditioning equipment and parts	28,215	28,174	30,822	2,608	4.5
Electrical transformers, static converters, and inductors	19,991	23,897	25,985	5,994	14.0
Miscellaneous machinery	21,428	21,584	23,629	2,200	5.0
Electric motors, generators, and related equipment	20,007	19,594	20,327	319	0.8
Semiconductor manufacturing equipment and robotics	18,123	16,703	19,334	1,210	3.3
Taps, cocks, valves, and similar devices	17,346	16,852	17,853	506	1.4
Farm and garden machinery and equipment	16,620	16,097	14,346	-2,274	-7.1
Nonautomotive insulated electrical wire and related products	13,819	13,285	14,298	479	1.7
Centrifuges and filtering and purifying equipment	11,323	11,875	12,473	1,149	5.0
Pumps for liquids	9,608	9,581	9,914	307	1.6
Industrial thermal-processing equipment and furnaces	7,185	7,336	9,153	1,969	12.9
Mineral processing machinery	6,140	7,232	7,974	1,834	14.0
Mechanical power transmission equipment	6,980	6,982	7,072	93	0.7
Portable electric handtools	6,406	5,070	5,812	-595	-4.8
Metal cutting machine tools	5,265	5,633	5,246	-20	-0.2
Molds and molding machinery	4,985	5,211	5,059	74	0.7
Wrapping, packaging, and can-sealing machinery	4,237	4,649	4,940	703	8.0
Metal forming machine tools	1,938	2,365	2,639	701	16.7
Non-metalworking machine tools	2,873	2,625	2,518	-355	-6.4
Pulp, paper, and paperboard machinery	1,998	2,308	2,290	292	7.0
Industrial food-processing and related machinery	2,233	2,466	2,258	25	0.6
Welding and soldering equipment	1,927	1,816	1,891	-37	-1.0
Electric lamps (bulbs) and portable electric lights	1,903	1,603	1,761	-142	-3.8
Printing and related machinery	1,518	1,647	1,437	-81	-2.7
Metal rolling mills	668	860	1,420	751	45.7
Machine tool accessories	1,491	1,358	1,413	-78	-2.7
Nonelectrically powered handtools	1,674	1,345	1,347	-328	-10.3

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022– 24 (%)
Boilers, turbines, and related machinery	1,045	1,111	1,286	241	10.9
Textile machinery	1,658	1,420	1,178	-480	-15.7
Scales and weighing machinery	839	808	856	17	1.0
Total	279,917	279,752	296,974	17,057	3.0

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.16: Machinery:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Semiconductor manufacturing equipment and robotics	30,222	24,790	25,266	-4,955	-8.6
Taps, cocks, valves, and similar devices	10,312	11,140	11,706	1,394	6.5
Miscellaneous machinery	10,251	11,490	11,491	1,240	5.9
Farm and garden machinery and equipment	12,341	13,249	10,997	-1,344	-5.6
Centrifuges and filtering and purifying equipment	10,101	10,051	9,234	-866	-4.4
Air-conditioning equipment and parts	7,778	8,405	8,431	652	4.1
Electric motors, generators, and related equipment	6,664	7,256	7,832	1,168	8.4
Pumps for liquids	6,011	6,604	6,849	838	6.7
Household appliances, including commercial applications	7,845	7,073	6,767	-1,078	-7.1
Nonautomotive insulated electrical wire and related products	6,585	6,691	6,341	-244	-1.9
Industrial thermal-processing equipment and furnaces	4,102	4,332	4,368	266	3.2
Electrical transformers, static converters, and inductors	3,731	4,342	4,106	375	4.9
Mechanical power transmission equipment	3,761	3,948	3,924	163	2.1
Metal cutting machine tools	1,878	2,065	1,900	22	0.6
Molds and molding machinery	1,816	1,858	1,641	-176	-5.0
Industrial food-processing and related machinery	1,194	1,299	1,383	189	7.6
Welding and soldering equipment	932	1,159	1,037	104	5.5
Boilers, turbines, and related machinery	1,116	947	1,003	-113	-5.2

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Mineral processing machinery	931	980	1,000	69	3.6
Printing and related machinery	1,013	984	926	-87	-4.4
Metal forming machine tools	1,087	1,080	890	-197	-9.5
Wrapping, packaging, and can- sealing machinery	883	935	842	-41	-2.4
Non-metalworking machine tools	806	739	771	-36	-2.2
Pulp, paper, and paperboard machinery	744	830	718	-27	-1.8
Machine tool accessories	455	487	510	55	5.9
Nonelectrically powered handtools	552	521	495	-56	-5.2
Textile machinery	538	505	435	-103	-10.1
Electric lamps (bulbs) and portable electric lights	386	377	393	6	0.8
Portable electric handtools	323	304	332	9	1.3
Scales and weighing machinery	193	192	208	16	4.0
Metal rolling mills	219	257	184	-34	-8.2
Total	134,772	134,890	131,979	-2,793	-1.0

