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Taiwan's Trade: An Overview of Taiwan's Major Exporting Sectors

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Patrick Crotty

Abstract

This paper provides an overview of Taiwan’s merchandise trade, including its major exporting sectors and its major export destinations. Although Taiwan’s semiconductors trade accounts for most of Taiwan’s exports, this paper explores Taiwan’s exports beyond semiconductors, noting both how the semiconductors ecosystem supports economic activity in Taiwan’s machinery and electronics sector more broadly, and discusses Taiwan’s other prominent exports, including metal products, plastics, and rubber. Taiwan’s major trading partners are the People’s Republic of China (China), the United States, and the Association of Southeast Asian Nations (ASEAN) trading bloc, with China being the largest trading partner by dollar value.[1] However, due to geopolitical tensions, Taiwan seeks to increase its trade relationship with its other trading partners. At the same time, the United States seeks to increase its trade relationship with Taiwan.

[1] In this paper, “China” refers to Mainland China or the People’s Republic of China.

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Introduction

The COVID-19 pandemic triggered a series of events that highlighted Taiwan's role in the global economy. These events included nationwide lockdowns exposing chokepoints in fragile supply chains, heightened demand for consumer electronics, and the semiconductor chip shortage ("chip shortage" hereafter).[1] Furthermore, tensions between the United States and the People's Republic of China (China) have led some policymakers to turn to Taiwan as an alternate supplier for certain technologies, and efforts to "reshore" semiconductor production have led to policymakers to seek Taiwan as a source of foreign direct investment.

The United States and Taiwan have begun a series of negotiations under the U.S.-Taiwan Initiative on 21st Century Trade. The first agreement under the U.S.-Taiwan Initiative on 21st Century Trade—the United States-Taiwan Initiative on 21st-Century Trade First Agreement Implementation Act—was signed into law on August 7, 2023, which paved the way for increased trade between the United States and Taiwan through a set of governance mechanisms. However, the agreement does not include changes to tariff rate quotas or tariff reductions. The second negotiating round under this agreement occurred in August 2023.[2] As Taiwan's role in the global economy continues to increase in importance, two important questions for policymakers and multinational firms have arisen: first, what are Taiwan's key exporting industries, and second, what do trade flows between Taiwan and its largest trading partners look like? To answer these questions, this paper introduces Taiwan's economic and political landscape, then analyzes Taiwan's trade data by sector, then by trade partner. During each step of this analysis, this paper provides the historical and economic context behind these trade patterns.

Taiwan's Economy

Taiwan is a high-income market economy with a nominal gross domestic product (GDP) of almost $762 billion at the 2022, making it the 21st-largest economy in the world, falling just behind Switzerland.[3] Taiwan's GDP per capita was $32,690 at the end of 2022, with a population of almost 24 million people.[4]

[1] Although "semiconductor," "chip," and "integrated circuit," are often used interchangeably, a technical distinction exists between these terms. The term "semiconductor" refers to the material used in chips production that can act as both an electric conductor and insulator. The term "integrated circuit" refers to the combination of transistors fabricated on the semiconductor material. The term "chip" or "microchip" is the collective name for these products because chips are made of semiconductive materials on which integrated circuits are fabricated. This paper uses the term "semiconductor" as a general term encompassing chips, integrated circuits, their component assemblies, and as a modifier when discussing the industry and knowledge associated with production of such products and technologies. This paper uses the term "chip" when referring to a semiconductor and integrated circuit assembled as a tradeable good. IBE, "Comparison between Chips, Semiconductors and Integrated Circuits," September 18, 2023.

[2] USTR, "Statement from USTR Spokesperson," June 1, 2023; USTR, "United States and Taiwan Hold Second Negotiating Round for the U.S.-Taiwan Initiative on 21st Century Trade," accessed November 30, 2023.

[3] Bajpai, "An Overview of Taiwan's Economy," October 18, 2022; International Monetary Fund (IMF), "GDP, Current Prices," 2023.

[4] During the same period, China's GDP per capita was $12,670, Japan's capita was $33,850, South Korea's was $32,420 and Hong Kong's was $48,150. Worldometer, "Taiwan Population," 2023; International Monetary Fund (IMF), "GDP, Current Prices," 2023.

In 2022, Taiwan's GDP per capita passed South Korea's GDP per capita for the first time in 18 years.[5] Manufacturing accounts for nearly 38 percent of GDP, while services account for just over 60 percent.[6] More than 98 percent of Taiwan's firms are small and medium sized enterprises (SMEs), which employ more than 80 percent of Taiwan's workforce.[7]

Since the early 2000s, Taiwan's economic growth came from exporting intermediate goods—mostly electronics products—to China for final assembly. However, Taiwan's exports to China have been on the decline. This is due to rising Chinese labor costs, competition from producers in China, decreased foreign direct investment from Taiwan, and geopolitical tensions between China and Taiwan.[8]

Between 2019 and early 2021, Taiwan's economy experienced significant growth due to high demand for semiconductors, consumer electronics, and consumption products.[9] However, high inflation, monetary policy tightening, and China's sluggish economic performance has weakened demand for electronics products.[10] As a result, Taiwan's economy began a downward trend in 2021.[11] Furthermore, Taiwan is on a small island with a narrow resource base, which makes Taiwan highly dependent on imports of food and energy products. Taiwan's wages have also stagnated since the early 2000s and, its population started declining in 2020, and the nation faces high youth unemployment.[12]

To boost the economy, the Taiwan government has introduced the 5+2 Plan, which seeks to promote selected industries through infrastructure development, regulatory and legal reform, capital access, and research and development (R&D) funding.[13] The goal of the 5+2 Plan is to create jobs, spur innovation,

[5] This change was caused by South Korea's falling GDP between 2021 and 2022, while Taiwan's' GDP fell comparatively less than South Korea's. During this period, South Korea's nominal GDP remained more than twice as large as Taiwan's. Lee, "Korea Overtaken by Taiwan in per Capita GDP Due to Export Slump," May 1, 2023; International Monetary Fund (IMF), "GDP, Current Prices," 2023.
[6] Taiwan Ministry of Foreign Affairs, "Economy," 2023. Agriculture accounts for the remaining two percent.
[7] Taipei Economic and Cultural Office in Los Angeles, "SMEs Serve as the Backbone of Taiwan's Stable Economic Development," December 15, 2022.
[8] These geopolitical tensions are discussed in more detail in the section focused on Taiwan-China trade. Chiang, "Taiwan's Economy Is Breaking Away From China's," March 22, 2023; "Changing Economic Trends in Taiwan," August 20, 2019.
[9] Biswas, "Surging GDP Growth in Taiwan Boosted by Electronics Exports," May 7, 2021.
[10] Crotty, Lotze, and Taylor, "Trends in US Merchandise Trade, 2022, Part 4," September 2023, 9; Chiang, "Taiwan's Gloomy Economy Adds Uncertainty to Prospects for the 2024 Presidential Election," August 9, 2023; FocusEconomics, "Taiwan Central Bank Hikes Rates in September," September 22, 2022.
[11] Chiang, "Taiwan's Gloomy Economy Adds Uncertainty to Prospects for the 2024 Presidential Election," August 9, 2023.
[12] Elaine Huang, "The Forces behind Taiwan's Stagnant Wages," January 11, 2020; Chia, Chen, and Tan, "Squeezed by Inflation and Low Salaries, Taiwan's Young Adults See Their Dreams Fading," August 6, 2023.
[13] Industries targeted in the 5+2 Plan include 5 pillar industries identified during President Tsai Ing-Wen's campaign—IoT, biomedical sciences, green energy, smart machinery, and defense. The Plan was later expanded to include two more industries, "new agriculture" and the circular economy. Since the Plan's expansion and renaming, it has further expanded to include the following pillars: the digital economy, cultural innovation, and semiconductors and integrated circuit design. Even with later additions to the Plan, the 5+2 Plan's name has remained the same. The 5+2 Plan seeks to promote these industries through investment, infrastructure funding, and regulatory and legal reform. Ferry, "The 5+2 Industrial Innovation Plan," May 8, 2017.

distribute wealth equitably, and shift Taiwan's economy from contract manufacturing to high value-added industries.[14]

Geopolitical Risk

Taiwan's largest economic risk is its precarious geopolitical position. China views Taiwan as part of its territory, despite Taiwan being independently governed since 1949.[15] Taiwan maintains a democratically elected government while the government of the People's Republic of China (*i.e.* Mainland China) argues that it is the only legitimate government of China, including Taiwan.[16] China views unification with Taiwan as "indispensable for the realization of China's rejuvenation" and tensions between the two economies have been on the rise in recent years.[17] Exacerbating these tensions, Taiwan is separated from China by the Taiwan Strait, which is only 70 miles wide at its narrowest point.[18] Due to Taiwan's fraught diplomatic status, Taiwan only has formal diplomatic relations with 12 countries. Of these countries, most are small island nations.[19] Despite limited formal diplomatic relations, Taiwan maintains membership or observer status in many intergovernmental organizations and strong relations with many countries.[20]

The United States and Taiwan do not have formal diplomatic relations. Instead, they maintain a "robust unofficial relationship" through the American Institute in Taiwan, a non-governmental organization.[21] The United States supports Taiwan's involvement in international organizations as an official member in organizations where statehood is not a requirement, and as a meaningful participant in organizations where statehood is a requirement.[22] Taiwan is a member of the World Trade Organization (WTO) and operates as a "separate customs territory."[23] The United States and Taiwan conduct bilateral trade dialogues through the U.S.-Taiwan Trade and Investment Framework Agreement.[24]

Taiwan's Trade

Taiwan is the 16th-largest merchandise exporter in the world and 17th-largest merchandise importer in the world.[25] Together, Taiwan's total trade volume reached almost $828 billion in 2021 with a $65.3 billion trade surplus.[26] This section provides a brief overview of Taiwan's exports, then focuses on Taiwan's three largest export sectors: machinery and electronics, base metals and articles of base metal,

[14] Ferry, "The 5+2 Industrial Innovation Plan," May 8, 2017.
[15] Maizland, "Why China-Taiwan Relations Are So Tense," April 18, 2023.
[16] Maizland, "Why China-Taiwan Relations Are So Tense," April 18, 2023.
[17] Maizland, "Why China-Taiwan Relations Are So Tense," April 18, 2023.
[18] Kuok, "Narrowing the Differences between China and the US over the Taiwan Strait," July 13, 2022.
[19] Taiwan's diplomatic allies are the following: Belize, Eswatini, Guatemala, Haiti, the Marshall Islands, Palau, Paraguay, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Tuvalu, and Vatican City. Blanchard, "And Then There Were 12," January 15, 2024.
[20] Government Portal of the Republic of China, "Foreign Affairs," November 30, 2023.
[21] USDOS, "U.S. Relations With Taiwan," May 28, 2022.
[22] USDOS, "U.S. Relations With Taiwan," May 28, 2022.
[23] Charnovitz, "Taiwan's WTO Membership and Its International Implications," 2006.
[24] ITA, "Taiwan Country Commercial Guide," January 10, 2024.
[25] Taiwan Ministry of Foreign Affairs, "Economy," 2023.
[26] Taiwan Ministry of Foreign Affairs, "Economy," 2023.

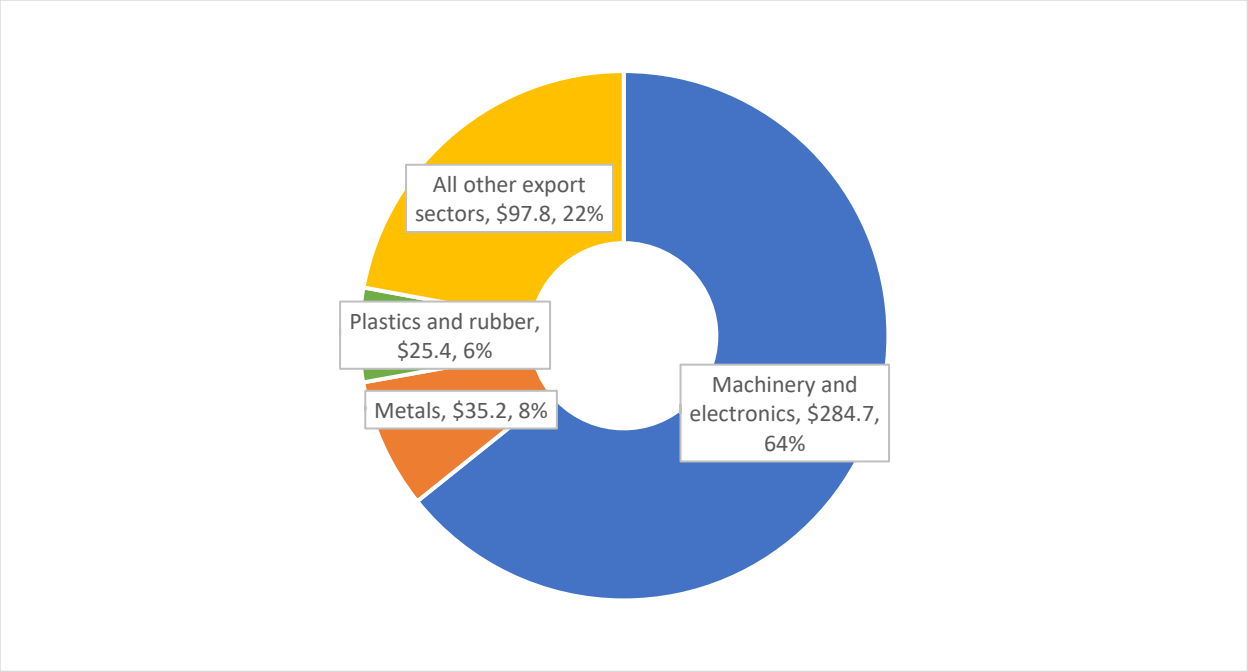
and plastics and rubber. Next, this section provides information about trade between Taiwan and its major trading partners: China, the Association of Southeast Asian Nations (ASEAN) Member States, and the United States. Goods are classified into sectors in accordance with Harmonized System (HS) codes.[27]

Taiwan's trade volume is mostly in the machinery and electronics sector. In 2022, more than 60 percent of Taiwan's exports by value were in this sector (figure 1). Integrated circuits, including semiconductors and peripheral circuits, make up the largest share of Taiwan's machinery and electronics exports, at just over 60 percent of exports within the machinery and electronics sector and approximately 40 percent of all exports by value. Products in the machinery and electronics sector also make up approximately 40 percent of Taiwan's overall imports.[28] Taiwan's imports and exports increased significantly between 2020 and 2021 due to strong global demand for technology during the COVID-19 pandemic.[29] Strong electronics exports, particularly of chips, and low domestic COVID-19 cases, led to Taiwan's GDP increasing during this time, while most of the global economy contracted due to COVID-19.[30] Strong demand for electronics products and the restart of automotive production across the globe sustained high export values in 2021.[31] These factors also drove higher import values for Taiwan, the majority of which are of products in the machinery and electronics sector (figure 2).[32] Higher prices for energy products and raw material costs also drove an increase in import values during this period.[33]

[27] The HS grouped into 22 sections. Each of these sections contain one more chapters of the HS. HS chapters group goods at the industry level. HS sections aggregate HS chapters into commodity sectors. The U.S. Harmonized Tariff Schedule (HTS) aligns with the HS chapters and sections, except for chapters 98 and 99, which contain special classification provisions and temporary legislations and modifications, respectively. HS sections and their constituent chapters are displayed in Appendix A.
[28] S&P Global, "Global Trade Atlas Database," accessed November 29, 2023. Rachel Chang, "From Chips to Beyond," May 15, 2023.
[29] Kao and Shen, "Taiwan GDP Storms to Decade High in 2021 on Strong Exports," January 27, 2022.
[30] Biswas, "Surging GDP Growth in Taiwan Boosted by Electronics Exports," May 7, 2021.
[31] Biswas, "Surging GDP Growth in Taiwan Boosted by Electronics Exports," May 7, 2021.
[32] Biswas, "Surging GDP Growth in Taiwan Boosted by Electronics Exports," May 7, 2021.
[33] Garcia-Herrero, "High Inflation and Weak Global Demand to Dent Taiwan's Economic Growth," July 28, 2022.

