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The Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act: What it Means for the United States Economy and its Foreign Relations

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The Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act represents a growing domestic and international policy interest in the production/manufacture and procurement of semiconductors. While the United States has historically led the world in advanced semiconductor development, an astounding majority of advanced semiconductors used in artificial intelligence and supercomputers are now produced abroad, namely Taiwan. As COVID-19 crippled global supply chains and tensions between the People's Republic of China and the United States have grown, the Biden Administration passed the CHIPS Act to incentivize foreign and domestic semiconductor producers to build factories stateside. While the promise of multimillion dollar government grants has certainly convinced such firms to build campuses across America, following legislation and American initiatives restricting trade with certain countries have born new competition between the U.S. and China as well as some friendly, chip-producing nations, such as Japan, South Korea, and even Taiwan. Though many Americans see the CHIPS Act as a boon towards bolstering fragile supply of an important commodity, international reactions have varied, and the CHIPS Act has drastically changed the global semiconductor landscape for the foreseeable future.

I. Overview

In a world marred by supply chain issues during the global COVID-19 pandemic and ensuing logistical crisis, the American legislature and Biden Administration, on August 9, 2022, passed the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act.²

The United States Congress, looking to shore up a supply of precious semiconductors at home, worked on the bill for a few years before President Biden signed it into law this past summer.³ This comment will review the legislative and substantive history of the CHIPS Act, including why the CHIPS Act was initially conceived, as well as the impact of the CHIPS Act on American businesses at home. Namely, this comment takes the position that the CHIPS Act passed in large part due to the growth of the Chinese semiconductor industry, the threat of a Chinese invasion of the island of Taiwan, and the fear that America's supply of semiconductors relied too disproportionately on Taiwan. Furthermore, this comment will discuss the CHIPS Act's effect on foreign relations between the U.S. and other countries—namely semiconductor producing sovereigns including the Peoples Republic of China (China), the Republic of China (Taiwan), and the Republic of Korea (South Korea). Finally, this comment takes the position that the CHIPS Act and related subsequent legislation around the production of semiconductors in the United States will help to stimulate and augment domestic and foreign direct investments within the United States. Further, the CHIPS Act will allow the U.S. to rely less on semiconductors made in Taiwan and other semiconductor producing companies while countering China in its attempt to bolster domestic semiconductor research, development, and manufacturing. Regardless, this comment acknowledges that the CHIPS Act has already and will continue to strain Chinese-American

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² H.R. RES. 4346, 117 Cong. (2022) (enacted).

³ *Id.*

relations while having the unintended effect of handicapping semiconductor manufacturers in friendly, East Asian countries such as South Korea and Taiwan.

II. The History/Driving Forces of the CHIPS and Science Act

A. What is the CHIPS Act?

The CHIPS and Science Act (hereinafter “the CHIPS Act”) is a piece of legislation that was passed into law on August 9, 2022.⁴ Named after integrated circuits consisting of semiconductor material, or “chips,” the CHIPS Act allocates about fifty-two billion dollars of government funds to invest in and bolster the American semiconductor industry in the hopes that such an investment incentivizes American and foreign semiconductor companies to establish semiconductor/electronic factories, research and develop more advanced semiconductors, and grow the American STEM industry and workforce.⁵ The CHIPS Act further directs additional spending to be allocated over a course of ten years, most of which will subsidize research and development as well as the overall commercialization of semiconductors in the United States.⁶

While on its face, the CHIPS Act appears to be good for business, it was conceived in large part due to a fear of reliance on Chinese, Taiwanese, and other foreign-made semiconductors.⁷ In the second quarter of 2020, while the COVID-19 pandemic was ongoing, supply of semiconductors floundered and multiple American industries, especially the auto industry, were unable to fill the demand for chips due to scarce supply.⁸ Semiconductor factories and plants in southeast Asia, including China, Taiwan, and Malaysia, were inundated with contagious COVID-19 variants, thinning the available workforce to a level that was inadequate to keep up with the global demand for semiconductors.⁹ As people across the globe went from going to an office with existing computers and workspaces to working from home, a demand for computers further strained the supply of available microchips and the labor needed to create them.¹⁰ Other industries were affected too: computer gaming enthusiasts were unable to obtain new video cards or processors for their computers while tech companies struggled to procure new parts for their products.¹¹ Even now, demand for chips still exceeds supply in the United States—the American used car market is

⁴ Chips and Science Act, Pub. L. 117-167, 136 Stat. 1366 (2022).

⁵ McKinsey & Company, *The CHIPS and Science Act: Here’s What’s in It*, MCKINSEY & COMPANY (Oct. 4, 2022), <https://www.mckinsey.com/industries/public-and-social-sector/our-insights/the-chips-and-science-act-heres-whats-in-it> [<https://perma.cc/X6RA-V4PY>].

⁶ *Id.*

⁷ Natalie Andrews, *House Passes Chips Act to Boost U.S. Semiconductor Production*, THE WALL STREET JOURNAL (July 28, 2022), <https://www.wsj.com/articles/house-passes-chips-act-to-boost-u-s-semiconductor-production-11659035676> [<https://perma.cc/UZ8T-934S>]; *Congress Passes Investments in Domestic Semiconductor Manufacturing, Research & Design*, SEMICONDUCTOR INDUSTRY ASSOCIATION, <https://www.semiconductors.org/chips/> [<https://perma.cc/HPP4-5HXZ>] [hereinafter Congress Invests].

⁸ *Supply Chain Issues and Autos: When Will the Chip Shortage End*, J.P. MORGAN (Aug. 11, 2022), <https://www.jpmorgan.com/insights/research/supply-chain-chip-shortage#:~:text=While%20the%20COVID%2D19%20pandemic,on%20an%20already%20stretched%20industry> [<https://perma.cc/VQX2-WTK6>].

⁹ *Id.*

¹⁰ *Id.*

¹¹ Michael Kan, *Inside the GPU Shortage: Why You Still Can’t Buy a Graphics Card*, PC MAG (Oct. 7, 2021), <https://www.pcmag.com/news/inside-the-gpu-shortage-why-you-still-cant-buy-a-graphics-card> [<https://perma.cc/SU6G-PKGP>].

still inflated and consumer electronics have yet to return to pre-pandemic stocks or prices.¹² Seeking to secure a steady stream of chips for the American consumer base, the Act also seeks to ensure that the United States need not rely on foreign, chiefly East Asian, nations for a supply of semiconductors.¹³

B. The History and Science of Semiconductors

Semiconductors are the piece of hardware that enables every single electronic to function—at the heart of every smartphone, computer, modern automotive, etc. lies a semiconductor.¹⁴ Also known as an integrated circuit (IC) or “chip,” semiconductors are an extremely important part of modern-day life and “are the enabling hardware for all information technology.”¹⁵ Named after the materials that make up semiconductors—semiconducting elements such as silicon—semiconductors are materials that can switch electrical signals on and off through the use of conductors such as copper and insulators such as glass.¹⁶ Due to their sensitive nature, chips are produced in “clean rooms”: designated manufacturing areas that can be as much as 100,000 times cleaner than a hospital environment.¹⁷

The American chip industry is a product of the Cold War and arms race between the United States and the Soviet Union when the U.S. Government and the Department of Defense needed to create a miniature version of the large, room-size computers of the era for use in missile guidance and other defense systems.¹⁸ Jack Kilby, an employee at Texas Instruments, invented the first modern version of a chip in 1958, largely funded by the United States government for use in defense operations.¹⁹ Throughout the 1960s, NASA and the Pentagon helped to develop and drive advancements in the computing technology of semiconductors via their use in the Apollo spacecraft and the Minuteman II ICBM missiles.²⁰ As the chip industry began to grow from its original parameters as a defense subsidized industry into a consumer business, so did the rest of the world’s market share. By the late 1970s, foreign governments such as those in Japan, began to develop and augment their own semiconductor industry.²¹ While Silicon Valley was (and in a large part, still is) the epicenter of semiconductor development and production, companies like Toshiba and NEC produced advanced semiconductors on par with those produced in the United States but for a fraction of the cost and with a greater reliability rate.²² East Asian governments in Japan, Korea, and Taiwan provided large government subsidies, incentivizing semiconductor giants like Toshiba, Samsung, and Taiwan Semiconductor Manufacturing Company (TSMC) to

¹² Erik Shilling, *The Used Car Market Remains in Chaos*, JALOPNIK (Jan. 11, 2023), <https://jalopnik.com/the-used-car-market-remains-in-chaos-1849976149> [<https://perma.cc/DG4T-BX2K>].