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.17: Transportation equipment:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Motor vehicles	207,580	258,473	271,003	63,422	14.3
Certain motor-vehicle parts	104,678	109,600	113,017	8,339	3.9
Aircraft, spacecraft, and related equipment	26,952	30,005	35,244	8,292	14.4
Internal combustion piston engines, other than for aircraft	33,222	33,779	33,740	518	0.8
Primary cells and batteries and electric storage batteries	24,643	30,832	33,422	8,779	16.5
Aircraft engines and gas turbines	23,878	28,842	31,008	7,131	14.0
Construction and mining equipment	23,985	29,137	24,458	473	1.0
Ignition, starting, lighting, and other electrical equipment	11,523	11,598	11,610	87	0.4
Forklift trucks and similar industrial vehicles	6,401	9,212	10,197	3,796	26.2
Powersport vehicles	10,350	10,019	8,550	-1,801	-9.1
Motors and engines, except internal combustion, aircraft, or electric	6,290	6,124	6,522	232	1.8
Trailers, semi-trailers, and parts	6,554	6,735	5,511	-1,043	-8.3
Ball and rollers bearings	4,654	4,183	4,422	-233	-2.5

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Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Ships, tugs, pleasure boats, and similar vessels	4,198	4,400	3,815	-382	-4.7
Rail locomotive and rolling stock	3,042	2,853	2,447	-595	-10.3
Total	497,951	575,791	594,965	97,014	9.3

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.18: Transportation equipment:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Aircraft, spacecraft, and related equipment	87,485	105,545	112,418	24,933	13.4
Motor vehicles	78,968	85,521	82,010	3,042	1.9
Certain motor-vehicle parts	35,668	42,019	38,952	3,283	4.5
Internal combustion piston engines, other than for aircraft	20,859	21,808	21,627	768	1.8
Construction and mining equipment	13,032	15,610	13,799	767	2.9
Aircraft engines and gas turbines	9,331	10,599	12,986	3,655	18.0
Primary cells and batteries and electric storage batteries	4,948	6,221	9,852	4,904	41.1
Ignition, starting, lighting, and other electrical equipment	3,316	3,698	3,606	289	4.3
Trailers, semi-trailers, and parts	4,924	4,148	3,540	-1,383	-15.2
Motors and engines, except internal combustion, aircraft, or electric	2,815	3,182	3,410	595	10.1
Ball and rollers bearings	2,921	3,079	3,228	307	5.1
Forklift trucks and similar industrial vehicles	2,747	3,065	3,224	477	8.3
Rail locomotive and rolling stock	3,123	3,200	3,185	62	1.0
Ships, tugs, pleasure boats, and similar vessels	2,319	2,527	2,450	131	2.8
Powersport vehicles	2,460	2,619	2,129	-331	-7.0
Total	274,917	312,843	316,416	41,499	7.3

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.19: Textiles, apparel, footwear:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Apparel	110,799	86,410	88,756	-22,043	-10.5
Footwear	35,865	25,724	27,319	-8,546	-12.7
Home furnishings	13,773	11,698	12,610	-1,163	-4.3
Miscellaneous textile products	11,651	9,297	10,052	-1,600	-7.1
Fabrics	8,493	7,140	7,457	-1,036	-6.3
Fibers and yarns, except raw cotton and raw wool	4,545	3,599	3,556	-990	-11.6
Carpets and rugs	3,583	3,210	3,394	-189	-2.7
Total	188,709	147,078	153,144	-35,565	-9.9

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.

Table A.20: Textiles, apparel, footwear:

In millions of dollars and percentages.

Product group (digest)	2022 (million \$)	2023 (million \$)	2024 (million \$)	Absolute change, 2022–24 (million \$)	Average change, 2022–24 (%)
Fabrics	5,705	5,324	5,187	-519	-4.7
Fibers and yarns, except raw cotton and raw wool	4,593	4,076	3,935	-659	-7.4
Miscellaneous textile products	3,723	3,434	3,422	-301	-4.1
Apparel	3,813	3,264	3,294	-519	-7.1
Footwear	899	913	930	31	1.7
Carpets and rugs	675	663	660	-14	-1.1
Home furnishings	575	514	496	-79	-7.1
Total	19,984	18,187	17,924	-2,060	-5.3

Source: USITC DataWeb/Census, accessed June 30, 2025.

Note: Average change is calculated using the compound annual growth rate formula.