Figure 1 Taiwan's exports by sector, 2022.

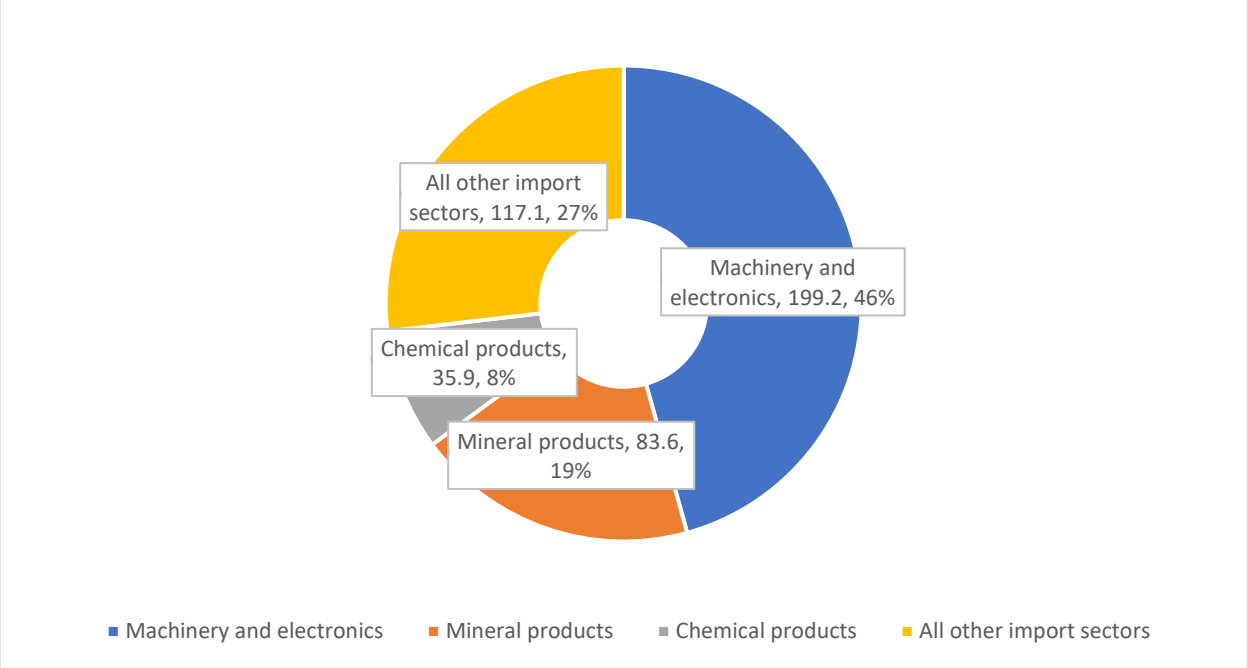
In Billions of U.S. dollars



Source: Compiled by author. S&P Global, GTA, list of HS headings by section of the HTS code, accessed November 29, 2023, correspond to those in appendix A of the report.

Figure 2 Taiwan's imports by sector, 2022.

In Billions of U.S. dollars



Source: Compiled by author. S&P Global, GTA, list of HS headings by section of the HTS code, accessed November 29, 2023, correspond to those in appendix A of the report.

Taiwan's Export Sectors

Taiwan's top three export sectors are machinery and electronics, metals, and plastics and rubber, at 64.2 percent, 7.9 percent, and 5.7 percent of all exports in 2022, respectively.[34] This section explores each of these sectors in more detail, including the top products exported in each sector and the historical and recent developments in each of these sectors.

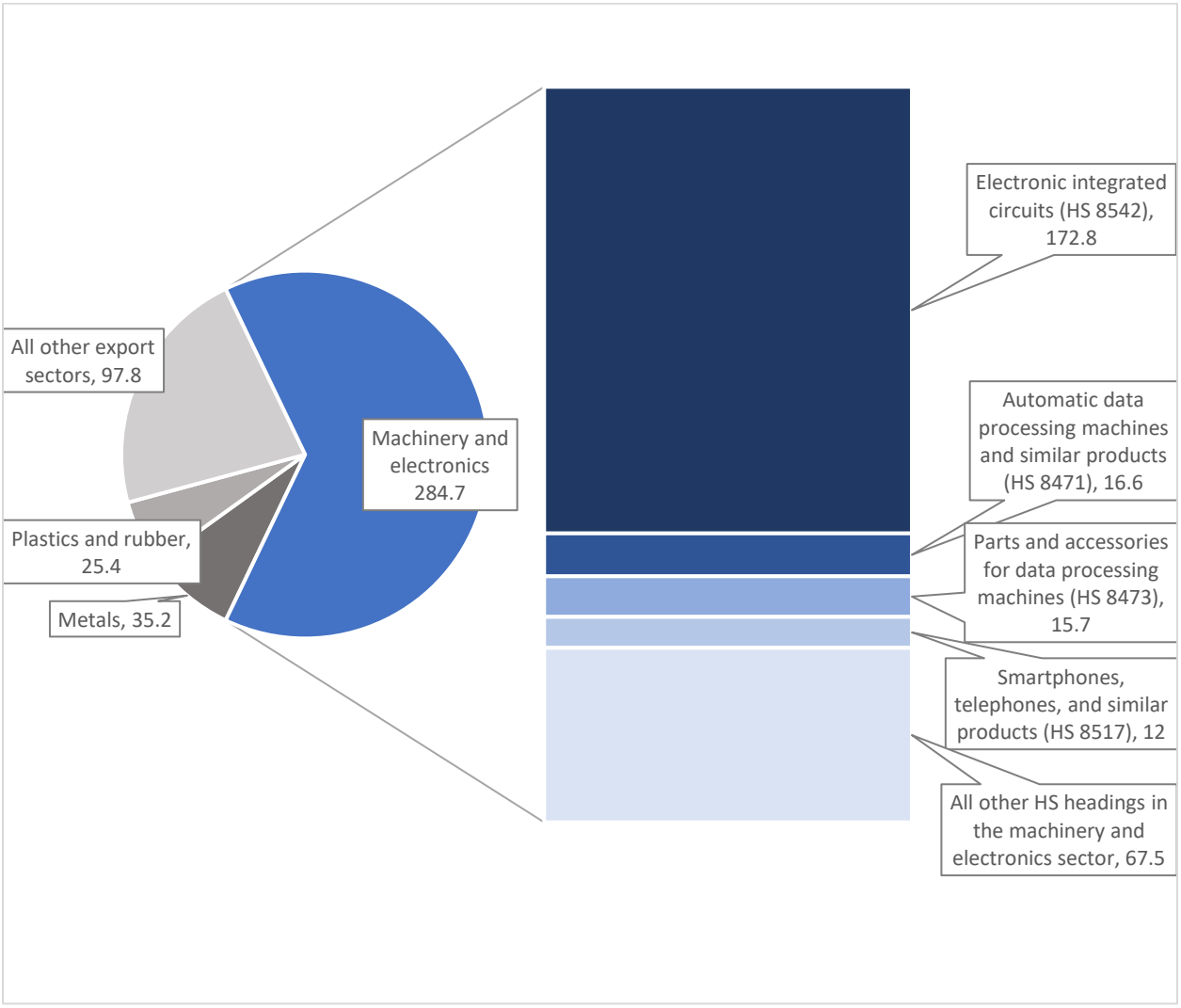
Machinery and Electronics

Taiwan has a highly developed economy with strengths in advanced technology, particularly related to the manufacture of semiconductors and electronics products.[35] This is due to Taiwan's semiconductor foundries, which act as contract manufacturers for companies that design chips. Taiwan's semiconductor foundry industry accounts for 60 percent of global foundry revenue. Taiwan Semiconductor Manufacturing Corporation (TSMC) is the largest semiconductor foundry in the world and one of the only companies capable of manufacturing 3 nanometer (nm) chips. [36] In 2021, Taiwan produced almost all the world's advanced chips (92 percent of chips less than 10nm) and more than a third of the world's less advanced chips.[37] As a result of Taiwan's dominance in the semiconductor industry, 64.2 percent of Taiwan's exports by value in 2022 were in the machinery and electronics sector. Nearly 40 percent of Taiwan's overall exports—including exports outside of the machinery and electronics sector—are specifically electronic integrated circuits and parts thereof (HS 8542) (figure 3).

[34] S&P Global, "Global Trade Atlas Database," accessed November 29, 2023
[35] USDOS, "2023 Investment Climate Statements: Taiwan," 2023.
[36] 3 nm chips bring more performance and efficiency than older chips, which may have applications in more advanced computing processes like artificial intelligence. PCMag, "Definition of Integrated Circuit," accessed August 31, 2023; TSMC, "3nm Technology," accessed November 30, 2023; Rachel Chang, "From Chips to Beyond," May 15, 2023; Naseer, "How Taiwan Came to Dominate the Semiconductor Industry," January 11, 2023.
[37] Vest, Kratz, and Goujon, "The Global Economic Disruptions from a Taiwan Conflict," December 14, 2022.

Figure 3 Taiwan's exports in the machinery and electronics sector, 2022.

In Billions of U.S. dollars



Source: Compiled by author. S&P Global, GTA, accessed November 29, 2023. HS headings displayed in this figure are listed in Appendix B.

Taiwan's technical expertise in the semiconductor industry comes from strategic investment in the latter part of the twentieth century. During the late 1960s and early 1970s, Taiwan laid for the foundation for its competitive advantage in semiconductors. In the early 1970s, the Taiwan government promoted technology transfer and invested in higher education, launched a venture capital industry, and fostered relationships with Taiwanese-Americans working in business and academia. These connections helped establish the Industrial Technology Research Institute (ITRI) in 1973.[38] ITRI serves as a domestic knowledge base for semiconductors, and created international linkages between the United States and Taiwanese semiconductor industries.[39] In 1976, ITRI signed a deal with RCA, an American consumer

[38] National Research Council, *Securing the Future*, May 8, 2003, 149–53; Feigenbaum, "Assuring Taiwan's Innovation Future," accessed August 16, 2023, 7–9; Rubinstein, *Technology Transfer Between the US, China and Taiwan, 0 ed.*, June 26, 2013, 28.

[39] Shih, "Scrutinizing an Economic Development Model," 2009, 2–3.

electronics firm, and the Taiwan government for a technology transfer that opened a 3-inch wafer fab that marked the beginning of Taiwan's semiconductor industry.[40] In 1987, the Taiwan government established a joint venture with Phillips Electronics, a Dutch company, and created TSMC. Using the technological expertise developed through the ITRI, TSMC pioneered the foundry model. The foundry model allowed TSMC to specialize in semiconductor manufacturing, leading to Taiwan's success in the semiconductor industry.[41]

Taiwan's advanced manufacturing capacity and semiconductor expertise has created a vibrant domestic information communication technology (ICT) industry. Together, semiconductors and other electronics equipment manufacturing, including telecommunications equipment, fiber optic cables, and computers, total 17 percent of Taiwan's GDP and support various activities in the services industry, including financial services and technology design, and software services.[42] Taiwan's strong ICT industry has strong linkages with U.S. ICT suppliers, including through providing Original Equipment Manufacturing (OEM) services.[43] Due to this robust tech ecosystem, Taiwan is home to other globally-recognized brands like Foxconn (trading as Hon Hai Technology Group in Taiwan and China), which is the world's largest electronics manufacturer and makes consumer electronics, including iPhones and PlayStations, and electronics components like semiconductors and optical components.[44]

The overwhelming share of Taiwan's global machinery and electronics products are classified under the HS as electronic integrated circuits and micro assemblies and parts thereof, making up more than 60 percent of Taiwan's machinery and electronics exports in 2022.[45] The value of these exports has risen relative to Taiwan's other exports, from 53.2 percent of machinery exports by value in 2018 to 60.7 percent in 2022.[46] This increase is likely due to higher global demand for electronics, including ICT infrastructure and consumer electronics, following COVID-19 and higher export values due to the semiconductor shortage starting in 2020. Although supply chain issues during the COVID-19 pandemic reduced the United States' volume of machinery, mechanical appliances, and electrical equipment imports from Taiwan, higher prices offset lower trade volumes to yield a net increase in imports by value from Taiwan during this period.[47] The same factors also drove significant growth in Taiwan's machinery and electronics exports overall (figure 4). Looking forward, tightening monetary policy and poor macroeconomic conditions in China may weaken demand for consumer electronics, leading to lower overall exports of machinery and electronics from Taiwan. However, the growth of artificial intelligence and other forms of advanced computing may mitigate this effect.