¹³ *Congress Invests*, *supra* note 6.

¹⁴ John VerWey, *Chinese Semiconductor Industrial Policy: Past and Present*, J. OF INT’L COM., July 2019, at 3 [hereinafter *Chinese Policy*].

¹⁵ *Id.*

¹⁶ *Id.*

¹⁷ *Id.*

¹⁸ Chris Miller, *History Offers a Guide to Winning our Growing ‘Chip War’ with China*, THE WASHINGTON POST (Oct. 4, 2022), <https://www.washingtonpost.com/made-by-history/2022/10/04/history-offers-guide-winning-our-growing-chip-war-with-china/> [<https://perma.cc/ADB6-NWRR>].

¹⁹ *Id.*; VerWey, *supra* note 13, at 3.

²⁰ Miller, *supra* note 17.

²¹ *Id.*

²² *Id.*

develop and manufacture chips in their native countries, respectively.²³ Over time, more and more East Asian countries, including Japan, South Korea, Taiwan, and China, grew their respective market shares in the chip industry while global consumer bases followed.²⁴ Today, the United States itself—long considered the leader of semiconductor research and development—produces only about ten percent of the world’s semiconductor supply while relying on East Asian nations which produce about seventy-five percent of the globe’s supply.²⁵ After COVID-19 exposed drastic flaws in the supply chain between the United States and these East Asian semiconductor producers, the Biden Administration and bipartisan legislature decided to incentivize semiconductor producers to onshore via the passage of the CHIPS Act, bringing with them a second wave of semiconductor production in the United States.²⁶

C. Legislative History of the CHIPS Act

The CHIPS Act was developed from several bipartisan congressional proposals, including the United States Innovation and Competition Act of 2021 (USICA), also known as the Endless Frontier Act.²⁷ Introduced by the Senate Committee on Health, Education, Labor and Pensions and sponsored by Senator Chuck Schumer (D-NY) in April 2021, the Endless Frontier Act aimed to:

- (1) strengthen U.S. leadership in critical technologies through fundamental research in key technology focus areas, such as artificial intelligence, high-performance computing, and advanced manufacturing;
- (2) enhance U.S. competitiveness in the focus areas by improving education in such areas and attracting more students to such areas; and
- (3) foster the impact of federally funded research and development through accelerated translation of advances in the focus areas into processes and products that help achieve national goals.²⁸

A large goal of the Endless Frontier Act, as with the CHIPS Act that later absorbed it, was to decrease reliance on foreign technology and materials deemed vital to national security, especially artificial intelligence (AI) and biotechnology.²⁹ Further, the Endless Frontier Act aimed to directly compete with China for a technological advantage in the AI field by disallowing any grants of public funds to entities involved with the Chinese government.³⁰

²³ Jeanne Whalen, *Chipmaker Micron to Build \$20 Billion N.Y. Factory Amid Semiconductor Boom*, THE WASHINGTON POST (Oct. 4, 2022), <https://www.washingtonpost.com/technology/2022/10/04/micron-chip-factory-new-york/> [<https://perma.cc/4NMZ-QHNT>].

²⁴ See Press Release, The White House, Fact Sheet: CHIPS and Science Act Will Lower Costs, Create Jobs, Strengthen Supply Chains, and Counter China (Aug. 9, 2022), <https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/09/fact-sheet-chips-and-science-act-will-lower-costs-create-jobs-strengthen-supply-chains-and-counter-china/> [<https://perma.cc/C9BU-ZEPA>] [hereinafter White House Fact Sheet].

²⁵ *Id.*

²⁶ *Id.*

²⁷ S. 3832, 116 Cong. (2020) (introduced) [<https://www.congress.gov/116/crec/2020/05/21/CREC-2020-05-21-pt1-PgS2588.pdf>].

²⁸ *Id.*

²⁹ *Id.*

³⁰ Michael Martina & David Shepardson, *U.S. Senate Panel Approves Tech Bill to Address China*, REUTERS (May 12, 2021), <https://www.reuters.com/world/us/us-senate-panel-vote-china-tech-bill-wednesday-2021-05-12/> [<https://perma.cc/XU82-CBP7>].

About a year after the introduction of the Endless Frontier Act, Senators John Cornyn (R-TX) and Mark Warner (D-VA) introduced the CHIPS for America Act.³¹ Prior to the introduction of the bill, former Under Secretary of State for Economic Growth, Energy, and the Environment worked with Taiwan Semiconductor Manufacturing Company (TSMC) to ensure a steady supply chain of semiconductors to the United States.³² During his time in office, Krach orchestrated a twelve million dollar onshoring deal with the semiconductor giant, while collaborating with Senators Cornyn and Warner in the process.³³ In doing so, Krach created a domino effect, causing companies such as Samsung and Intel to construct their own similar semiconductor facilities in the United States.³⁴

In the Senate, the Endless Frontier Act (USICA) and CHIPS for America Act merged into USICA and passed the Senate with a vote of sixty-eight to thirty-two.³⁵ In the House of Representatives, the America COMPETES Act of 2022 (the House version of USICA) passed with minor differences to USICA.³⁶ After resolving differences, the bills merged to form the CHIPS and Science Act, which made its way through both houses of Congress again before President Biden signed it into law on August 9, 2022.³⁷

D. China's History of Semiconductor Production and its Role in the Passage of the CHIPS Act

1. *Brief History of Semiconductors in China*

To understand the aim and passage of the CHIPS Act, one must first understand the massive role the Chinese government and Chinese Communist Party have played in forming the American legislature's opinions on the semiconductor industry, as well as the history of semiconductors in China. China's semiconductor industry began in the late-1950s when China developed its first semiconductor in a state-run laboratory.³⁸ From this time until the early 1990s and the fall of the Soviet Union, China's semiconductor policy was that of a "Soviet-style" system in which the government encouraged autonomous development and involved itself via planning and funding within the semiconductor industries.³⁹ Throughout this period, semiconductor research and development took place in state labs while production occurred in state factories. But the two activities almost never comingled, leading to the early Chinese semiconductor industry to somewhat isolate itself from the technological developments of the rest of the world.⁴⁰ Instead of various state-run factories and labs communicating with each other, semiconductors and semiconductor technology in China was often developed independently of each other, as opposed to companies in the United States who researched and produced semiconductors under the same

³¹ Matt Hamblen, *President Biden Signs CHIPS and Science Act: Comments and Reactions*, FIERCE ELECTRONICS (Aug. 9, 2022), <https://www.fierceelectronics.com/sensors/president-biden-signs-chips-and-science-act-comments-and-reactions> [https://perma.cc/FES8-PW2V].

³² *Purdue Center for Tech Diplomacy Chairman Keith Krach and Director Bonnie Glick Counsel Commerce Secretary Gina Raimondo on Securing Semiconductor Supply Chain*, YAHOO (Mar. 21, 2022), <https://www.yahoo.com/now/purdue-center-tech-diplomacy-chairman-224100125.html> [https://perma.cc/67SP-QT4M].

³³ *Id.*

³⁴ *Id.*

³⁵ S. 1260, 117 Cong. (2021) (passed Senate) [https://www.congress.gov/117/bills/s1260/BILLS-117s1260es.pdf].

³⁶ H.R. 4521, 117 Cong. (2022) (amended) [https://www.congress.gov/117/bills/hr4521/BILLS-117hr4521eas.pdf].

³⁷ Chips and Science Act, *supra* note 3.

³⁸ VerWey, *supra* note 13, at 3.

³⁹ *Id.* at 10.