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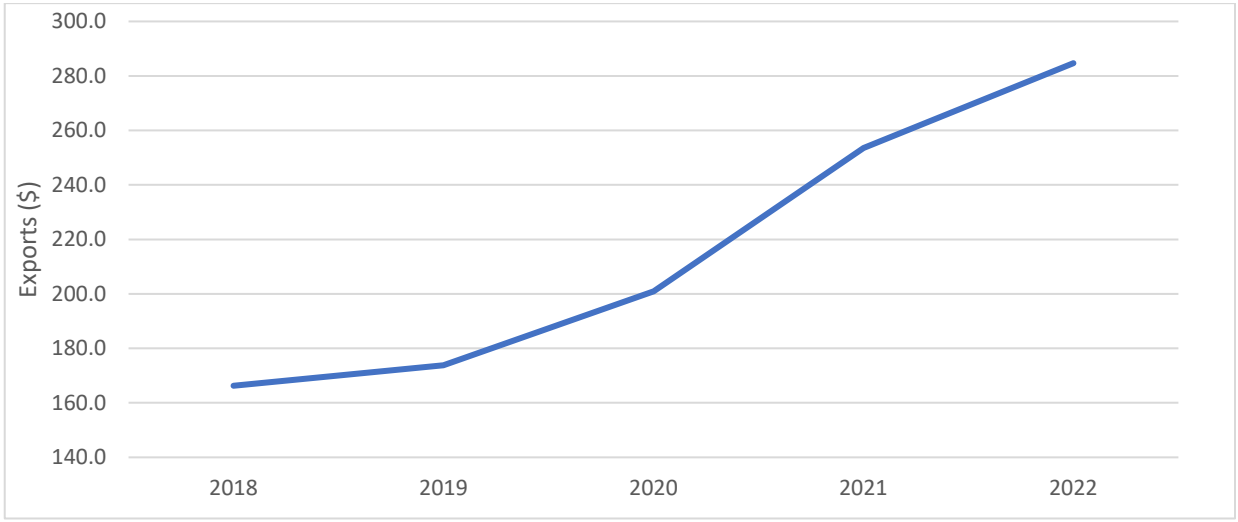
[40] National Research Council, *Securing the Future*, May 8, 2003, 149–53; Meg Chang, "Veteran Tells Story of Taiwan's Semiconductor Industry," June 18, 2010.
[41] National Research Council, *Securing the Future*, May 8, 2003, 149–53; Meg Chang, "Veteran Tells Story of Taiwan's Semiconductor Industry," June 18, 2010.
[42] ITA, "Information Communication Technology," September 16, 2022; KPMG Taiwan, *2022 Taiwan Banking Report*, December 5, 2022.
[43] Original Design Manufacturers (ODMs) design chips and other goods and enter contracts with OEMs to manufacture the designed products at a large scale. While ODMs often have manufacturing capabilities, many ODMs in the semiconductor industry rely on OEMs like TSMC to manufacture chips at a large scale. Integrated device manufacturers (IDMs) design, manufacture, and assemble chips.
[44] Foxconn, "Products and Services," accessed November 30, 2023.
[45] S&P Global, "Global Trade Atlas Database," HS Section XVI, accessed November 29, 2023.
[46] S&P Global, "Global Trade Atlas Database," HS Section XVI, accessed November 29, 2023.
[47] Crotty, Lotze, and Taylor, "Trends in US Merchandise Trade, 2022, Part 4," September 2023, 5–12; Bouchard Siddiq, "The COVID-19 Factor and Impact of US-China Trade War on Taiwan," July 1, 2020.

Further, competition from other economies may threaten Taiwan's dominance in the semiconductor industry in the future. The United States, China, and European Union are investing in domestic leading-edge chips manufacturing capacity. Other economies like Thailand, Malaysia, and the Philippines are developing capacity in chip assembly, testing and manufacturing (ATP) and making investments to climb the global value chain for chips production. If successful, these investments could threaten Taiwan's market share in chips production, which may harm Taiwan's economic and national security prospects. [48] Furthermore, there have been discussions that TSMC's overseas investments could lead to the "hollowing out" of Taiwan's semiconductor industry. The American Chamber of Commerce in Taiwan, however, remains confident that Taiwan will continue domestically producing its most advanced semiconductors.[49]

Figure 4 Taiwan's exports in the machinery and electronics sector.

In Billions of U.S. dollars



Source: Compiled by author. S&P Global, GTA, list of HS subheadings in Section XVI of the HTS code, accessed November 29, 2023.

Metal products

Metal products exports compose nearly 8 percent of Taiwan's exports by value. Taiwan's metal exports are led by metals fasteners, such as screws, nuts, and bolts (HS 7318), followed by hot-rolled flat products of iron and steel (HS 7208) (figure 5). As of 2022, the largest export destinations for goods in

[48] Taiwan's integral role in the semiconductor industry has earned the nickname "silicon shield" because it is considered a deterrent to global conflict. However, questions have arisen regarding the strength of this deterrent. Cronin, "Semiconductors and Taiwan's 'Silicon Shield,'" August 16, 2022; Chiao, "China and US Bolster Semiconductor Independence," December 14, 2023; Shen, "Taiwan's Share in Global Chip Manufacturing Supply Chain to Decline," October 5, 2023; Geraghty, "Taiwan and the Shaky 'Silicon Shield,'" October 24, 2023; Neil, "Doubts Grow over Taiwan's Silicon Shield," March 28, 2023; Powers-Riggs, "Taipei Fears Washington Is Weakening Its Silicon Shield," February 17, 2023.

[49] Mark and Graham, *Relying on Old Enemies*, November 17, 2023, 9.

the metal sector were the United States (26.7 percent of metal exports by value in 2022), China (13.4 percent), Japan (7.9 percent), Vietnam (4.2 percent), and Thailand (3.5 percent).[50]

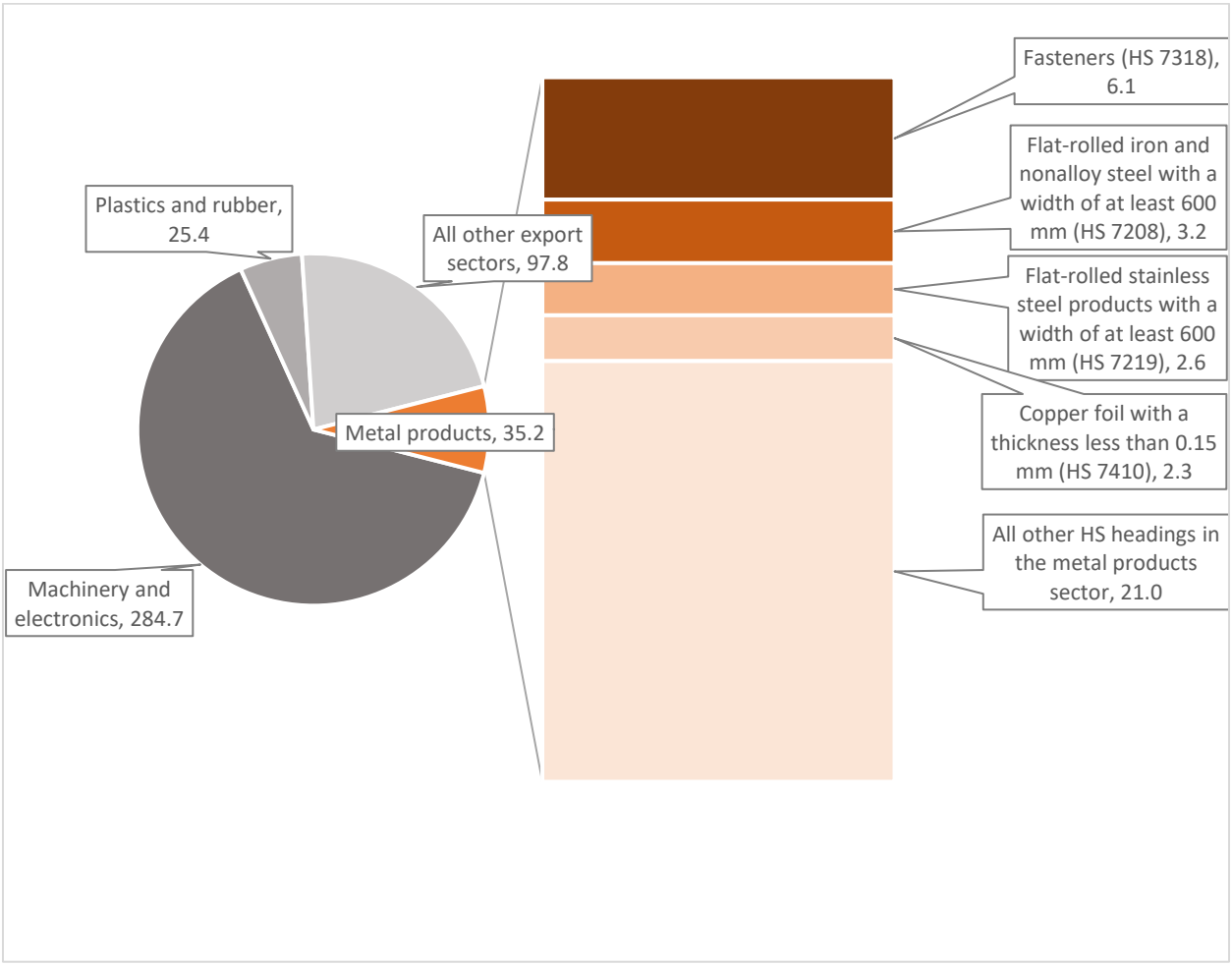
Taiwan is home to more than 1,800 fastener manufacturers, responsible for 13 percent of global fastener production. Taiwan is also the third-largest fastener exporter in the world and largest exporter of fasteners to North America.[51] Most of Taiwan's fastener exports are destined for the United States and Europe.[52] Taiwan continues to innovate in the fasteners market and is moving into higher-value fasteners, such as those used by the aerospace industry.[53]

Despite the size of Taiwan's fastener market, it has been highly volatile in recent years. First, the U.S.-China trade war negatively affected Taiwanese fastener operations in China. This triggered production and supply chain adjustments in the industry. Next, COVID-19 lockdowns in China diverted U.S. and E.U. fastener orders from China to Taiwan starting in February 2020. However, the global spread of the pandemic in March 2020 led to cancelled orders and shipment issues, and eventually, a 10 percent decline in exports between Q1 2019 and Q1 2020.[54]

[50] S&P Global, "Global Trade Atlas Database," HS Section XV, accessed November 29, 2023.
[51] Kastner, "Securing the Future in the Kingdom of Screws," March 15, 2023; Taiwan External Trade Development Council, "Hand Tools and Fastener Industry," accessed December 1, 2023.
[52] DIY International, "Fasteners and connections at Taiwan Fastener," November 4, 2023.
[53] Fastener World, *2019-2022 Taiwan Fastener Export to the U.S*, 2023, 2; Kastner, "Securing the Future in the Kingdom of Screws," March 15, 2023.
[54] Hsu, *Taiwan Fastener Industry Before and After the COVID-19 Pandemic*, 2020.

Figure 5 Taiwan's exports in the metal sector, 2022.

In Billions of U.S. dollars



Source: Compiled by author. S&P Global, GTA, accessed November 29, 2023. HS headings displayed in this figure are listed in Appendix C.

As of 2022, Taiwan is the twelfth-largest steel producer[55]. Its top export destinations for steel were Vietnam (12 percent of Taiwan's steel exports), China (11 percent), Japan (8 percent), and the U.S (8 percent).[56] During this period, the majority of Taiwan's steel exports by value were flat products (i.e. sheets, strips, and plates) and stainless steel products.[57] To remain competitive with lower-priced steel exports from China, Taiwan has focused on technical upgrades, capital investments, more technical products, and R&D.[58]

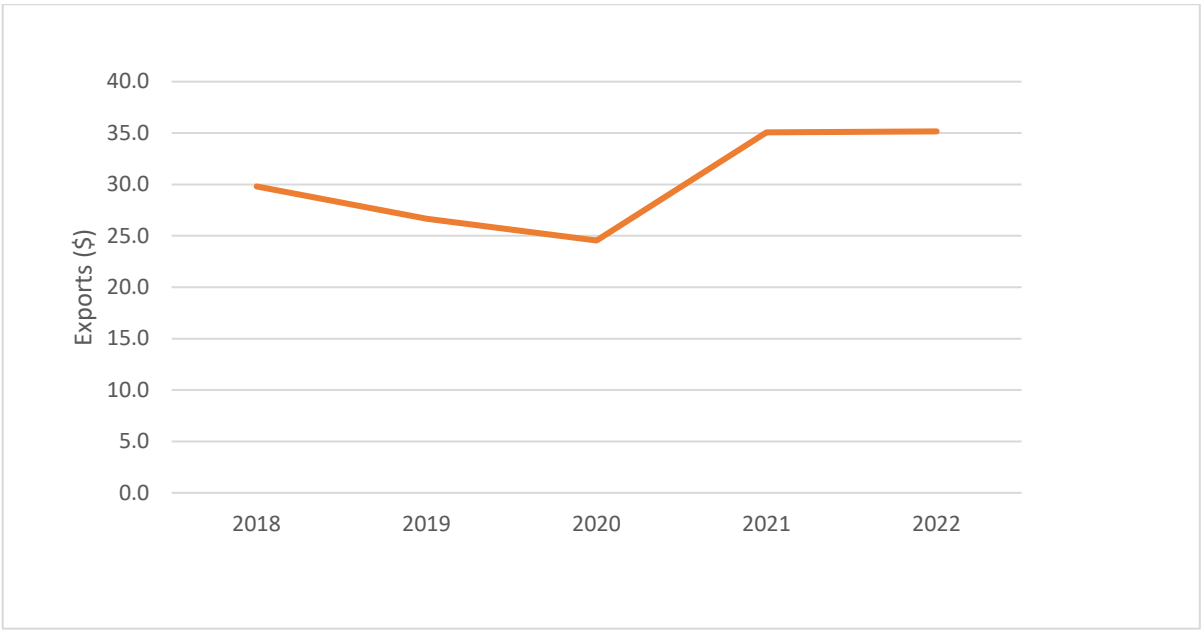
Despite these investments, Taiwan's steel industry exports have slowed in recent years due to the COVID-19 pandemic and higher energy costs (figure 6). Many industrial production and construction activities, which drive demand for steel products, were canceled during the COVID-19 pandemic.

[55] World Steel Association, *World Steel in Figures 2023*, 2023.
[56] ITA, *Steel Exports Report*, May 2019.
[57] ITA, *Steel Exports Report*, May 2019.
[58] Fastener Eurasia Magazine, "Analysis of Taiwan," March 26, 2021.

Lockdowns also limited production across the metals and mining industry.[59] Higher energy costs have also raised production costs for steel. To stabilize energy prices for households and industrial users, the Taiwan government heavily subsidizes electricity prices for households and industries through price fixing and other subsidies.[60] Even with these subsidies, however, electricity prices for steel mills have increased more than 17 percent at a time when spot prices for steel are low.[61] These high energy costs are a result of Taiwan's reliance on imported energy products. In 2020, Taiwan imported 98 percent of its energy, primarily as coal, crude oil, or petroleum, mostly from the Middle East.[62]

Figure 6 Taiwan's metal exports.

In Billions of U.S. dollars



Source: Compiled by author. S&P Global, "Global Trade Atlas Database," list of HTS section XV of the HTS code, accessed November 29, 2022.

Plastics and Rubber

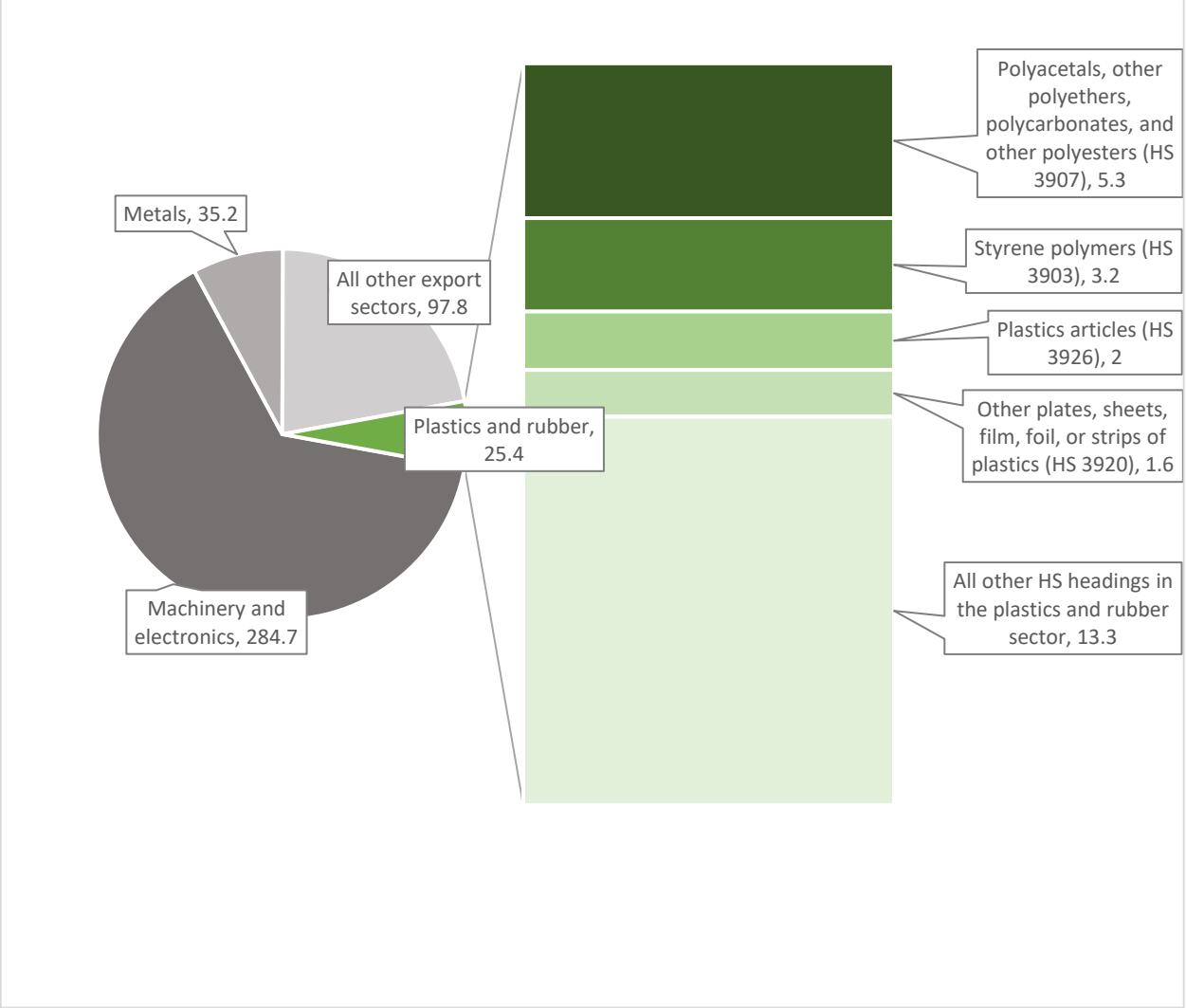
Taiwan is the sixth largest rubber and plastic exporters in the world, and its major export markets are other Asian economies, including China, Southeast Asia, and Japan. By value, exports in the plastics and rubber sector composed nearly six percent of Taiwan's exports in 2022, with polyacetals, polyethers, and epoxide resins making up the largest share of exports within this sector (HS 3907) (figure 7). Taiwan's rubber and plastic industry has benefited from government policy that encouraged a robust domestic value chain in raw material industries, plastics, rubber, and chemicals manufacturing.[63] Roughly 98

[59] Research and Markets, "Metals and Mining in Taiwan," January 2022; Commodity Inside, "The Steel Industry Faces Serious Challenges after Covid-19," April 6, 2023.
[60] Stinson and Oung, "The High Cost of Taiwan's Low Electricity Prices," May 19, 2022.
[61] Tianran Zhao, "Power Price Hike Forces Taiwan Steel Mills Summer Production Cuts," April 25, 2023.
[62] Feigenbaum and Hou, "Overcoming Taiwan's Energy Trilemma," April 27, 2020.
[63] Through a series of policies starting in the late 1980s, Taiwan has also developed a highly successful recycling industry and has been described as a model for waste collection and recycling. Market Prospects Insights, "Industry 4.0 Wave," June 8, 2022; Wu, Hu, and Ni, "Supporting a Circular Economy," April 2021.

percent of Taiwan's plastic and rubber companies are SMEs, and 40 percent of the petrochemicals sector's output is exported.[64]

Figure 7 Taiwan's exports in the plastics and rubber sector, 2022.

In Billions of U.S. dollars



Source: Compiled by author. S&P Global, GTA, accessed November 29, 2023. HS headings displayed in this figure are listed in Appendix D.

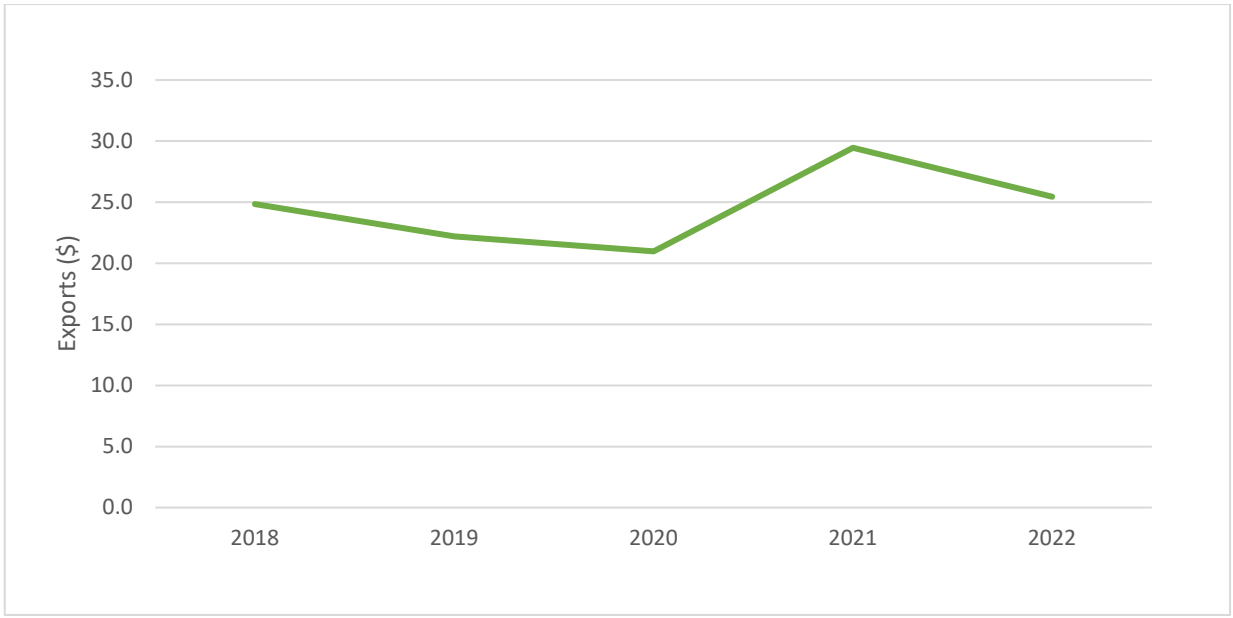
Between 2018 and 2022, plastics exports increased less than one percent in nominal terms, while rubber exports declined slightly in nominal terms.[65] Growth in the automotive, aerospace, and consumer goods sectors provided a jolt to plastics and rubber industry in 2021 and part of 2022, but poor macroeconomic conditions have slowed demand in these sectors, making Taiwan's plastics and rubber industry's recent boon short-lived (figure 8).[66] Overall, the output of the Taiwanese plastics and rubber

[64] Market Prospects Insights, "Industry 4.0 Wave," June 8, 2022; Liu, "Moving towards a World without Oil," March 23, 2022.
[65] S&P Global, "Global Trade Atlas Database," list of HTS section VII of the HTS code, accessed November 29, 2022.
[66] Market Prospects Insights, "Industry 4.0 Wave," June 8, 2022; PRM Taiwan, "Taiwanese Manufacturers in the Plastics and Rubber Industry Rise to Ongoing Challenges," June 2, 2023.

market is only projected to grow at a compound annual growth rate of less than two percent between 2023 and 2028.[67]

Figure 8 Taiwan's plastics and rubber exports.

In Billions of U.S. dollars



Source: Compiled by author. S&P Global, "Global Trade Atlas Database," list of HTS section VII of the HTS code, accessed November 29, 2022.

Recent innovations have helped Taiwan compete in plastics and rubber machinery, despite a slowdown in plastics and rubber exports. Taiwan has also made advancements in greener production, including recycling, reducing waste and energy consumption, and automating production.[68] These advancements have not only led to more environmentally-friendly plastics, but also helped Taiwan's upstream plastics machinery manufacturing industry gain international recognition for making more efficient industrial machinery.[69] As a result, Taiwan's exports of plastics and rubber machinery are on the rise. Taiwan is the sixth-largest exporter of such machinery and Germany is one of its top export destinations.[70] Taiwan is also exploring the development and application of higher-end polymers for electric vehicles and biomaterials.[71]

Other export sectors

Taiwan's chemicals sector made up 5.0 percent of exports in 2022 and 8.2 percent of imports in 2022 (table 1).[72] China is the primary destination for Taiwan's chemicals exports and is the largest global

[67] Statista Market Insights, "Rubber & Plastics - Taiwan," 2023.
[68] Market Prospects Insights, "Industry 4.0 Wave," June 8, 2022.
[69] PRA, "Taiwanese Machinery Promoted for Efficient Production," 2020.
[70] Laird, "Taiwan Plastics Machinery Performs Increasingly Well in the World Market," September 20, 2022.
[71] Taiwantrade, "In The Electric Vehicle Age," November 15, 2021.
[72] S&P Global, GTA, list of HS headings by section of the HTS code, accessed November 29, 2023

consumer of para-xylene, Taiwan's largest chemical export by value.[73] Although exports in the mineral products sector, predominately petroleum oils, compose the fifth-largest sector, Taiwan is not a significant petroleum exporter. In fact, Taiwan is highly dependent on imported petroleum for energy needs.[74]

Table 1 The value of Taiwan's exports in each sector in 2022.
In Billions of U.S. dollars and percentages

Sector	Value of Exports ($)	Percent of all exports (%)
Machinery and electronics	$284.673	64.2%
Metals	$35.161	7.9%
Plastics and Rubber	$25.444	5.7%
Chemical products	$22.193	5.0%
Mineral products	$17.029	3.8%
Transportation equipment	$16.288	3.7%
Optical, medical, and other precision instruments	$14.608	3.3%
Textiles	$8.718	2.0%
Miscellaneous	$5.531	1.2%
Prepared foodstuffs	$2.328	0.5%
Wood pulp, paper, and paperboard	$2.045	0.5%
Articles of stone, plaster, cement, glass, and similar materials	$2.044	0.5%
Pearls and precious and semiprecious materials	$1.823	0.4%
Animals and animal products	$1.727	0.4%
Special classification provisions and temporary legislation	$1.475	0.3%
Vegetable products	$0.684	0.2%
Rawhides, leather, and skins	$0.440	0.1%
Footwear, headgear, etc.	$0.403	0.1%
Arms and ammunition and parts thereof	$0.203	0.0%
Animal or vegetable oils, faxes, and waxes	$0.153	0.0%
Wood and wood articles	$0.131	0.0%
Artwork and antiques	$0.007	0.0%
Total	$443.106	100%

Source: Compiled by author. S&P Global, GTA, list of HS headings by section of the HTS code.