⁴⁰ *Id.*

roof.⁴¹ Yet as China's industry slowly developed, Mao Zedong's Cultural Revolution (1965-75) hampered further advancement and progress of semiconductor technology, and China lost much of the progress it had made in the early days of its semiconductor industry.⁴²

Yet as China's economy began to open up to the rest of the world in the late 1970s, so did its semiconductor industry: the State Council took steps to modernize the country's semiconductor industry, including opening more state-owned factories as well as importing other pre-manufactured foreign semiconductor lines.⁴³ As a result, China's state-led chip industry, while still behind the rest of the world in the mid-1980s, was able to "narrow and deepen" the industry, allowing a smaller amount of Chinese semiconductor firms than originally planned to achieve more technological success.⁴⁴

As China continued to integrate with the rest of the world through the 1980s and into the 1990s, Chinese semiconductor manufacturers and firms—with the approval and financial backing of the state—collaborated with foreign groups in a push to further develop the Chinese industry.⁴⁵ Despite its joint ventures with firms like ITT, NEC, Philips, Nortel, and Lucent Technologies, China continued to lag behind in chip development and research.⁴⁶ Despite these struggles, China's semiconductor industry in the form of consumptions saw some growth during the 2000s: China's market share of the global market for semiconductors grew twenty-three percent—from two to twenty-five percent—by 2005.⁴⁷ While beneficial for the Chinese industry, such growth was also an asset to the global market, as chip producers around the globe were able to sell vast amounts of semiconductors in the Chinese market.⁴⁸ Further, as Beijing offered more and more tax breaks and incentives into the 2000s, causing many ethnic Chinese engineers to return to and work in China, its semiconductor technology and production grew to the point that in 2005, China's State Council expressed plans to eventually grow its domestic industry to be self-sufficient by the year 2020.⁴⁹ The plan set forth by China's State Council—*National Medium- and Long-Term Science and Technology Development Plan Outline for 2006-20*—expressed Beijing's plan to not only "catch up" to the semiconductor manufacturing capabilities of the rest of the world via state acquisition of foreign semiconductor technology and firms but further to develop a homegrown, China-centric semiconductor industry that relied less on foreign collaboration and placed more emphasis on domestic innovation and development.⁵⁰

Today, it would seem China's 2005 plan has come to fruition. In 2014, China put forth its new semiconductor policy with the title "Made in China."⁵¹ A year later, the Made in China policy took effect and currently seeks to acquire overseas assets and develop a "closed-loop"

⁴¹ See *id.*

⁴² VerWey, *supra* note 13, at 10.

⁴³ *Id.*

⁴⁴ *Id.*

⁴⁵ *Id.* at 11.

⁴⁶ *Id.*

⁴⁷ VerWey, *supra* note 13, at 11.

⁴⁸ Christopher Thomas, *Lagging but Motivated: The State of China's Semiconductor Industry*, BROOKINGS (Jan. 7, 2021), <https://www.brookings.edu/techstream/lagging-but-motivated-the-state-of-chinas-semiconductor-industry/> [<https://perma.cc/G4S9-TJ98>].

⁴⁹ See VerWey, *supra* note 13, at 12.

⁵⁰ See Thomas, *supra* note 46; VerWey, *supra* note 13, at 12.

⁵¹ Thomas, *supra* note 46.

semiconductor industry, just as Beijing’s 2005 plan stated it would.⁵² As Chinese aggression in the global consumption and supply of semiconductors increases, the United States has taken similar measures to produce and develop chips at home rather than rely on foreign research and production of chips, leading to the passage of the CHIPS Act.⁵³

2. *China’s Role in the Passage of the CHIPS Act*

While China’s semiconductor policy as laid out in the prior section of this comment is certainly not the only driving force behind the passage of the CHIPS Act, it is nonetheless a large factor in the massive piece of bipartisan legislation.⁵⁴ China is a massive consumer of semiconductors: since 2012, China has purchased and consumed more chips than every other country combined, largely thanks to domestic and export demand.⁵⁵ As of 2018, China was estimated to produce ninety percent of the world’s smartphones and over half of all personal computers and smart televisions, all of which require semiconductors to manufacture.⁵⁶ As China implements more advanced domestic semiconductor policies which seek to allow domestic growth and production, the United States, as well as other countries such as Taiwan, Japan, and South Korea, have an interest in ensuring China continues to purchase semiconductors from them rather than produce them domestically. While the United States may not produce (pre-CHIPS Act) what it used to in terms of global semiconductor supply (American semiconductor manufacturing capacity shrunk from forty to twelve percent of global supply from 1990 to 2022), the United States still produces some of the most advanced semiconductors (but struggles to do so at volume) in the world, many of which Chinese state-run semiconductor firms purchase for use in domestic and exported products.⁵⁷

Furthermore, the United States has another reason to ensure China’s market share and production capacity does not increase too much: national security and the threat of Chinese invasion of Taiwan.⁵⁸ As it stands today, TSMC located on the island which China claims as its own, produces about fifty percent of the world’s semiconductors and around ninety percent of the world’s most advanced semiconductors.⁵⁹ Much of the United States’ own imported semiconductors are produced by TSMC for a number of uses, whether it be in the American automotive or defense industry.⁶⁰ While this “sole-sourcing” doesn’t appear to be an issue in and of itself, it could spell

⁵² *Id.*

⁵³ *The CHIPS Act: What It Means for the Semiconductor Ecosystem*, PWC, <https://www.pwc.com/us/en/library/forward-now-accounting-business-news/chips-act.html> [<https://perma.cc/HE2R-AMKV>] [hereinafter *Semiconductor Ecosystem*].

⁵⁴ White House Fact Sheet, *supra* note 23.

⁵⁵ See VerWey, *supra* note 13, at 6.

⁵⁶ *Id.*

⁵⁷ STAFF OF S. COMM. ON COMMERCE, 116TH CONG., *THE CHIPS ACT OF 2022*, (Comm. Print 2022), <https://www.commerce.senate.gov/services/files/592E23A5-B56F-48AE-B4C1-493822686BCB> [<https://perma.cc/C2A3-EJVX>] [hereinafter S. COMM. ON COMMERCE]; see *Semiconductor Ecosystem*, *supra* note 52; see also VerWey, *supra* note 13 at 3-4.

⁵⁸ See Alexandra Seymour, *Semi-Protecting Semiconductors Poses a Risk to National Security*, THE HILL (Jan. 4, 2023), <https://thehill.com/opinion/technology/3789324-semi-protecting-semiconductors-poses-a-risk-to-national-security/> [<https://perma.cc/Q92Q-4Y7X>].

⁵⁹ Gina Con, *TSMC Is China’s Trump Card Against U.S. and Taiwan*, REUTERS (Aug. 5, 2022), <https://www.reuters.com/breakingviews/tsmc-is-chinas-trump-card-against-us-taiwan-2022-08-05/> [perma.cc/6LQL-PDM3].

⁶⁰ *Id.*

serious trouble for American's at home if anything were to happen to the manufacturing capacity of TSMC's factories in Taiwan.⁶¹ In early August 2022, House of Representatives Speaker Nancy Pelosi visited Taiwan as part of a diplomatic envoy sent to strengthen ties between the two countries while also sending a message to mainland China that the United States would defend the island nation in the event of an invasion by China's People's Liberation Army.⁶² Yet one issue remains clear: were China to actually invade Taiwan and take out TSMC's manufacturing capabilities, one of the United States' largest providers of semiconductors would cease to be able to manufacture chips, leading to a massive unfulfilled demand of chips.⁶³ During Speaker Pelosi's visit, China launched the largest ever military drill up to that point in the Taiwan Strait, the body of water separating Taiwan from mainland China, indicating that the politicians visit was crossing a threshold deemed unacceptable by Beijing.⁶⁴ A few days prior to the visit, TSMC Chair Mark Liu stated in an interview with CNN that if China did invade Taiwan, the company's most advanced chip factory would become inoperable and thus unable to produce chips.⁶⁵ While it's true that China's chip producers would also suffer from such an event—mainland Chinese chip manufacturers as well as other Chinese tech industries rely on TSMC for a number of products—the threat of invasion is a serious risk for the United States and others who import TSMC brand chips.⁶⁶ For a company that produces such a gigantic portion of the world's chip supply—sixty-five percent of North America's alone—such an event would be catastrophic as the global semiconductor supply chain would likely falter and leave consumers unable to obtain electronic goods for years to come.⁶⁷

Again, while China and Chinese policy towards Taiwan is not the sole reason for the passage of the CHIPS Act, it is certainly a large factor to consider. The national security risks and implications of a defunct TSMC unable to operate any of its manufacturing plants in Taiwan, nor provide the rest of the world with advanced chips—which it does on a large scale—would spell disaster for the global economy and pose a serious national security risk. As a result, the CHIPS Act clearly addresses these issues, seeking to decrease the risk of foreign competitors while also anticipating and neutralizing the economic threat of a Chinese invasion of Taiwan.⁶⁸

III. Impact of the CHIPS Act: The World Economy and Foreign Reactions

A. Impact of the CHIPS Act on American Business and Domestic Semiconductor Manufacturing

Before the CHIPS Act even became law in August 2022, multiple semiconductor manufacturers already broke ground and started construction of chip factories and production plants on American soil in anticipation of the passage of the act at a later date.⁶⁹ In September 2021, almost a year

⁶¹ Seymour, *supra* note 57.

⁶² Norah Huang, *A Taiwan Perspective on What Is at Stake After Nancy Pelosi's Visit to Taiwan*, BROOKINGS (Sept. 26, 2022), <https://www.brookings.edu/blog/order-from-chaos/2022/09/26/a-taiwan-perspective-on-what-is-at-stake-after-nancy-pelosis-visit-to-taiwan/> [https://perma.cc/QJA7-ZEJT].

⁶³ Con, *supra* note 58.

⁶⁴ *Id.*

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ Lori Ditoro, *The Importance of Taiwan in the Chip Supply Chain*, SUPPLY & DEMAND EXECUTIVE (Oct. 14, 2022), <https://www.sdcexec.com/software-technology/supply-chain-visibility/article/22485850/the-importance-of-taiwan-in-the-chip-supply-chain> [https://perma.cc/UP7A-RW2N].

⁶⁸ See S. COMM. ON COMMERCE, *supra* note 56.

⁶⁹ See White House Fact Sheet, *supra* note 23.

before the CHIPS Act was signed into law, but during which the Endless Frontier Act was marching its way through the House, Intel broke ground on two fabrication plants totaling twenty billion dollars in Chandler, Arizona.⁷⁰ Intel, who already had four other previous semiconductor factories at their Chandler campus, stated that the new plants will produce Intel's most advanced, cutting edge chips in an effort to draw market share away from TSMC.⁷¹ Intel's Chief Executive Pat Geisinger cited a need for a more resilient supply chain as a major factor in constructing the new fabrication plants, while the operations will yield a significant economic boost to the area's job market.⁷² A few months earlier in July 2021, semiconductor manufacturer GlobalFoundries announced plans to build a new and highly advanced semiconductor manufacturing plant in upstate New York with funding from the federal government.⁷³ GlobalFoundries—whose investments include a one billion dollar push to produce more wafers (the silicone structure chips are built upon)—worked with politicians including Senator Schumer as well as Department of Defense officials in crafting the bipartisan USICA, the precursor to the CHIPS Act.⁷⁴ While, as previously mentioned, the CHIPS Act grew from USICA and its sister bill, the Endless Frontier Act, the CHIPS Act itself had not been signed into law—rather, GlobalFoundries worked with the government to ensure that USICA, which provided fifty-two billion dollars in backing to semiconductor companies, passed through Congress and allowed for the planning and construction of a new plant.⁷⁵ Similarly, in November 2021, Samsung announced plans to construct a seventeen billion dollar chip factory outside of Austin, Texas, making it the largest foreign direct investment of all time in the state.⁷⁶ Samsung Vice Chairman Kinam Kim, as with Intel and GlobalFoundries, cited government incentives and as well as supply chain concerns as reasons to build a new semiconductor factory in the United States.⁷⁷ While Samsung has maintained a semiconductor fabrication plant in the state since the late 1990s, most of Samsung's manufacturing still occurs in Korea and other East Asian nations—something the CHIPS Act aimed to dissuade.⁷⁸ Before the CHIPS Act became law, the precursors to the law—including the Endless Frontier Act and USICA—stimulated and helped grow foreign and domestic direct investment within the American semiconductor industry.

Yet once the CHIPS Act became law on August 9, 2022, another wave of semiconductor manufacturers—foreign and domestic—announced plans to construct fabrication plants and build

⁷⁰ Stephen Nellis, *Intel Breaks Ground on \$20 Billion Arizona Plants as U.S. Chip Factory Race Heats Up*, REUTERS (Sept. 25, 2021), <https://www.reuters.com/technology/intel-breaks-ground-20-bln-arizona-plants-us-chip-factory-race-heats-up-2021-09-24/> [<https://perma.cc/L3XD-KXFE>].

⁷¹ *Id.*

⁷² *Id.*

⁷³ Press Release, GlobalFoundries, *GlobalFoundries Plans to Build New Fab in Upstate New York in Private-Public Partnership to Support U.S. Semiconductor Manufacturing* (July 19, 2021), <https://investors.gf.com/news-releases/news-release-details/globalfoundries-plans-build-new-fab-upstate-new-york-private> [<https://perma.cc/HWQ6-YVER>].

⁷⁴ *Id.*

⁷⁵ *Id.*

⁷⁶ *Samsung Says It Will Build \$17B Chip Factory in Texas*, NPR (Nov. 24, 2021), <https://www.npr.org/2021/11/24/1058770506/samsung-says-it-will-build-17b-chip-factory-in-texas> [<https://perma.cc/UMW6-LLSK>] [hereinafter *Samsung Factory*].

⁷⁷ *Id.*; see GlobalFoundries, *supra* note 72; see also Nellis, *supra* note 69.

⁷⁸ See *Samsung Factory*, *supra* note 75.

campuses in the United State.⁷⁹ Wolfspeed—a semiconductor manufacturer that specializes in silicon carbides—selected North Carolina as the place to construct a new silicon carbide semiconductor facility.⁸⁰ The company’s new campus, which will total an investment of five billion dollars, was driven in part by the CHIPS Act as well as North Carolina’s own Economic Investment Committee via its High-Yield Job Development Investment Grant, authorizing a potential incentive of up to seventy-six million dollars over the course of the next twenty years.⁸¹ In October 2022, two months after the CHIPS Act passed, semiconductor manufacturer Micron stated plans for a new twenty billion dollar factory located in upstate New York which will employ around 3,000 people and could grow to total an approximately \$100 billion investment.⁸² This came only a few weeks after Micron announced it would construct a new facility in its home state of Idaho, again citing federal backing as a major reason for the new facilities.⁸³

Yet by far, the largest announcement came in December 2022 when TSMC announced its plan to construct a second, forty-billion-dollar semiconductor manufacturing plant in Arizona—one of the largest foreign direct investments in the history of the United States—while still constructing its first plant in the same area (worth an estimated twelve billion dollars).⁸⁴ According to National Economic Council’s Aaron “Ronnie” Chatterji, the TSMC plants “will produce enough advanced chips to meet the U.S. annual demand” which is around 600,000 wafers annually.⁸⁵ Director of the National Economic Council, Brian Deese, cited the CHIPS Act as essential to drawing chip manufacturers to the United States.⁸⁶ The importance of TSMC—the world’s largest producer of advanced semiconductors—opening within the borders of the United States cannot be understated. If Chatterji and others are correct, the United States will not only become independent when it comes to semiconductor manufacturing but will also no longer be under the threat of a Chinese invasion of Taiwan when it comes to semiconductors.⁸⁷

While most of the CHIPS Act is certainly good for American business, local economies, and semiconductor stocks as a whole, the law comes with a catch: the CHIPS Act limits recipients of

⁷⁹ Robert Casanova, *The CHIPS Act Has Already Sparked \$200 Billion in Private Investments for U.S. Semiconductor Production*, SEMICONDUCTOR INDUSTRY ASSOCIATION (Dec. 14, 2022, 8:00 am), <https://www.semiconductors.org/the-chips-act-has-already-sparked-200-billion-in-private-investments-for-u-s-semiconductor-production/> [https://perma.cc/L6RA-CM6L].

⁸⁰ Press Release, Governor Roy Cooper, Governor Cooper Announced Wolfspeed Selects North Carolina for 445 Acre Manufacturing Campus (Sept. 9, 2022), <https://governor.nc.gov/news/press-releases/2022/09/09/governor-cooper-announces-wolfspeed-selects-north-carolina-445-acre-manufacturing-campus> (Silicon carbide semiconductors are a variation of normal chip technology and are used in vehicles, cellular network transmission, as well as energy storage) [https://perma.cc/8LAL-KNGU].

⁸¹ *Id.*

⁸² Whalen, *supra* note 22.

⁸³ *Id.*

⁸⁴ Emma Kinery, *TSMC to Up Arizona Investment to \$40 Billion with Second Semiconductor Chip Plant*, CNBC (Dec. 6, 2022), <https://www.cnbc.com/2022/12/06/tsmc-to-up-arizona-investment-to-40-billion-with-second-semiconductor-chip-plant.html> [https://perma.cc/V8KN-7RRC]; Yang Jie & Ken Thomas, *TSMC Raises Arizona Chip Investment to \$40 Billion as Biden Visits*, THE WALL STREET JOURNAL (Dec. 6, 2022), <https://www.wsj.com/articles/tsmc-raises-arizona-chip-investment-to-40-billion-as-biden-visits-11670318568> [https://perma.cc/22EF-LL4J].