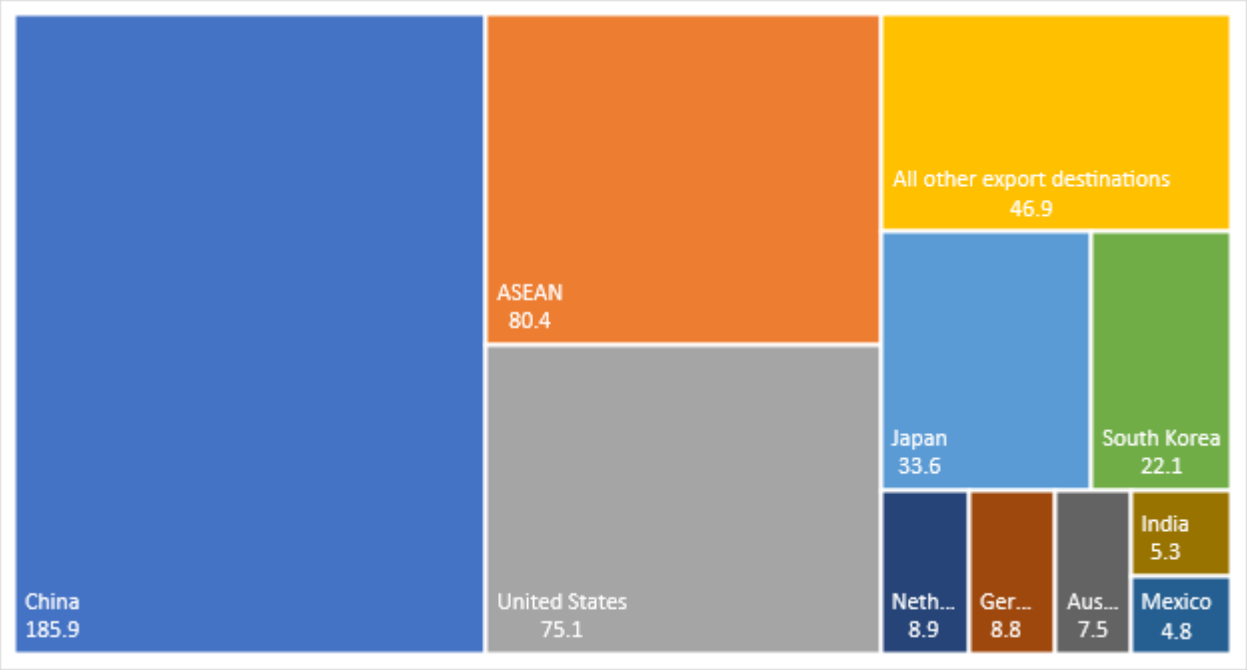
Major trading partners

China (including Hong Kong) receives 42.3 percent of Taiwan's' exports, followed by ASEAN member states, at 15.7 percent, and the United States, at 14.7 percent (figure 9). Taiwan's top sources of imports are China (including Hong Kong) (22.1 percent of all imports), Japan (14.7 percent), ASEAN member states (12.4 percent), and the United States (10.3 percent) (figure 10). [75]

[73] Para-xylene is an intermediate feedstock for polyester production Gaille, "20 Taiwan Chemical Industry Statistics and Trends," February 8, 2019; S&P Global Commodity Insights, "Para-Xylene," January 2022.
[74] Boone, "Securing Taiwan's Black Gold," September 6, 2023.
[75] Taiwan Ministry of Foreign Affairs, "Economy," 2023.

Figure 9 Taiwan's export destinations, 2022.

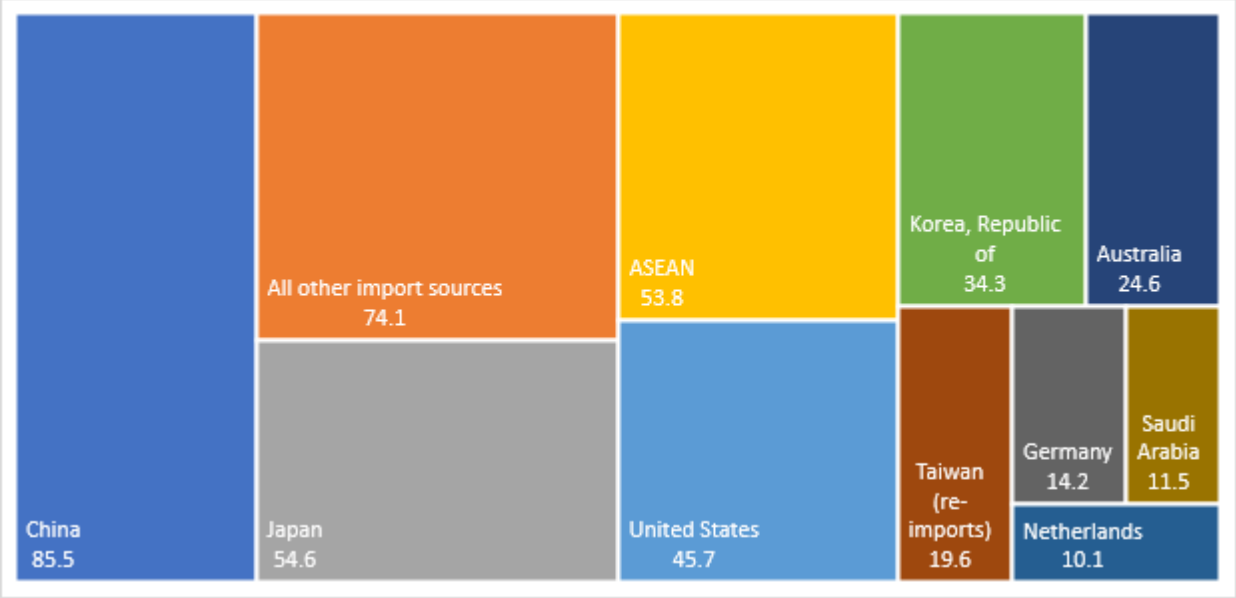
In Billions of U.S. dollars



Note: Exports to China and Hong Kong are combined.
Source: Government of Taiwan, "CPT Single Window," accessed January 2, 2024.

Figure 10 Taiwan's import sources, 2022.

In Billions of U.S. dollars



Note: Exports to China and Hong Kong are combined.
Source: Government of Taiwan, "CPT Single Window," accessed January 2, 2024.

China

Despite tenuous relations between Taiwan and China, cross-strait trade is vital to both economies. Generally, Taiwan imports lower-end electronic components from China, while Taiwan exports higher-end electronic components like advanced chips to China.[76] Among these goods, integrated circuits account for the largest share of Taiwan's imports from China, at nearly 30 percent of all imports from China.[77] China accounts for 60 percent of global semiconductor demand, 90 percent of which is met by imports or production by foreign firms operating within China, with Taiwan's TSMC as one of China's leading import suppliers.[78] Many of these Taiwan-produced chips are assembled into consumer electronics and other technologies in China.[79] For example, iPhone production heavily relies on cross-strait trade. Taiwan manufactures the custom chips, core processors, modems, and camera lenses for iPhones, which are the most valuable components of the iPhone (approximately 36 percent of the iPhone's materials costs).[80] China manufactures lower-value iPhone components and assembles the finished iPhone, although this manufacturing and assembly occurs at a Taiwanese-owned contract manufacturer's facility.[81]

China also plays a growing role in legacy chip production and chips ATP operations. ATP operations involve cutting wafers into individual chips, testing these chips, and assembling chips into final products like consumer electronics. Chips will cross the Taiwan Strait multiple times at various stages of production, benefitting from China's lower labor costs and Taiwan's technological advantage.[82]

In general, tensions between the two economies have grown since Tsai Ing-Wen's presidential election in 2016. Tsai is a member of the Democratic Progressive Party in Taiwan, which is traditionally pro-Taiwanese independence.[83] The Chinese government has passed bans on certain products to allegedly target companies and counties with strong support for the Democratic Progressive Party, including on mangoes in August of 2023.[84] Following the U.S. House of Representatives Speaker Nancy Pelosi's visit to Taiwan in 2022, China also imposed sanctions on certain natural sand, fruit, and fish product imports

[76] Kohlman, "How Much Does Taiwan Depend on China?," August 6, 2022.
[77] Ziwen Zhao, "Everything You Need to Know about Trade between Mainland China and Taiwan," August 7, 2022.
[78] Platzer, Jr, and Sutter, "Semiconductors," October 26, 2020, 25–26; Sacks, "Will China's Reliance on Taiwanese Chips Prevent a War?," July 6, 2023.
[79] McDonald, "China Blocks Some Taiwan Imports but Avoids Chip Disruptions," August 3, 2022.
[80] Li, Cheng, and London, "How Taiwan Became the Indispensable Economy," May 31, 2023.
[81] Ma, "How Apple Will Save Billions of Dollars on Chips for New IPhone," August 7, 2023; Li, Cheng, and London, "How Taiwan Became the Indispensable Economy," May 31, 2023.
[82] Mark and Graham, *Relying on Old Enemies*, November 17, 2023, 8; Mark and Roberts, *United States–China Semiconductor Standoff*, February 23, 2023, 8.
[83] O'Connor and Meick, *Taiwan Opposition Party Wins Presidency and Legislative Majority in Historic Elections*, January 28, 2016; Ziwen Zhao, "Everything You Need to Know about Trade between Mainland China and Taiwan," August 7, 2022.
[84] The Chinese government allegedly detected pests in a shipment of Taiwanese mangoes, which prompted the ban. However, the ban occurred the day after vice president of Taiwan's trip to Paraguay with stopovers in the United States and two days after China conducted military drills near Taiwan. Taiwan's Ministry of Agriculture has accused China of "arbitrarily interrupting trade" and stated that it intended to bring the ban to the WTO. Agence France Presse, "Taiwan Slams China's Ban On Mango Imports," August 21, 2023; Taipei Times, "Taipei to Take PRC Mango Ban to WTO," August 22, 2023; Mark and Graham, *Relying on Old Enemies*, November 17, 2023, 3.

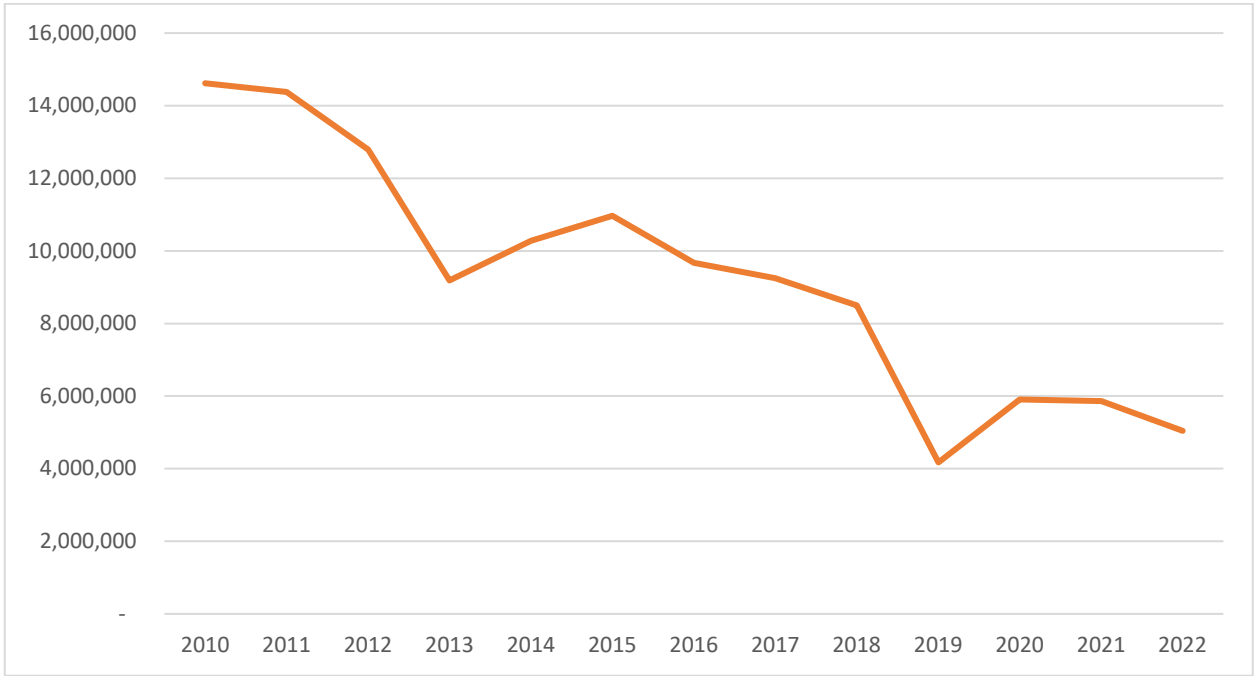
from Taiwan.[85] Additionally, China has launched an investigation into Taiwan's alleged trade barriers against more than 2,000 products and extended the deadline of this investigation to one day before Taiwan's 2024 presidential election, which has triggered allegations from Taiwan of election interference.[86] Separately, China's Ministry of Commerce's investigation concluded that Taiwan has erected trade barriers against Chinese products.[87]

Despite cross-strait trade reaching a record high in 2021, investment between China and Taiwan have suffered in recent years.[88] Between 2010 and 2022, investment from China to Taiwan declined nearly 60 percent after peaking in 2016 (figure 11). During the same period, investment from Taiwan to China declined 65 percent, declining since an all-time high in 2010 (figure 12). This decline reflects rising geopolitical tensions between the two economies, particularly Taiwan's efforts to find new export and investment markets and China's efforts to become more self-reliant.[89] The change in investment and desire for less dependent on each is due primarily to increases in the previously discussed geopolitical tensions. In 2019, Taiwan also launched three investment programs to attract Taiwanese companies with investment and production in China back to Taiwan.[90]

[85] These goods accounted for less than 1 percent of Taiwan's total exports in 2020. Reuters, "Sanctions China Has Imposed on Taiwan over Pelosi Visit," August 3, 2022; USCC, *Report to Congress*, 2022.
[86] The Democratic Progressive Party's candidate and Taiwan's Vice President in the Tsai administration, Lai Ching-te, won the 2024 presidential election. Jennings and Wong, "Mainland China to Probe Taiwan's 'Trade Barriers' Affecting 2,400 Products," April 12, 2023; Jennings, "Mainland China Could Delay Complex Trade Probe to Eve of Taiwan Election," October 9, 2023; Gan, "Who Is Lai Ching-Te," January 14, 2024.
[87] Pamir Consulting, "Taiwan's Economic Decoupling From China Gains Traction," January 22, 2024.
[88] Maizland, "Why China-Taiwan Relations Are So Tense," April 18, 2023.
[89] Mark and Graham, *Relying on Old Enemies*, November 17, 2023, 2.
[90] USDOS, "2022 Investment Climate Statements: Taiwan," accessed December 1, 2023.

Figure 11. Taiwan's Investment in China.