⁸⁵ Kinery, *supra* note 83.

⁸⁶ *Id.*

⁸⁷ *See id.*

federal funds in their ability to expand into and do business within China.⁸⁸ According to Subsection 103(a)(3)(C)(i) of the statute, any entity or company awarded a government grant “may not engage in any significant transaction . . . involving the material expansion of semiconductor manufacturing capacity in the People’s Republic of China,” subject to some exceptions.⁸⁹ Furthermore, the statute requires that entities notify the Secretary of State of any “planned significant transactions . . . involving the material expansion of semiconductor manufacturing” in China, as well as any other country of concern, including the Democratic People’s Republic of Korea, the Russian Federation, and the Islamic Republic of Iran.⁹⁰

B. Additional Restrictions on Business with China

While the CHIPS Act incentivized domestic and foreign semiconductor firms to open up shop in America, the Biden Administration—only a few months after the CHIPS Act passed—prescribed newer, tighter restrictions on American businesses, recipients of the CHIPS Act or not, from doing business in China.⁹¹ Meant to hamper China’s military growth and semiconductor capability, the Bureau of Industry and Security (BIS), Department of Commerce, announced that it was implementing a series of new export controls on semiconductor manufacturing related to “advanced computing” and supercomputers.⁹² Citing China’s growing and technologically advancing military as well as its advances in computing and semiconductor manufacturing, the BIS sought to control end-use items destined for supercomputers within China.⁹³ While semiconductor manufacturers may still do business with Chinese entities, such businesses now need to obtain a license from the Department of Commerce to sell certain chips and semiconductor materials used in the construction of supercomputers, many of which are used in China’s defense and weapons systems.⁹⁴ Though restrictions regarding China’s use of semiconductor imports, the rules issued in October 2022 are some of the most sweeping yet, indicating along with the CHIPS Act that the United States is not only in a chip war with China, but that the Biden Administration is seriously concerned about China’s development of advanced armed systems and artificial intelligence that require highly advanced semiconductors to operate.⁹⁵

C. Criticism Within the United States

⁸⁸ Chips and Science Act, *supra* note 2, at § 103(a)(3)(C)(i).

⁸⁹ *Id.*

⁹⁰ *Id.* at §§ 103(a)(3)(C)(ii), 10638(2).

⁹¹ John D. McKinnon & Asa Fitch, *U.S. Restricts Semiconductor Exports in Bid to Slow China’s Military Advance*, THE WALL STREET JOURNAL (Oct. 7, 2022), https://www.wsj.com/articles/u-s-restricts-semiconductor-exports-in-bid-to-slow-chinas-military-advance-11665155702?mod=article_inline [<https://perma.cc/DS2D-363G>]; Michael Schuman, *Why Biden’s Block on Chips to China Is a Big Deal*, THE ATLANTIC (Oct. 25, 2022), <https://www.theatlantic.com/international/archive/2022/10/biden-export-control-microchips-china/671848/> [<https://perma.cc/GYE2-9AAT>].

⁹² Bureau of Industry and Security, Department of Commerce, 87 Fed. Reg. 62,186, 62,186-89 (Oct. 13, 2022) (to be codified at 15 C.F.R. pts. 734, 736, 740, 742, 744, 762, 772, and 774) [hereinafter “BIS Regulations”]; Press Release, Bureau of Industry and Security, Department of Commerce, Commerce Implements New Export Controls on Advanced Computing and Semiconductor Manufacturing Items to the People’s Republic of China (PRC) (Oct. 7, 2022), <https://www.bis.doc.gov/index.php/documents/about-bis/newsroom/press-releases/3158-2022-10-07-bis-press-release-advanced-computing-and-semiconductor-manufacturing-controls-final/file> [<https://perma.cc/9MWT-GQ8U>] [hereinafter BIS Press Release].

⁹³ Bureau of Industry and Security, Department of Commerce, *supra* note 91, at 62,186.

⁹⁴ McKinnon & Fitch, *supra* note 90.

⁹⁵ *See id.*

While most American and foreign companies receiving funds designated through the CHIPS Act found the trade-off to be worth the cost of limited expansion of China, some aren't so sure about the efficacy of the new law—many of the new factories built as a result of the CHIPS Act will be producing more and more advanced chips.⁹⁶ While no doubt important, much of the United States economy relies on older chips for use in products such as cars—the same type of chips that have been high in demand and low in supply over the past few years.⁹⁷ As a result, while China's advanced semiconductor industry will probably struggle to gain new footing and progress at a solid rate, China still produces many of these older-style semiconductors that are used in a plethora of everyday electronics and goods.⁹⁸ While the United States has targeted China's ability to produce and obtain advanced semiconductors for use in artificial intelligence and defense systems-related super computers, the Biden administration failed to introduce restrictions regarding China's production of older chips used in household and everyday products.⁹⁹

Another issue with the CHIPS Act and additional restrictions imposed by the Biden administration is that it expects China to be unable to obtain any advanced chips as a result of the restrictions. The issue with this thinking is that the main technologies the United States seeks to prevent China from obtaining have alternatives that are already widely available.¹⁰⁰ While the United States already attempted to persuade other chip manufacturing nations—the Netherlands, for example—to comply with its efforts to dismantle China's ability to obtain advanced chips, there has not been international agreement on how to handle the China semiconductor issue.¹⁰¹ Further, even with such broad restrictions against China, there is no guarantee that Beijing won't start production on advanced semiconductors at home—China, in part thanks to its “Made In China” policy discussed above, has already attracted a large number of foreign engineers (many of whom are ethnically Chinese) as well as taken additional measures to establish domestic production of advanced semiconductors.¹⁰² Subsequently, the United States and current administration may be overestimating their importance in ensuring China doesn't develop such advanced semiconductors all while possibly hurting American semiconductor companies that manufacture large numbers of chips and other products reliant on semiconductors in mainland China.¹⁰³

Yet the issue with these critiques is that the United States government has proactively accounted for many of these issues. When it comes to the CHIPS Act—which has already generated over

⁹⁶ Don Clark & Ana Swanson, *U.S. Pours Money into Chips, but Even Soaring Spending Has Limits*, N.Y. TIMES (Jan. 1, 2023), <https://www.nytimes.com/2023/01/01/technology/us-chip-making-china-invest.html> [https://perma.cc/58RF-88YN].

⁹⁷ *Id.*

⁹⁸ Zeyi Yang, *Chinese Chips Will Keep Powering Your Everyday Life*, MIT TECHNOLOGY REVIEW (Jan. 4, 2023), <https://www.technologyreview.com/2023/01/04/1066136/chinese-legacy-chips-advantage/> [https://perma.cc/GKM6-5W3D].

⁹⁹ *Id.*

¹⁰⁰ Rakesh Kumar, *Chip Bans on Countries like China Will Hurt the U.S. More Than They'll Help. They Won't Even Work*, FORTUNE (Sept. 28, 2022), <https://fortune.com/2022/09/28/chip-export-ban-china-us-asml-nvidia-rakesh-kumar/> [https://perma.cc/Q6ZE-RB97].

¹⁰¹ Che Pan, *Dutch Minister Says She Will Fight for Open Trade in Davos Chip Panel Discussion, as US Pressure Rises on Export Controls to China*, SOUTH CHINA MORNING POST (Jan. 19, 2023), <https://www.scmp.com/tech/article/3207455/dutch-minister-says-she-will-fight-open-trade-davos-chip-panel-discussion-us-pressure-rises-export> [https://perma.cc/VS9A-XALF]; *see id.*

¹⁰² *See* Pan, *supra* note 100; *see supra* text accompanying notes 44-52.

¹⁰³ *See* Kumar, *supra* note 99.

200 billion dollars in the form of direct investments within the United States—companies are not precluded from doing business in China if such firms are already established in the country.¹⁰⁴ Subsection 103(a)(3)(C)(ii)(I) and (II) of the Act notes that prohibitions for recipients of federal assistance do not include “existing facilities or equipment of a covered entity or manufacturing legacy semiconductors; or (II) significant transactions involving the material expansion of semiconductor manufacturing capacity that (a) produces legacy semiconductors and (b) predominately serves the market of a foreign country of concern.”¹⁰⁵ In other words, the CHIPS Act allows recipients of federal funds to continue producing legacy semiconductors (older models that are found in common, everyday products such as cars, personal computers, etc.) and further, produce such semiconductors for use in China’s own domestic market.¹⁰⁶ Such criticism ignores the fact that the CHIPS Act was deliberately written to not impede China’s production of legacy semiconductors, but more importantly, not stifle American legacy chipmakers as well, many of whom have a large consumer base in China.¹⁰⁷

Further, even the more recent BIS Department of Commerce restrictions make room for American companies with already established plants and operations in China.¹⁰⁸ The new regulations set forth by the BIS only impose limitations on advanced semiconductors for use in supercomputers, artificial intelligence, and other advanced applications in the Chinese defense sector.¹⁰⁹ Such regulations are not an accident—the Biden Administration and Department of Commerce know that a blanket ban on the sale of *all* Chinese semiconductors and related materials would stress an already thinned supply of legacy chips.¹¹⁰ Due to the lower price of labor in China as well as Chinese semiconductor firms’ ability to produce and market legacy chips on a low-cost basis (many of which are found in products made in China and destined for the United States), China is already in a good spot to continue production of legacy chips: something the United States has deliberately left absent from the CHIPS Act and following regulations.¹¹¹ While criticism regarding China’s ability to limit its flow and manufacturing of legacy chips to the United States is valid, cutting off the supply would also hurt the Chinese semiconductor industry, considering that the United States is a large market for products constructed in China that contain older chips and that China’s semiconductor industry isn’t strong enough (yet) on its own to impose comparable restrictions.¹¹²

Additionally, the BIS export restrictions are not absolute: such restrictions allow semiconductor companies and firms to file and apply for licenses to do business with China, similar to how businesses receiving grants under the CHIPS Act may use exceptions to continue operations in China.¹¹³ In doing so, the Department of Commerce ensured that not *all* semiconductor business

¹⁰⁴ Casanova, *supra* note 78; Chips and Science Act, *supra* note 2, at § 103(a)(3)(C)(ii)(I), (II).

¹⁰⁵ Chips and Science Act, *supra* note 2, at § 103(a)(3)(C)(ii)(I), (II).

¹⁰⁶ See Yang, *supra* note 97; see also Clark & Swanson, *supra* note 95.

¹⁰⁷ See *supra* text accompanying note 56.

¹⁰⁸ BIS Regulations, *supra* note 91, at 62,186.

¹⁰⁹ Ana Swanson, *Biden Administration Clamps Down on China’s Access to Chip Technology*, N.Y. TIMES (Oct. 7, 2022), <https://www.nytimes.com/2022/10/07/business/economy/biden-chip-technology.html> [<https://perma.cc/3YBF-BBG8>]; see Yang, *supra* note 97.

¹¹⁰ See *id.*

¹¹¹ Yang, *supra* note 97.

¹¹² Zeyi Yang, *What’s Next for the Chip Industry*, MIT TECHNOLOGY REVIEW (Jan. 3, 2023), <https://www.technologyreview.com/2023/01/03/1065959/whats-next-chip-industry-2023/> [<https://perma.cc/NS4H-5Z8F>]; see Thomas *supra* note 47.

¹¹³ BIS Regulations, *supra* note 91, at 62,193; see BIS Press Release, *supra* note 91.

between America and China halted, but rather that such business must be approved at the discretion of the BIS before continuing.¹¹⁴ Thus the United States successfully targeted China’s development of advanced semiconductors through the CHIPS Act and BIS regulations, while still allowing other semiconductor businesses to continue.¹¹⁵ While the restrictions from both sources are still fresh, the United States wisely limited China’s ability to produce advanced chips used in weapons systems while allowing mutually beneficial trade to occur—something that critics seem to fail to address.

D. The Impact of the CHIPS Act and Subsequent Restrictions on Chinese-American Relations Unsurprisingly, Beijing’s reaction to the CHIPS Act and subsequent legislation was less cheery than semiconductor companies receiving financial incentives under the CHIPS Act. Only nine days after President Biden signed the CHIPS Act into law, Yu Xiekang, vice chairman of the China Semiconductor Industry Association spoke out against the new regulations, criticizing the CHIPS Act for unfairly targeting China’s semiconductor industry and intentionally benefitting China’s international competitors.¹¹⁶ Xiekang, during a semiconductor industry event in China, stated that “[w]e resolutely oppose the U.S.’s restrictive actions targeting certain countries . . . [i]t contains essentially discriminatory clauses in market competition and creates an unfair playing field, which goes against the WTO’s fair-trade principles.”¹¹⁷ The CHIPS Act and further prohibitive regulations strained already tense relations between the two nations, especially when the independence of Taiwan and territorial disputes in the South China Sea have come to a head in the recent past.¹¹⁸ While Washington’s passage of the act is one issue, the Biden Administration has also recruited other semiconductor producing countries to impose export controls on China—none of which helps to cool tensions between the two nations.¹¹⁹ Since the CHIPS Act passed, the Administration has held talks with the host countries of ASML Holding NV (ASML) (Netherlands) and Nikon Corporation (Japan) to restrict trade between them and China in order to essentially form a “technology blockade.”¹²⁰

Reacting to the CHIPS Act as well as the Biden Administration’s attempt to levy export controls against China’s chip industry, China’s Ministry of Commerce filed a complaint with the World Trade Organization (WTO) against the United States, using the international body to dispute the various export controls.¹²¹ The Chinese Ministry of Commerce specified in the complaint that the

¹¹⁴ See BIS Press Release, *supra* note 91.

¹¹⁵ See *id.*; see Yang, *supra* note 97.

¹¹⁶ Bloomberg, *China Attacks U.S. Chips Handouts While Warning of a Market Slowdown*, TIME (Aug. 18, 2022), <https://time.com/6206951/china-us-semiconductor-chips/> [<https://perma.cc/9YCM-EYHT>]; Gadjó Sevilla, *China Opposes \$52 Billion CHIPS Act*, INSIDER INTELLIGENCE (Aug. 19, 2022), <https://www.insiderintelligence.com/content/china-opposes-52-billion-chips-act> [<https://perma.cc/CQH2-4SV4>].

¹¹⁷ Sevilla, *supra* note 115.

¹¹⁸ Kristin Huang, *US-Philippines Military Bases Deal Seen as Reaction to China’s Moves in South China Sea Over Past Decade*, SOUTH CHINA MORNING POST (Feb. 5, 2023), <https://www.scmp.com/news/china/diplomacy/article/3209093/us-philippines-military-bases-deal-seen-reaction-chinas-moves-south-china-sea-over-past-decade> [<https://perma.cc/SWF3-ZRTR>]; see *supra* text accompanying notes 51-56.

¹¹⁹ Bloomberg, *supra* note 115.

¹²⁰ *Id.*

¹²¹ Yuka Hayashi & James T. Areddy, *China Says It Has Taken U.S. Semiconductor Rules to WTO*, THE WALL STREET JOURNAL (Dec. 12, 2022), <https://www.wsj.com/articles/china-says-it-has-taken-u-s-semiconductor-controls-to-wto-11670885619> [<https://perma.cc/2HUK-4SAS>].

United States has “expanded its concept of national security, abused export-control measures, hindered the normal international trade of semiconductors . . . threatened the stability of the global industrial supply chain and taken other steps that disrupt the international economy” in recent years.¹²² In response, the Office of the U.S. Trade Representative refuted the efficacy of the complaint and noted that since such export controls deal with national security, the WTO is an improper forum for the complaint to be filed.¹²³

Yet in its response, China revealed its hand: the Chinese semiconductor industry is still highly dependent on other countries to manufacture the types of semiconductors it consumes.¹²⁴ Despite Beijing’s “Made in China” policy and advancement of semiconductor research/proliferation of Chinese engineers working in the Chinese semiconductor industry—which no doubt, increased China’s own chip production capability—China’s domestic semiconductor manufacturing can only supply ten to fifteen percent of the domestic market’s demand since the country’s demand is that colossal.¹²⁵ Perhaps the Chinese government’s reaction to the CHIPS Act is more telling than Beijing cares to let on, but one fact is clear: as the semiconductor war rages, the United States—despite Chinese protest—appears determined to bring domestic chip manufacturers back home while attracting foreign manufacturers to its shores.