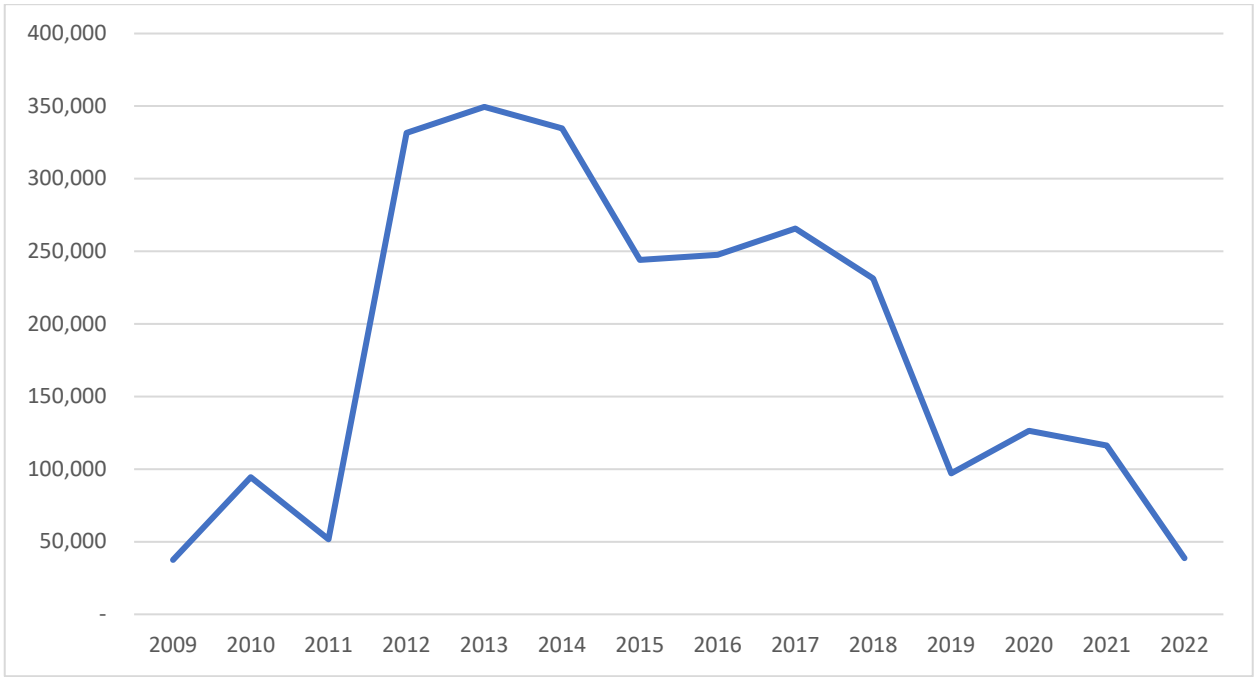
In Thousands of U.S. dollars



Source: Ministry of Economic Affairs, Department of Investment Review, "Statistics Chart," accessed May 1, 2024.

Figure 12. China's Investment in Taiwan.

In Thousands of U.S. dollars

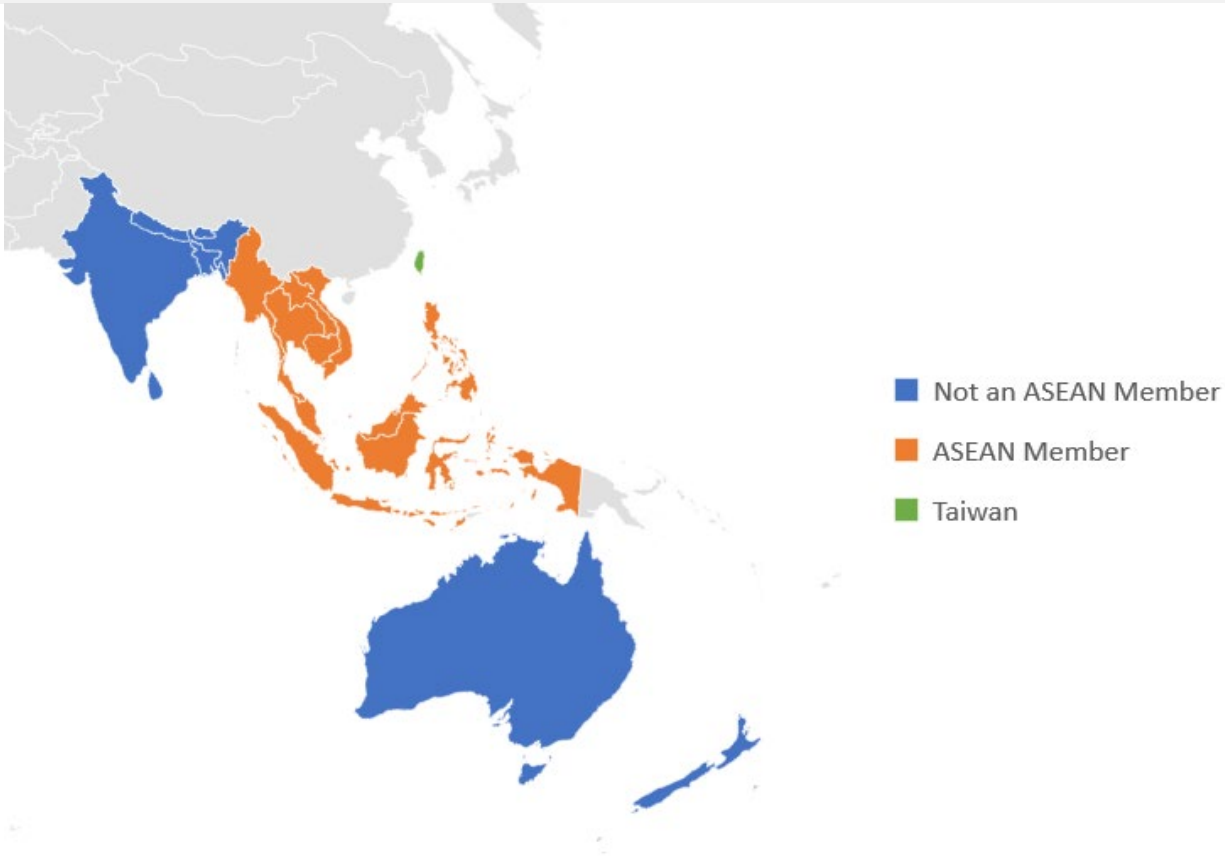


Source: Ministry of Economic Affairs, Department of Investment Review, "Statistics Chart," accessed May 1, 2024.

ASEAN Member States

Taiwan's trade with ASEAN member states has grown significantly in recent years.[91] In 2016, then-President Tsai released the New Southbound Policy, which aims to diversify Taiwan's economy and deepen its regional integration. Specifically, the New Southbound Policy seeks to enhance economic collaboration, deepen cultural and human capital exchanges, enhance resource sharing, and strengthen regional links between Taiwan, the ASEAN member states, South Asia, New Zealand, and Australia (figure 13). [92] The New Southbound Policy is the Taiwan's most recent effort to diversify Taiwan's outbound investment away from China and toward other nearby economies.

Figure 13. Countries included in Taiwan's New Southbound Policy.



Source: Compiled by author.

Previous efforts to better integrate Taiwan with the ASEAN member states have had a limited impact, but some analysts believe that the New Southbound Policy is both more strategic and comprehensive, and may benefit from sluggish macroeconomic conditions in China.[93] Additionally, early results suggest

[91] ASEAN member states are Brunei, Burma, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, and Vietnam.
[92] CSIS, *Taiwan's New Southbound Policy*, January 2018; Ministry of Foreign Affairs, "New Southbound Policy Portal," accessed March 6, 2024.
[93] CSIS, *Taiwan's New Southbound Policy*, January 2018, VIII.

that the New Southbound Policy's encouragement and subsidization of Taiwanese companies' reallocation from China and to the Indo-Pacific have been successful.[94]

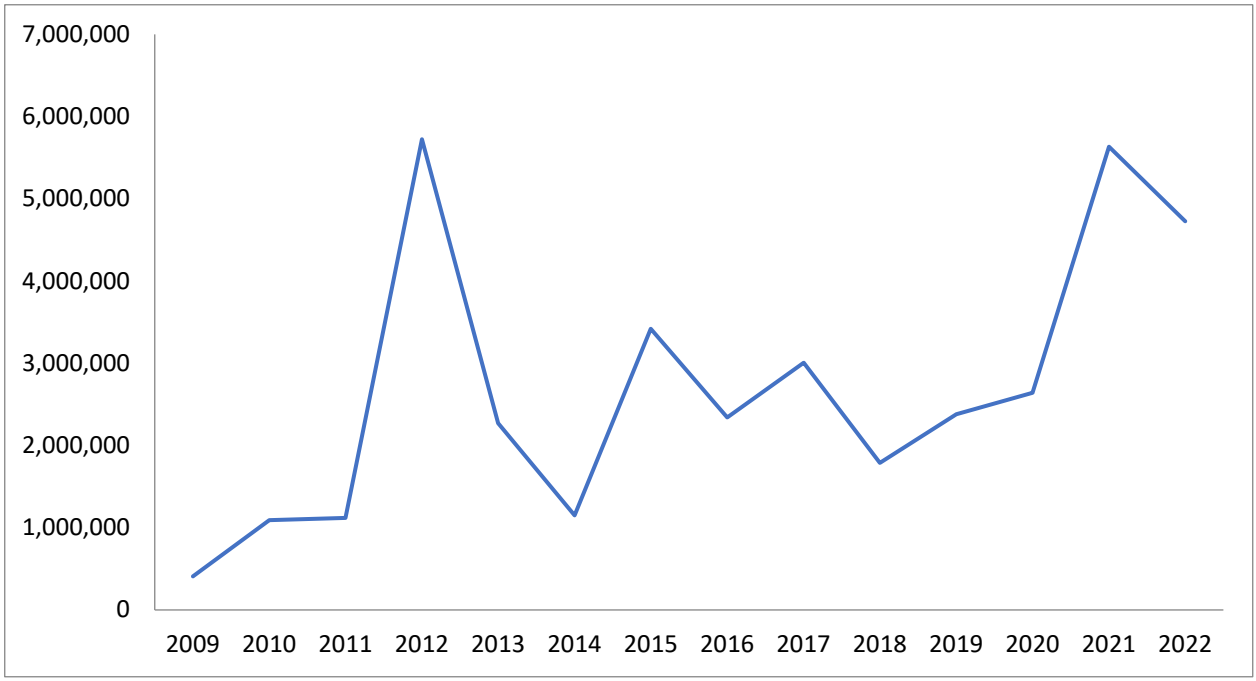
Taiwanese tech companies have reportedly preferred relocating to the ASEAN-6 (Singapore, Malaysia, Vietnam, Philippines, Thailand, and Indonesia), particularly Vietnam, Malaysia, and Thailand.[95] Further, many ASEAN member states play a role in the global machinery and electronics supply chain, with which Taiwan has strong linkages. As a region, Southeast Asia is a hub for semiconductor ATP operations.[96] Historically, these ATP operations have been lower-value and more labor-intensive than other steps in the semiconductor supply chain, but automation is expected to continue reducing the labor intensity in ATP operations.[97] Many ASEAN member states are also seeking to attract high-value investment from chipmakers and other technology companies through targeted subsidies.[98] This may have a dual effect: on one hand, chips exports from Taiwan may increase as these countries buy more Taiwanese chips and other inputs to expand ATP operations. On the other hand, ASEAN member-states may begin to directly compete with some of Taiwan's semiconductor foundries.[99]

FDI to ASEAN member-states is concentrated in the semiconductor and electronic component industries, at nearly half of all deals by estimated value between 2018 and 2022, and chemicals, at 28 percent.[100] In this region, Singapore received the highest amount of approved FDI between 2018 and 2022, followed by Vietnam.[101] In addition to preferential tax policies that attract FDI, Singapore has a robust semiconductor industry with both foundry and ATP operations and plays an important role in electronics transportation and logistics.[102] Similarly, Vietnam's growing electronics manufacturing industry has attracted investment from Taiwan. In 2022, Taiwan was Vietnam's second largest source of FDI and Taiwanese companies were responsible for 8 percent of Vietnam's total FDI that year.[103] FDI between Taiwan and ASEAN member-states has been increasing since 2009, although both inward and outward investment has been variable from year-to-year (figures 14 and 15).

[94] Hawksley, "Taiwan's New Southbound Policy Is Decreasing Its Reliance on China," October 4, 2019.
[95] Hawksley, "Taiwan's New Southbound Policy Is Decreasing Its Reliance on China," October 4, 2019.
[96] For more discussion, see Jones et al., "U.S. Exposure to the Taiwanese Semiconductor Industry," November 2023.
[97] Thadani and Allen, *Mapping the Semiconductor Supply Chain*, May 30, 2023, 11; Applied Materials, Inc. and Automation Products Group, "Challenges and Strategies to Achieve Full Automation in Semiconductor Assembly and Test," 2023.
[98] For example, see Vietnamese efforts to attract chipmakers. Ebrahami, "US Chipmakers March South as Vietnam Subsidizes Its Tech Future," September 18, 2023..
[99] Nguyen, "Semiconductor Manufacturing in Vietnam vs Taiwan," April 3, 2023.
[100] Financial Times, "FDi Markets," accessed April 18, 2024.
[101] Ministry of Economic and Investment Affairs, Department of Investment Review, via Textor, "Taiwan," February 12, 2024.
[102] HQTS Group Ltd., "Electronics Sourcing in Singapore," February 10, 2023; Singapore Economic Development Board, "Electronics Industry in Singapore," 2023; Gudykov, "2023 Singapore Tax System," February 9, 2023.
[103] Tran, "Semiconductor and Renewable Energy," March 1, 2024.

Figure 14. Taiwan's Investment to ASEAN Member-States.

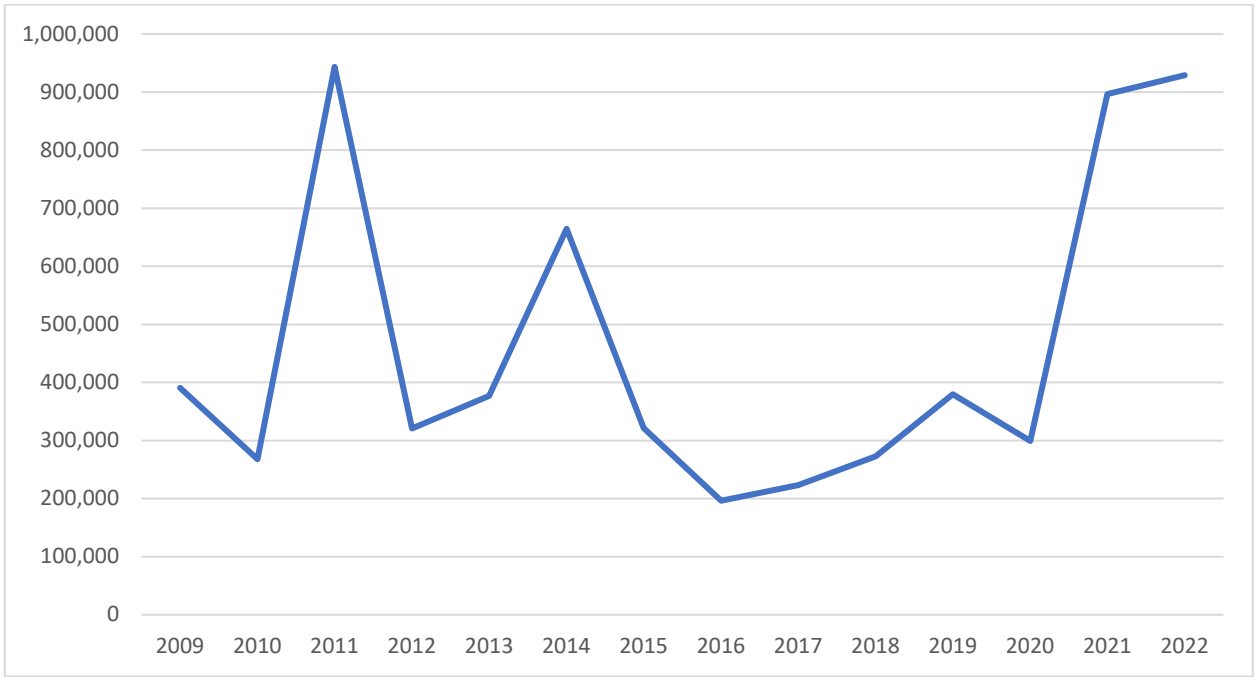
In Thousands of U.S. dollars



Source:Ministry of Economic Affairs, Department of Investment Review, "Statistics Chart," accessed May 1, 2024.