C. The Impact of the CHIPS Act and Subsequent Restrictions on Foreign Relations with Friendly, Chip Producing Nations

1. *The Netherlands*

While the CHIPS Act appears to be working as intended, one undesired effect can be seen in America’s current relationship with friendly, semiconductor manufacturing nations like South Korea, the Netherlands, and Japan. After the CHIPS Act and its subsequent related legislation became law in late 2022, the United States continued in its quest to chill the growing Chinese domestic chip industry by requesting that other semiconductor-producing nations—including Japan and the Netherlands—restrict their scope of business with China.¹²⁶ Initially, the Netherlands resisted export controls requested by the Biden Administration: in January 2023, Dutch foreign trade minister Liesje Schreinemacher told the press she would fight for “free trade” during a World Economic Forum in Davos, Switzerland.¹²⁷ The United States, seeking to employ its own trade restrictions against China in other semiconductor producing nations, was met with some resistance from Ms. Schreinemacher, who also indirectly criticized the CHIPS Act and its subsidies, stating that such large federally subsidized grants went against “open trade,” but rather were forms of protectionism.¹²⁸ Yet such criticism was not without a goal in mind: ASML, a Dutch semiconductor company which produces and supplies a plethora of lithography systems—parts that are essential for the construction of both advanced and legacy semiconductors—has been

¹²² *Id.*

¹²³ *Id.*

¹²⁴ VerWey, *supra* note 13, at 6; Milton Ezrati, *Beijing Is Furious*, FORBES (Oct. 17, 2022), <https://www.forbes.com/sites/miltonezrati/2022/10/17/beijing-is-furious/?sh=53d98d0d3753> [<https://perma.cc/DP7K-X6JM>].

¹²⁵ Ezrati, *supra* note 123; *see supra* text accompanying notes 51-2.

¹²⁶ *Japan, Netherlands to join U.S. in Restricting Chip Equipment Exports to China*, Bloomberg Reports, REUTERS (Jan. 27, 2023), <https://www.reuters.com/technology/japan-netherlands-join-us-china-chip-controls-bloomberg-2023-01-27/> [<https://perma.cc/V522-7H46>] [hereinafter *Japan & Netherlands Export Blocks*].

¹²⁷ Pan, *supra* note 100.

¹²⁸ *Id.*

barred from doing some business with China under the Biden Administration’s regulations surrounding the CHIPS Act.¹²⁹ Under these regulations, semiconductor and semiconductor-related companies, even if based outside the United States, are prohibited from using “U.S.-origin technology in certain areas” of semiconductor manufacturing equipment that would otherwise be exported to China.¹³⁰ In the case of ASML, the Dutch semiconductor firm has been unable to export “extreme ultraviolet lithography machines” to its third-largest export market in the world: mainland China.¹³¹ As a result, ASML’s revenue, especially the share of its revenue derived from China, has decreased, all while further regulations threaten to damage ASML’s profits further.¹³²

Despite this looming loss in profits and Ms. Schreinemacher’s protests, The Hague ultimately ruled in Q1 of 2023 to step in line with the U.S.-led and designed export controls against China, though such controls have not yet been defined clearly.¹³³ While ASML will surely suffer the consequences of such restrictions, the move signals to other chip-producing nations and economies that the U.S. is not alone in their crusade against China.¹³⁴ For the Netherlands—and by proxy, ASML—to agree to such stringent restrictions and regulations recommended by the American government and Biden administration shows that there is more than just an American focus to curtail China’s current semiconductor procurement and production. The looming question is if the U.S. can convince and persuade enough allies that adopting similar export controls, regardless of declining profits and decreased market share, is worth the overall cost. As of now, the Netherlands has answered, despite pushback, that it is.

2. South Korea

In December 2022, Yang Hyang-ja of Samsung Electronics Co. (South Korea) voiced concerns about a modern chip war, spurred by nations across the globe offering heavy incentives to semiconductor manufacturers to produce chips in their respective countries.¹³⁵ In January, South Korea—thanks in part to the Presidential special committee Yang sits on—announced it would offer semiconductor companies up to a thirty-five percent tax break to manufacture chips in Korea.¹³⁶ Though South Korea is the largest producer of memory chips in the world, President Yoon Suk-yeol’s Administration worries that the CHIPS Act and other legislation will have a negative impact on South Korea’s market share.¹³⁷

¹²⁹ *Id.*

¹³⁰ *Id.*

¹³¹ *Id.*

¹³² *See id.*

¹³³ Toby Sterling & Philip Blenkinsop, *ASML, China Customers Haunted by Uncertainty on New Dutch Chip Export Rules*, REUTERS (Mar. 9, 2023), <https://www.reuters.com/technology/asml-china-customers-haunted-by-uncertainty-new-dutch-chip-export-rules-2023-03-09/> [<https://perma.cc/P7R3-CPE8>]; *see* Toby Sterling & Stephanie van den Berg, *Dutch Export Rules on China in Focus Ahead of ASML Results*, REUTERS (Jan. 20, 2023), <https://www.reuters.com/technology/dutch-export-rules-china-focus-ahead-asml-results-2023-01-20/> [<https://perma.cc/E3W4-J3T2>].

¹³⁴ *See* Sterling & Blenkinsop, *supra* note 132.

¹³⁵ Sohee Kim, *‘We’re in a Chip War’: Korea’s Lead on Semiconductors is Worried about the Country Losing Chip Manufacturing to the U.S.*, FORTUNE (Jan. 3, 2023, 4:00 am), <https://fortune.com/2023/01/03/south-korea-chip-war-semiconductors-yang-hyang-ja-subsidies-us-china-japan/> [<https://perma.cc/6T75-VENS>].

¹³⁶ *Id.*; *South Korea Unveils Tax Breaks for Domestic Investments in Chips*, AL JAZEERA (Jan. 3, 2023), <https://www.aljazeera.com/economy/2023/1/3/south-korea-unveils-tax-breaks-for-domestic-investments-in-chips> [<https://perma.cc/9JU5-LXVA>] [hereinafter *South Korea Tax Breaks*].

¹³⁷ *South Korea Tax Breaks*, *supra* note 135.

Further, the South Korean administration worries that the United States could ask it to join the United States and other countries in imposing semiconductor trade restrictions against China.¹³⁸ While unlikely, the request would not be a welcome one: China is South Korea's trading partner when it comes to semiconductors and semiconductor components.¹³⁹ According to the Korean Institute for International Economic Policy (KIEP), over forty-three percent of all gross semiconductor exports from South Korea in 2020 were sent to mainland China while over eighteen percent were exported to Hong Kong, bringing the total amount of South Korean chip exports to China at just over sixty percent.¹⁴⁰ Despite this, the South Korean government chose to join the U.S.-headed "Chip 4" alliance—consisting of the United States, Japan, Taiwan, and South Korea—thinking the decision to be inevitable and one necessary to ensure China's semiconductor industry is kept weak for the foreseeable future, though South Korean firms could lose profits in the process.¹⁴¹

As time passes, tensions may develop: eventually, South Korea will need to increase its own competitiveness within the industry without relying on American semiconductor.¹⁴² As of now, the South Korean semiconductor industry relies heavily on American components and parts that are necessary to manufacture chips.¹⁴³ While Samsung and SK Hynix—two South Korean firms—were granted year-long licenses allowing them to escape U.S. export restrictions, it is unclear as to whether the U.S. will renew such licenses, creating fears that if South Korea does not onshore at the same rate as the U.S., it will lose semiconductor market share and the ability to produce chips at its current rate.¹⁴⁴ Yet, for now, the South Korean government and the Yoon administration have chosen to remain friendly with the other Pacific Rim nations in the Chip 4 alliance.¹⁴⁵ As with the Netherlands and ASML, South Korea has had to balance its own interests against the combined interests of the U.S. and the semiconductor producing nations seeking to limit China's power in the industry.¹⁴⁶ Though such restrictions will surely hurt South Korean chip producers and the overall South Korean economy, the east Asian nation knows that allowing China's chip producing capacity to grow unfettered may result in the long term loss of South Korea's regional power as well its own market share in the semiconductor market.¹⁴⁷

3. Japan

¹³⁸ Erika Na, *South Korea Caught in the Middle of US-China Chip War, but American Export Control Requests Unlikely*, SOUTH CHINA MORNING POST (Nov. 14, 2022), <https://www.scmp.com/economy/china-economy/article/3199299/south-korea-caught-middle-us-china-chip-war-american-export-control-requests-unlikely> [<https://perma.cc/6FXC-YQAF>].

¹³⁹ *Id.*

¹⁴⁰ *Id.*

¹⁴¹ *See Tech War: Taiwan Says US-led Chip 4 Alliance Held First Senior Officials Meeting*, SOUTH CHINA MORNING POST (Feb. 26, 2023), <https://www.scmp.com/tech/tech-war/article/3211594/tech-war-taiwan-says-us-led-chip-4-alliance-held-first-senior-officials-meeting> [<https://perma.cc/MCM9-LM3B>] [hereinafter *Chip 4 Meeting*].