Figure 15. ASEAN Member-States' Investment in Taiwan.

In Thousands of U.S. dollars



Source: Ministry of Economic Affairs, Department of Investment Review, "Statistics Chart," accessed May 1, 2024.

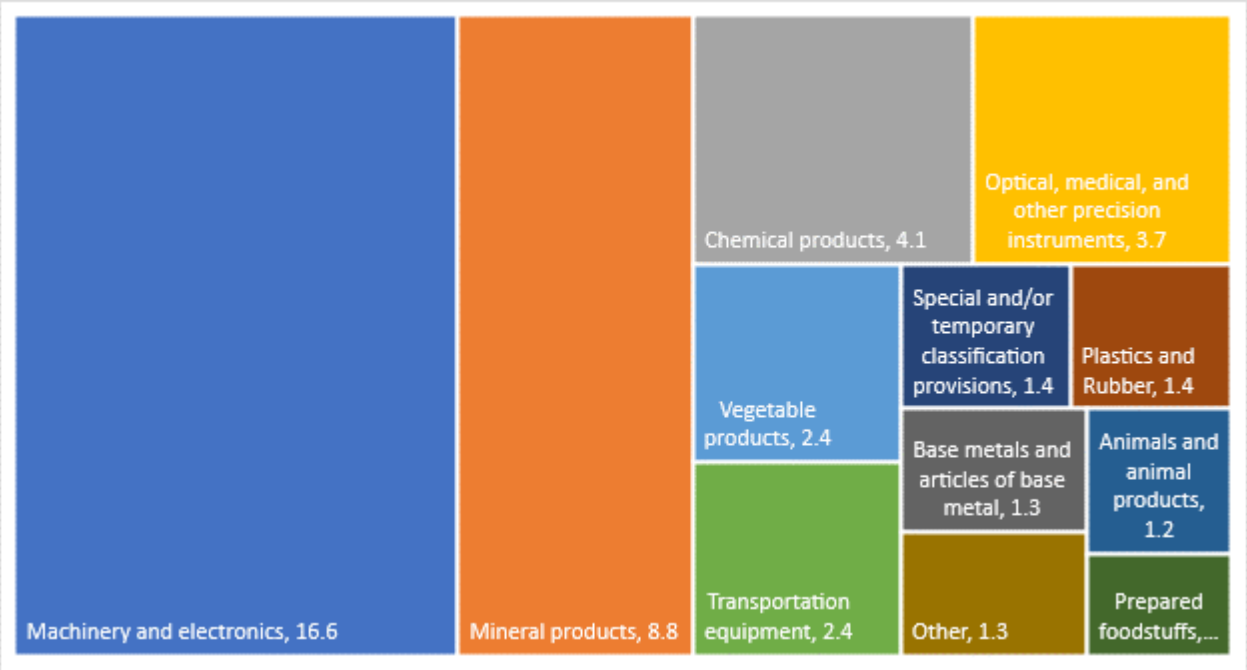
United States

Trade between the United States and Taiwan is increasing and has more than doubled since 2017, as both economies enjoy a strong bilateral trade relationship concentrated in machinery and electronics.[104] In 2022, the United States was Taiwan's second-largest export destination by value (behind China), and third-largest source of imports (behind China and Japan).[105] Taiwan is the eleventh largest destination for U.S. domestic exports ($39.3 billion in 2022), behind France ($40.1 billion) and ahead of Singapore ($39.2 billion).[106]

Overall, the largest share of U.S. exports to Taiwan is machinery, mechanical appliances, electrical equipment, and parts, at 36 percent of all exports to Taiwan in 2022. Mineral fuels and oils make up the next largest share of exports, at 19 percent (figure 16). This is because of Taiwan's dependence on imported energy products. Taiwan is also the United States' sixth largest agricultural export market. Agricultural exports from the United States to Taiwan include soybeans, beef and pork, corn, wheat, and fresh fruit.[107]

Figure 16 Taiwan's imports from the United States by value, 2022

In Billions of U.S. dollars

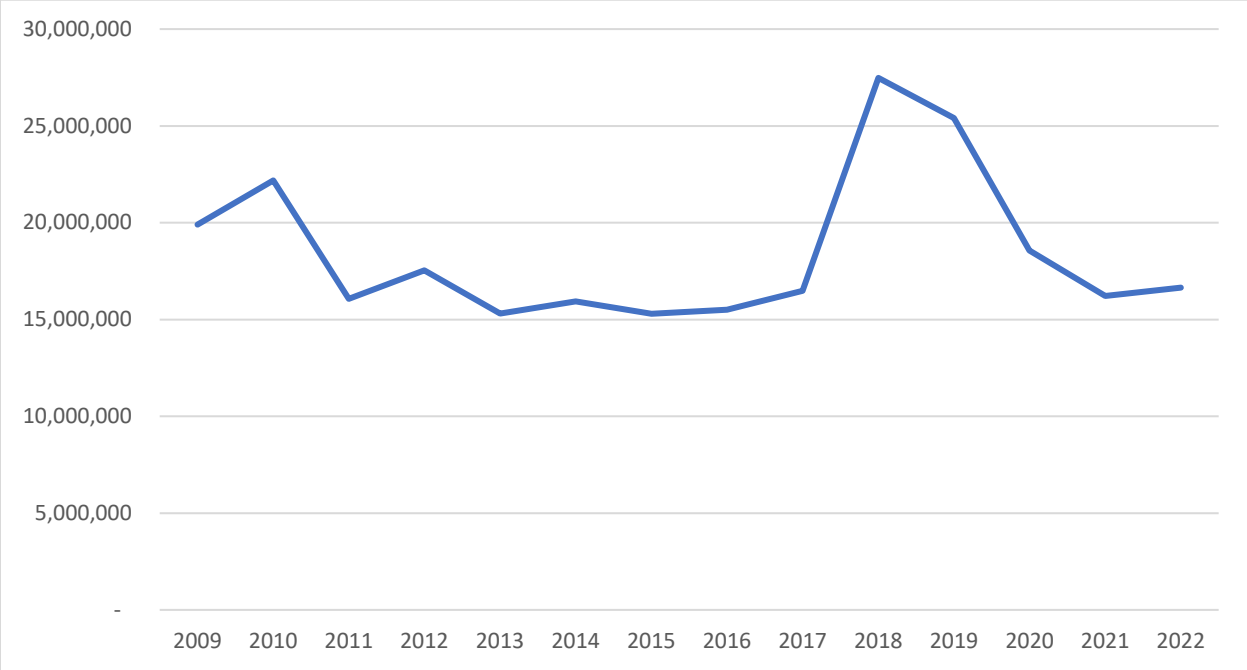


Source: Compiled by author. S&P Global, GTA, accessed November 29, 2023.

[104] Walters, "US-Taiwan Economic Relations in 2023," January 25, 2023.
[105] S&P Global, "Global Trade Atlas Database," all HS subheadings, accessed November 29, 2023.
[106] USITC DataWeb/Census, all HS subheadings, accessed November 29, 2023.
[107] ITA, "Taiwan Market Overview," September 15, 2022.

Figure 17 U.S. Investment in Taiwan.

In Thousands of U.S. dollars



Source: USDOC BEA, "Balance of Payment Statistics," accessed April 18, 2024

The United States and Taiwan have strong trade linkages and interconnected value chains.[108] The supply chain between the United States and Taiwan is characterized by U.S. imports from Taiwan to use in the manufacture of final goods in the United States. In 2021, 86 percent of U.S. imports from Taiwan are intermediate goods, such as parts, semifinished products, and capital goods, which the United States uses to produce final electronics, medical devices, pharmaceuticals, machinery, transportation, and motor vehicles in the United States [109] Because of this value chain pattern, the United States runs a slight trade deficit with Taiwan in dollar terms, but it runs a trade surplus when measured in value-added terms.[110] Similarly, Taiwan imports a significant amount of intermediate goods and raw materials from the United States.[111] The United States is Taiwan's second largest source of machinery imports, behind Japan, and the largest share of imports from the United States in the machinery, mechanical appliances, and electrical equipment sector are machines for semiconductor manufacturing and electronic integrated circuits and microassemblies.[112]

[108] Ezell, "The Future of Taiwan," April 16, 2021.
[109] Ezell, "The Future of Taiwan," April 16, 2021; *The Evolution of Taiwan's Trade Linkages With the U.S. and Global Economies*, October 25, 2021, 3.
[110] Value added trade statistics capture the amount the value of a good increases at each step of the production process. At the country-level, value added statistics show the value of the "national work" performed on a country's exports. U.S. International Trade Commission (USITC), "Special Topic," accessed March 6, 2024; Ezell, *The Evolution of Taiwan's Trade Linkages With the U.S. and Global Economies*, October 25, 2021, 3.
[111] ITA, "Taiwan Market Overview," September 15, 2022.
[112] Machines for semiconductor manufacturing are classified under HTS 4-digit subheading 8486 and electronic integrated circuits and microassemblies are classified under HTS 4-diget subheading 8542. USITC DataWeb/Census, HS Section XVI, accessed November 29, 2023; ITA, "Taiwan Machinery and Machine Tools," September 16, 2022.

A significant share of trade between the United States and Taiwan is in capital goods, which are goods used to manufacture finished products. According to analysis from the U.S. International Trade Administration, 39 percent of all U.S. exports to Taiwan are in capital goods. Similarly, nearly 54 of Taiwan's exports to the United States were capital goods.[113] A significant share of the United States' capital goods imports from Taiwan are imports of semiconductors. However, semiconductor trade between the United States and Taiwan is not one-sided. First, Taiwan was the third largest export destination for U.S. chips in 2022 ($6 billion).[114] Second, many Taiwanese chips derive a significant share of their value from the United States, particularly with regards to chip design: in 2021 the United States held 46 percent of global market share for chip design, while Taiwan held 7 percent.[115] The United States is also responsible for the largest share of value-added in the industry, at 35 percent.[116] During the same period, Taiwan held eight percent of the global market share and was responsible for ten percent global value-added. [117]

As both economies seek to diversify supply chains away from dependence on China, the United States and Taiwan government are interested in deepening bilateral trade for both economic and security reasons.[118] This is particularly pronounced in the semiconductor and electronics supply chain. A common electronics supply chain involves the United States designing goods and sending these designs to contract manufacturers in Taiwan. These goods are produced or assembled in China by Taiwanese companies, often using Taiwanese components, then exported as final consumer goods back to the United States.[119] Examples of this supply chain include iPhones, many chips, and EV parts.[120]

According to the U.S. Department of State, the United States is Taiwan's second-largest source of FDI, behind the Netherlands, although many U.S. firms invest in Taiwan through the Netherlands.[121] Taiwan's technological leadership in high-tech supply chains drives FDI flows between the United States and Taiwan.[122] Between 2018 and 2022, 116 greenfield investments from the United States to Taiwan were announced. 24 of these deals were in software and IT services, 19 in semiconductors and electronic components, and 18 in communications. [123] The average estimated value per deal in the semiconductor and electronic component industries was more than 14 times larger than the estimated value per deal in the software and IT services industry. Because of the higher value per deal in the semiconductor industry, the estimated value of greenfield investment in the semiconductor industry made up 37

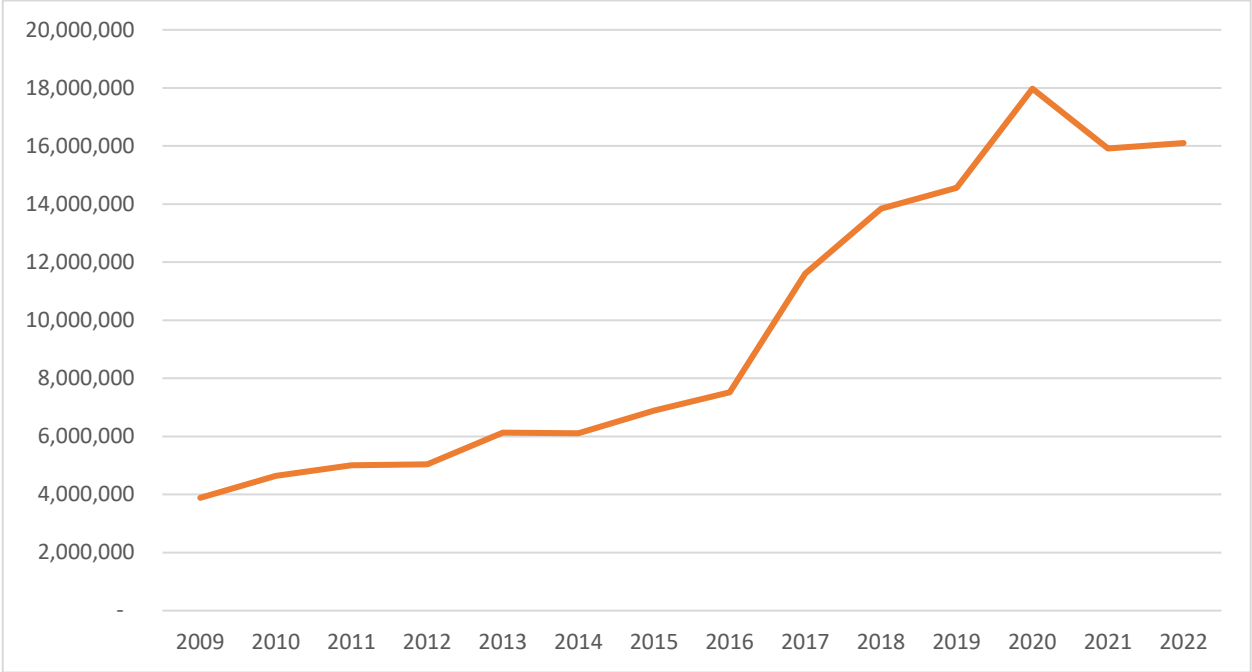
[113] ITA, "Taiwan Market Overview," September 15, 2022.
[114] Institute, "U.S., Taiwan, and Semiconductors," June 21, 2023, 31.
[115] SIA, *State of the U.S. Semiconductor Industry*, 2022, 10; Shivakumar and Wessner, "Semiconductors and National Defense," June 8, 2022.
[116] SIA, *State of the U.S. Semiconductor Industry*, 2022, 20–22.
[117] SIA, *State of the U.S. Semiconductor Industry*, 2022, 20–22.
[118] Chen, *A New Dawn?*, November 2017, 6; Sacks and Hillman, "The Time Is Now for a Trade Deal With Taiwan," June 14, 2021.
[119] Chen, *A New Dawn?*, November 2017, 1.
[120] ITA, "Taiwan Electric Vehicles," June 6, 2023.
[121] USDOS, "2022 Investment Climate Statements: Taiwan," accessed December 1, 2023.
[122] This also drives investment from the Netherlands, which is a leader in manufacturing lithography equipment used to produce advanced semiconductors.
[123] Financial Times, "FDi Markets," accessed April 18, 2024. fDi Markets includes the value of capital investment for each project, but most of these values are estimates and may not be reflective of the actual investment value. Therefore, the number of projects was used to inform this analysis.

percent of the overall estimated value of greenfield investment during the 2018-2022 period.[124] U.S. investment in Taiwan reached its peak in 2018, at nearly $27.5 billion (figure 17).