¹⁴² *See* Na, *supra* note 137.

¹⁴³ Na, *supra* note 137.

¹⁴⁴ *See id.*

¹⁴⁵ *See Chip 4 Meeting, supra* note 140.

¹⁴⁶ *See South Korea Tax Breaks, supra* note 135.

¹⁴⁷ *Id.*

Just as the Netherlands and South Korea stepped in line with U.S. policy on export controls restricting China's chip industry growth, so too will Japan.¹⁴⁸ The island nation, a longtime rival of China and since the end of World War II, and important American ally, decided it would adopt export controls and various regulatory procedures designed to retard China's growth in the chip industry.¹⁴⁹ Deputy Chief Cabinet Secretary Seiji Kihara noted that Japan's procedures on the matter would be based on similar regulatory procedures adopted by the U.S. and other allies.¹⁵⁰ Yet just as with ASML in the Netherlands and Samsung in South Korea, the Japanese optics company, Nikon, may be adversely affected by the implementation of such export controls the Japanese government is considering.¹⁵¹ Nikon, which produces optics used in the production of semiconductors, derives approximately twenty-five percent of its sales revenue from the Chinese semiconductor industry and Chinese consumer.¹⁵² Again, Japan finds itself in the same quandary as the Netherlands and South Korea in a post-CHIPS Act world: join current allies in throttling economic relations with China or continue to do business with the Chinese semiconductor industry at the risk of being isolated by other chip producing nations.¹⁵³ While Japan decided on the former, nobody knows how long or how feasibly Japan, or any semiconductor-component producing economy for that matter, can resist doing business with the Chinese market.

4. Taiwan

Of all the eastern Pacific chip-producing nations, Taiwan and its people face the biggest stakes and perhaps the largest consequences generated by the CHIPS Act. Taiwan, located a short distance away from mainland China across the Taiwan Strait, has been under the threat of Chinese invasion for years with Beijing recently committing to a renewed interest in the island nation.¹⁵⁴ The Republic of China (ROC), established in Taiwan, by fleeing Chinese Nationalist's under Chang Kai-shek at the end of the Chinese Civil War, has been a thorn in the side of mainland communist China since its inception, with Beijing periodically attempting to exert control and power of the island.¹⁵⁵ While the U.S. has long supported Taiwanese sovereignty (unofficially) through its sale of weapons to and its economic ties with the island nation, the CHIPS Act threatens to reduce Taiwan's strategic use to the U.S., and thus its security.¹⁵⁶ The United States' positive relationship with Taiwan was not born from altruism, but rather a need for advanced semiconductors, of which TSMC produces more than fifty percent of the world's supply and over ninety percent of the world's advanced chips.¹⁵⁷ Yet as companies relocated to America to gain advantage of the grants the CHIPS Act promises, some, including TSMC's very own founder, Morris Chang, worries that the Taiwanese semiconductor industry could lag behind that of America's, eventually causing the U.S. to have a decreased security interest in the island.¹⁵⁸

¹⁴⁸ *Japan & Netherlands Export Blocks*, *supra* note 125.

¹⁴⁹ *See id.*

¹⁵⁰ *Id.*

¹⁵¹ *Id.*

¹⁵² *Id.*

¹⁵³ *See id.*; *See also Chip 4 Meeting*, *supra* note 140.

¹⁵⁴ *See Seymour*, *supra* note 57; *see also Huang*, *supra* note 61.

¹⁵⁵ *See Taiwan*, CIA WORLD FACTBOOK, <https://www.cia.gov/the-world-factbook/countries/taiwan/> [<https://perma.cc/LR7Y-T4GT>] (last visited Mar. 14, 2023).

¹⁵⁶ Aidan Powers-Riggs, *Taipei Fears Washington is Weakening Its Silicon Shield*, FOREIGN POLICY (Feb. 17, 2023), <https://foreignpolicy.com/2023/02/17/united-states-taiwan-china-semiconductors-silicon-shield-chips-act-biden/> [<https://perma.cc/Q9CH-N2FH>].

¹⁵⁷ *Con*, *supra* note 58.

¹⁵⁸ Powers-Riggs, *supra* note 155.

Besides the fact that Taiwan’s government and citizens benefit greatly from the sale of advanced semiconductors to markets across the globe, many, including Change, believe that the U.S. reliance on Taiwanese semiconductors has kept the threat of a Chinese invasion low.¹⁵⁹ The “Silicon Shield Theory,” takes the position that the unique economic landscape of Taiwan, and mainly its semiconductors, protect Taiwan from Chinese invasion as (1) China itself relies on semiconductors and semiconductor components made in Taiwan and (2) other third parties such as the U.S. and Japan, also relying on such parts, have an interest in keeping Taiwan free from Chinese hegemony.¹⁶⁰ With the CHIPS Act attracting foreign semiconductor producers to America—including TSMC—Taiwan could be viewed as less strategically important by the U.S. and other western allies, making the geopolitical landscape ripe for an invasion.¹⁶¹

What’s further is Taiwan announced in October 2022 that it would abide by U.S. export controls against China that followed the passage of the CHIPS Act.¹⁶² As with other chip producing nations, this may result in a loss for TSMC and other semiconductor companies located on the island, but this is not the biggest concern.¹⁶³ Taiwan, by following the U.S. export controls and reducing its volume of semiconductors sold to the Chinese market, may appear as less vital to the Chinese economy, and therefore, less of a risk to invade.¹⁶⁴ While tensions have been high for some time, and China does not necessarily desire nor is ready for a war with the U.S. and its allies, the concern of a Chinese invasion of Taiwan is present, and due to the implementation of export controls and American incentives for chip companies under the CHIPS Act, growing.¹⁶⁵

IV. Conclusion

Since Congress and President Biden signed the CHIPS and Science Act into law in mid-2022, the global semiconductor market has changed dramatically. New markets have opened while others, namely the domestic Chinese market, have been cut off and isolated from Western producers due to the CHIPS Act and its progeny. Spurred on by COVID-19, the CHIPS Act promised Americans a steady, consistent supply chain of semiconductors for use in everyday goods as well as advanced electronics and AI with defense capabilities and applications. So far, the CHIPS Act has worked as intended: multiple stalwarts of the semiconductor industry have already set up shop in the U.S., with more on the way. Promising jobs to local communities and the end of reliance on foreign chips, such companies, incentivized by the funding provided in the CHIPS Act, have already started construction on new offices and fabrication plants in America. Overall, the CHIPS Act has already benefited Americans by providing jobs in the U.S., stimulating foreign and domestic investments in communities across the nation, and ensuring that precious semiconductors are available for a plethora of products such as laptops, cars, etc.

Yet the CHIPS Act and the subsequent regulations that resulted are not so clean cut: such regulations, while currently working as intended, may strain relations with friendly, semiconductor

¹⁵⁹ *Id.*

¹⁶⁰ *Id.*

¹⁶¹ *See id.*

¹⁶² Jeanne Whalen, *Taiwan, a Major Producer of Semiconductors, Says it Will Abide by U.S. Rules*, THE WASHINGTON POST (Oct. 21, 2022), <https://www.washingtonpost.com/politics/2022/10/21/taiwan-major-producer-semiconductors-says-it-will-abide-by-us-rules/> [<https://perma.cc/9QZG-2HHT>].

¹⁶³ *See id.*

¹⁶⁴ *See Powers-Riggs, supra* note 155.

¹⁶⁵ *See id.*

producing nations as well as further degrade relations between the U.S. and China who have already engaged each other in a tech-A.I. development war for the past few years, especially as Xi Jinping has consolidated power. Other foreign, chip producing nations, must balance their own economic and security interests with U.S.-led export controls in an attempt to keep the developing Chinese semiconductor industry at bay.

Regardless, the CHIPS Act has been a success so far from an American perspective. Though more time is needed to truly judge the outcome of the CHIPS Act, the U.S. has taken the first step in protecting an incredibly important industry—one that drives all forms of technology and technological development—my incentivizing the production of semiconductors within America. Is such a goal worth the geopolitical pushback America may encounter from other chip producers and China itself? As of now, it's too early to tell if such a trade will be worth the cost; yet in the end, America has taken the first step in securing a fragile yet crucial industry within its own boundaries.