The overall amount of FDI from Taiwan into the United States has increased significantly since 2009, reaching a peak in 2020 of nearly $18 billion (figure 18). Between 2018 and 2022, 60 greenfield investments from Taiwan to the United States were announced, with 19 in the semiconductor or electronic component industries. The value of these deals comprises nearly 80 percent of the estimated value of greenfield investments announced during this period.[125] Recently there have been several high-profile announcements of Taiwanese investment in the United States including TSMC's plan to open a facility in Arizona, Hota's plan to open a Tesla parts supplier factory in New Mexico, and Asustek Computer's plan to open a server production line in the United States.[126]

Figure 18. Taiwan's Investment in the United States.

In Thousands of U.S. dollars



Source: USDOC BEA, "Balance of Payment Statistics," accessed April 18, 2024.

Efforts to deepen bilateral trade between the United States and Taiwan include the U.S.-Taiwan Initiative on 21st Century Trade. On June 1, 2023, Deputy U.S. Trade Representative Sarah Bianchi signed the first agreement under the U.S.-Taiwan Initiative on 21st Century Trade. This agreement covers the following topics: customs administration and trade facilitation, good regulatory practices, services domestic regulation, anticorruption, and small and SMEs.[127] On August 7, 2023, it was signed into law as the

[124] Financial Times, "FDi Markets," accessed April 18, 2024.
[125] Financial Times, "FDi Markets," accessed April 18, 2024.
[126] Cheng, "Taiwan's Top Computer Maker to Produce Servers in US to Tap AI Boom," November 21, 2023; Kolenc, "Taiwan Company Supplying Tesla Finalizes Plan for Santa Teresa Factory with 350 Workers," September 25, 2023; Wendell Huang, "TSMC Announces Intention to Build and Operate an Advanced Semiconductor Fab in the United States," May 15, 2020; USDOS, "2022 Investment Climate Statements: Taiwan," accessed December 1, 2023.
[127] USTR, "USTR Announcement Regarding U.S.-Taiwan Trade Initiative," May 18, 2023.

United States-Taiwan Initiative on 21st Century Trade First Agreement Implement Act, which serves the following purposes: strengthening mutually beneficial economic relations between the two economies, providing a foundation for further cooperation between the two economies, and establishing transparency and certain requirements for further agreements.[128]

According to the Office of the United States Trade Representative, this agreement will allow U.S. businesses to bring more products to Taiwan and create more transparent and streamlined regulatory procedures. This agreement is expected to facilitate economic opportunities and investment, particularly for SMEs.[129] On August 18, 2023, the United States and Taiwan began their second negotiating round for the U.S.-Taiwan Initiative on 21st Century Trade. This negotiation is ongoing but has included discussions regarding agriculture, labor, and the environment.[130]

These agreements follow other trade discussions between the United States and Taiwan, including the December 2021 U.S.-Taiwan Technology Trade and Investment Collaboration, which sought to expand cooperation and investment in critical technologies. The initial critical technologies of focus were semiconductors, 5G networks, electric vehicles, sustainable energy, and cybersecurity.[131] Other trade discussions include the 2020 and 2021 U.S.-Taiwan Economic Prosperity Partnership over supply chain resiliency, economic coercion, the digital economy, 5G, and collaboration in science and technology.[132] The United States and Taiwan have also reached agreements over certain trade issues, such as lifting bans on beef and pork imported from the United States[133] Support for more trade between the United States and Taiwan grew in 2019, after 150 House members signed a letter to the U.S. Trade Representative supporting a free trade agreement (FTA) with Taiwan and has continued through the present.[134] However, according to a Heritage Foundation analysis, an FTA would not have significant economic effects based on tariff elimination alone. [135] This is because the average nominal tariff rate for U.S. imports of Taiwanese goods is just over 6 percent.[136] When eliminating certain non-tariff barriers, however, an FTA could increase total trade would increase by $6.2 billion in the United States and $3.8 billion in Taiwan.[137]

[128] Pub. L. No. 118-13, 137 Stat. 63 (August 7, 2023) (codified at 19 U.S.C. § 2112 note).
[129] USTR, "United States and Taiwan Hold Second Negotiating Round for the U.S.-Taiwan Initiative on 21st Century Trade," accessed November 30, 2023.
[130] USTR, "United States and Taiwan Hold Second Negotiating Round for the U.S.-Taiwan Initiative on 21st Century Trade," accessed November 30, 2023.
[131] AIT, "Technology, Trade and Investment Collaboration," accessed December 1, 2023.
[132] USDOS, "2021 U.S.-Taiwan EPPD," November 23, 2021.
[133] Executive Yuan Department of Information Services, "Taiwan eases rules on US pork, beef imports," March 16, 2021.
[134] KPMG, "U.S. President Signs Taiwan Trade Bill," August 10, 2023; Smith, Beaumont-Smith, and Wolpert, "U.S.–Taiwan Free Trade Agreement," April 28, 2022, 5.
[135] Smith, Beaumont-Smith, and Wolpert, "U.S.–Taiwan Free Trade Agreement," April 28, 2022, 8.
[136] U.S. imports from Taiwan have an average nominal tariff rate of 4.13 percent for industrial products and 15.06 percent for agricultural products This figure does not consider recent tariffs imposed under Section 232 of the Trade Expansion Act of 1962 or tariffs under Sections 201 and 301 of the Trade Act of 1974. ITA, "Taiwan Import Tariffs," September 16, 2022.
[137] Smith, Beaumont-Smith, and Wolpert, "U.S.–Taiwan Free Trade Agreement," April 28, 2022, 8–9.

Conclusion

Taiwan's capital-intensive economy and global leadership in chips production has enabled the small island to become an integral part of the global value chain for machinery, electronics, and other goods. Taiwan is also an important supplier for other capital-intensive goods like metals, fasteners, plastics, and rubber. Despite Taiwan's efforts to diversify international trade away from China, Taiwan's reliance on China is likely to continue due to the strong linkages between the two economies. However, economic relations between the Taiwan and the United States and Taiwan and ASEAN are also growing. The United States' efforts to diversify supply chains may lead to greater economic alignment with Taiwan through direct links like FDI and higher utilization of Taiwanese suppliers for certain goods, or through indirect links like sourcing chips made with Taiwanese components but assembled in ASEAN member states.

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Appendix A

Table A.1 List of HS sections

HS Section	Section Description	HS Chapters Included	Sector
Section I	Live Animals; Animal Products	1-5	Animals and animal products
Section II	Vegetable Products	6-14	Vegetable products
Section III	Animal or Vegetable Fats and Oils and Their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes	15	Animal or vegetable oils, faxes, and waxes
Section IV	Prepared Foodstuffs; Beverages, Spirits, and Vinegar; Tobacco and Manufactured Tobacco Substitutes	16-24	Prepared foodstuffs
Section V	Mineral Products	25-27	Mineral products
Section VI	Products of the Chemical or Allied Industries	28-38	Chemical products
Section VII	Plastics and Articles Thereof Rubber and Articles Thereof	39-40	Plastics and Rubber
Section VIII	Raw Hides and Skins, Leather, Furskins and Articles Thereof; Saddlery and Harness; Travel Goods, Handbags and Similar Containers; Articles of Animal Gut (Other Than Silkworm Gut)	41-43	Rawhides, leather, and skins
Section IX	Wood and Articles of Wood; Wood Charcoal; Cork and Articles of Cork; Manufacturers of Straw,of Esparto or of Other Plaiting Materials; Basketware and Wickerwork	44-46	Wood and wood articles
Section X	Pulp of Wood or of Other Fibrous Cellulosic Material; Waste and Scrap of Paper or Paperboard; Paper and Paperboard and Articles Thereof	47-49	Wood pulp, paper, and paperboard
Section XI	Textile and Textile Articles	50-63	Textiles
Section XII	Footwear, Headgear, Umbrellas, Sun Umbrellas, Walking Sticks, Seatsticks, Whips, Riding-Crops and Parts Thereof; Prepared Feathers and Articles Made Therewith; Artificial Flowers; Articles of Human Hair	64-67	Footwear, headgear, etc.
Section XIII	Articles of Stone, Plaster, Cement, Asbestos, Mica or Similar Materials; Ceramic Products; Glass and Glassware	68-70	Articles of stone, plaster, cement, glass, and similar materials
Section XIV	Natural or Cultured Pearls, Precious or Semiprecious Stones, Precious Metals, Metals Clad With Precious Metal, and Articles Thereof; Imitation Jewelry; Coin	71	Pearls and precious and semiprecious materials
Section XV	Base Metals and Articles of Base Metal	72-83	Metals
Section XVI	Machinery and Mechanical Appliances; Electrical Equipment; Parts Thereof; Sound Recorders and Reproducers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles	84-85	Machinery and electronics
Section XVII	Vehicles, Aircraft, Vessels and Associated Transport Equipment	86-89	Transportation equipment
Section XVIII	Optical, Photographic, Cinematographic, Measuring, Checking, Precision, Medical or Surgical Instruments and Apparatus; Clocks and Watches; Musical Instruments; Parts and Accessories Thereof	90-92	Optical, medical, and other precision instruments

HS Section	Section Description	HS Chapters Included	Sector
Section XIX	Arms and Ammunition; Parts and Accessories Thereof	93	Arms and ammunition and parts thereof
Section XX	Miscellaneous Manufactured Articles	94-96	Miscellaneous
Section XXI	Works of Art, Collectors' Pieces and Antiques	97	Artwork and antiques
Section XXII	Special Classification Provisions; Temporary Legislation; Temporary Modifications Proclaimed pursuant to Trade Agreements Legislation; Additional Import Restrictions Proclaimed Pursuant to Section 22 of the Agricultural Adjustment Act, As Amended	98-99	Special classification provisions and temporary legislation

Source: Compiled by author. From U.S. International Trade Commission (USITC), "Harmonized Tariff Schedule," accessed May 6, 2024.

Appendix B

Table B.1 Largest 4-digit HS headings in Section XVI of the HS (machinery and electronics)

HS heading	Description
HS 8542	Electronic integrated circuits; parts thereof
HS 8471	Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included.
HS 8473	Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with machines of headings 8470 to 8472. Note: HS heading 8470 covers calculating machines and pocket-size data recording, reproducing and displaying machines with calculating functions; accounting machines, postage-franking machines, ticket-issuing machines and similar machines, incorporating a calculating device; cash registers. HS heading 8472 covers other office machines (for example, hectograph or stencil duplicating machines, addressing machines, automatic banknote dispensers, coin-sorting machines, coin-counting or wrapping machines, pencil-sharpening machines, perforating or stapling machines).
HS 8517	Telephone sets, including smartphones and other telephones for cellular networks or for other wireless networks; other apparatus for the transmission or reception of voice, images or other data, including apparatus for communication in a wired or wireless network (such as a local or wide area network), other than transmission or reception apparatus of headings 8443, 8525, 8527 or 8528; parts thereof. Note: HS heading 8443 covers printing machinery used for printing by means of plates, cylinders and other printing components of heading 8442; other printers, copying machines and facsimile machines, whether or not combined; parts and accessories thereof. HS heading 8525 covers transmission apparatus for radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; television cameras, digital cameras and video camera recorders. HS 8527 covers reception apparatus for radiobroadcasting, whether or not combined, in the same housing, with sound recording or reproducing apparatus or a clock. HS heading 8528 covers Monitors and projectors, not incorporating television reception apparatus; reception apparatus for television, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus.

Source: compiled by author. From U.S. International Trade Commission (USITC), "Harmonized Tariff Schedule," accessed May 6, 2024.

Appendix C

Largest 4-digit HS headings in Section XV of the HS (base metals and articles of base metal)

HS heading	Description
HS 7318	Screws, bolts, nuts, coach screws, screw hooks, rivets, cotters, cotter pins, washers (including spring washers) and similar articles, of iron or steel.
HS 7208	Flat-rolled products of iron or nonalloy steel, of a width of 600 mm or more, hot-rolled, not clad, plated or coated.
HS 7219	Flat-rolled products of stainless steel, of a width of 600 mm or more.
HS 7410	Copper foil (whether or not printed or backed with paper, paperboard, plastics or similar backing materials) of a thickness (excluding any backing) not exceeding 0.15 mm.

Source: compiled by author. From U.S. International Trade Commission (USITC), "Harmonized Tariff Schedule," accessed May 6, 2024.

Appendix D

Table D.1 Largest 4-digit HS headings in Section VII of the HS (plastics and rubber)

HS heading	Description
HS 3907	Polyacetals, other polyethers and epoxide resins, in primary forms; polycarbonates, alkyd resins, polyallyl esters and other polyesters, in primary forms.
HS 3903	Polymers of styrene, in primary forms.
HS 3926	Other articles of plastics and articles of other materials of headings 3901 to 3914. Note: HS heading 3901 covers polymers of ethylene, in primary forms. HS heading 3914 covers ion-exchangers based on polymers of headings 3901 to 3913, in primary forms.
HS 3920	Other plates, sheets, film, foil and strip, of plastics, noncellular and not reinforced, laminated, supported or similarly combined with other materials.

Source: compiled by author. From U.S. International Trade Commission (USITC), "Harmonized Tariff Schedule," accessed May 6, 2024.