

# When the Chips Are Down

## Gaming the Global Semiconductor Competition

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*with Hannah Kelley*

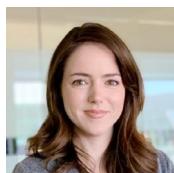
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## Acknowledgments

We are deeply grateful to the participants of The Chips Are Down game for their time, insights, and creativity. We are likewise grateful to our CNAS colleagues who contributed to the game development or facilitation: ED McGrady, Richard Fontaine, Lisa Curtis, Stacie Pettyjohn, Ripley Hunter, Megan Lamberth, Jennie Matuschak, Emily Jin, and Jason Bartlett. We also thank Harry Clapsis for his review of this report and the helpful comments he provided; Ryan Johnson and Shayan Rauf for their research support; and Maura McCarthy, Emma Swislow, Melody Cook, and Rin Rothback for their assistance with editing and design. This report was made possible with general support to CNAS.

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## About the Defense Program

Over the past 15 years, CNAS has defined the future of U.S. defense strategy. Building on this legacy, the CNAS Defense Program team continues to develop high-level concepts and concrete recommendations to ensure U.S. military preeminence into the future and to reverse the erosion of U.S. military advantages vis-à-vis China and, to a lesser extent, Russia. Specific areas of study include concentrating on great-power competition, developing a force structure and innovative operational concepts adapted for this more challenging era, and making hard choices to effect necessary change. This paper is a part of [The Gaming Lab](#) at CNAS, a larger initiative led by the Defense Program that develops highly tailored unclassified games and exercises to help policymakers and other stakeholders gain critical insights into key national security problems.

## About the Technology and National Security Program

Technology is changing our lives. Rapid developments in AI, autonomy and unmanned systems, digital infrastructure, networking and social media, and disinformation are profoundly altering the national security landscape. Nation-states have new tools at their disposal for political influence as well as new vulnerabilities to attacks. Authoritarian governments are empowered by high-tech tools of oppression and exploit radical transparency. AI and automation raise profound questions about the role of humans in conflict and war. CNAS' Technology and National Security Program explores the policy challenges associated with these and other emerging technologies. A key focus of the program is bringing together the technology and policy communities to better understand these challenges and together develop solutions.

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## Introduction

The United States is in a strategic competition with a well-resourced and capable opponent. China seeks a global role that is broadly at odds with the strategic interests and values of America and fellow democracies. Technology, a key enabler of political, economic, and military power, is at the center of this competition. Within this competition, semiconductors loom large. Chips are a driving force for breakthroughs in a range of critical technology areas, from AI to synthetic biology to quantum computing. Semiconductors are essential to the military systems used by the United States and its allies and partners to defend themselves and their interests. At a fundamental level, the day-to-day functioning of modern society hinges on dependable access to chips; critical infrastructure, transportation networks, and digital communication cannot function without them.

Semiconductor supply chains form an intricate global web, with several countries and companies serving as important nodes. Some of these nodes have such outsized importance that any disruption would have significant and detrimental cascading effects for U.S. national and economic security. Taiwan is the central node in the semiconductor supply chain. Home to the Taiwan Semiconductor Manufacturing Company (TSMC), the world's largest contract chip foundry, more than half of the world's outsourced semiconductor manufacturing and nearly all leading-edge manufacturing capacity is in Taiwan. Secure access to the output of Taiwan's semiconductor industry is therefore a strategic necessity.

Yet, while policymakers understand the critical importance of Taiwan's semiconductor industry, the myriad of factors and nuances essential to developing policies and plans that protect its integrity, mitigate risk, and reduce second-order consequences are insufficiently studied.

Given the complexity of the topic at hand, the CNAS Gaming Lab developed a strategy game to examine global semiconductor competition. Games provide a “safe to fail” environment, which is particularly conducive to examining poorly understood problems. Games also serve as powerful tools for establishing a shared understanding of a problem, given their collaborative and experiential format and ability to convene different communities. The Chips Are Down game enabled the CNAS team to learn more about the competition for semiconductors, while providing game participants with a shared understanding of the critical implications of the competition.

The Chips Are Down game produced critical insights into the nature of U.S.-China strategic competition and global competition for semiconductors, discussed in this report. This report first provides an overview of the game including its purpose, the scenario, and the game design. Next, it details four key insights derived from the game, examining their emergence during gameplay and their real-world implications. Lastly, it concludes with recommendations for overcoming a set of challenges stemming from these insights, aimed at improving the U.S. position in future strategic competition.

## The Chips Are Down: The Game

CNAS conducted a virtual strategy game in April 2021 to better understand how China could attempt to influence and exert control over Taiwan's semiconductor industry while remaining under the threshold of war and the subsequent implications for strategic competition with the United States. The game featured 30 high-level participants drawn from government, industry, and civil society. The purpose of the game was twofold: to understand how China could shape the semiconductor industry and strategic technology competition in its favor, and to investigate how the United States and Taiwan could counter such attempts. The goal was to identify areas of risk and vulnerability within the semiconductor industry and better understand the tradeoffs of different strategic approaches that the teams could adopt. More broadly, the aim was to glean insights about the nature of the U.S.-China strategic competition, with respect to Taiwan's critical role.

The semi-structured game was conducted virtually and featured three teams: the United States (Blue team), China (Red team), and Taiwan (Green team). The U.S. team represented an interagency task force, while the China and Taiwan teams represented coordinating committees. The CNAS control team presented all three teams with a baseline scenario, but with different objectives that reflected the teams' national interests (see Appendix A).

The game scenario began in January 2025, following a period of intensified strategic competition between the United States and China, focused on the economic domain and the competition for technology resources, ideas, and talent. Semiconductors, particularly leading-edge manufacturing capabilities, were a key focus, as the United States and China both sought to enhance their access to semiconductors by strengthening domestic design and fabrication capabilities. China doubled down on an ambitious technology indigenization strategy, and the United States offered incentives to expand fabrication capacity at home. Despite their efforts, both countries remained heavily dependent on Taiwan for leading-edge chips, and Taiwan became the flashpoint in the broader tensions between Washington and Beijing.

The competition over Taiwan's semiconductor sector—as well as the broader U.S.-China competition for influence—came to a head after a political crisis between the two countries emerged over U.S. support for Taiwan. Shortly thereafter, three TSMC manufacturing facilities reported an issue in their manufacturing lines and halted all production. TSMC engineers discovered that

code used to manufacture leading-edge chip designs was corrupted, although it was unclear whether it was due to software failure or a cyber attack. The result was a two-month suspension in chip fabrication, creating a global shortage in leading-edge chips.

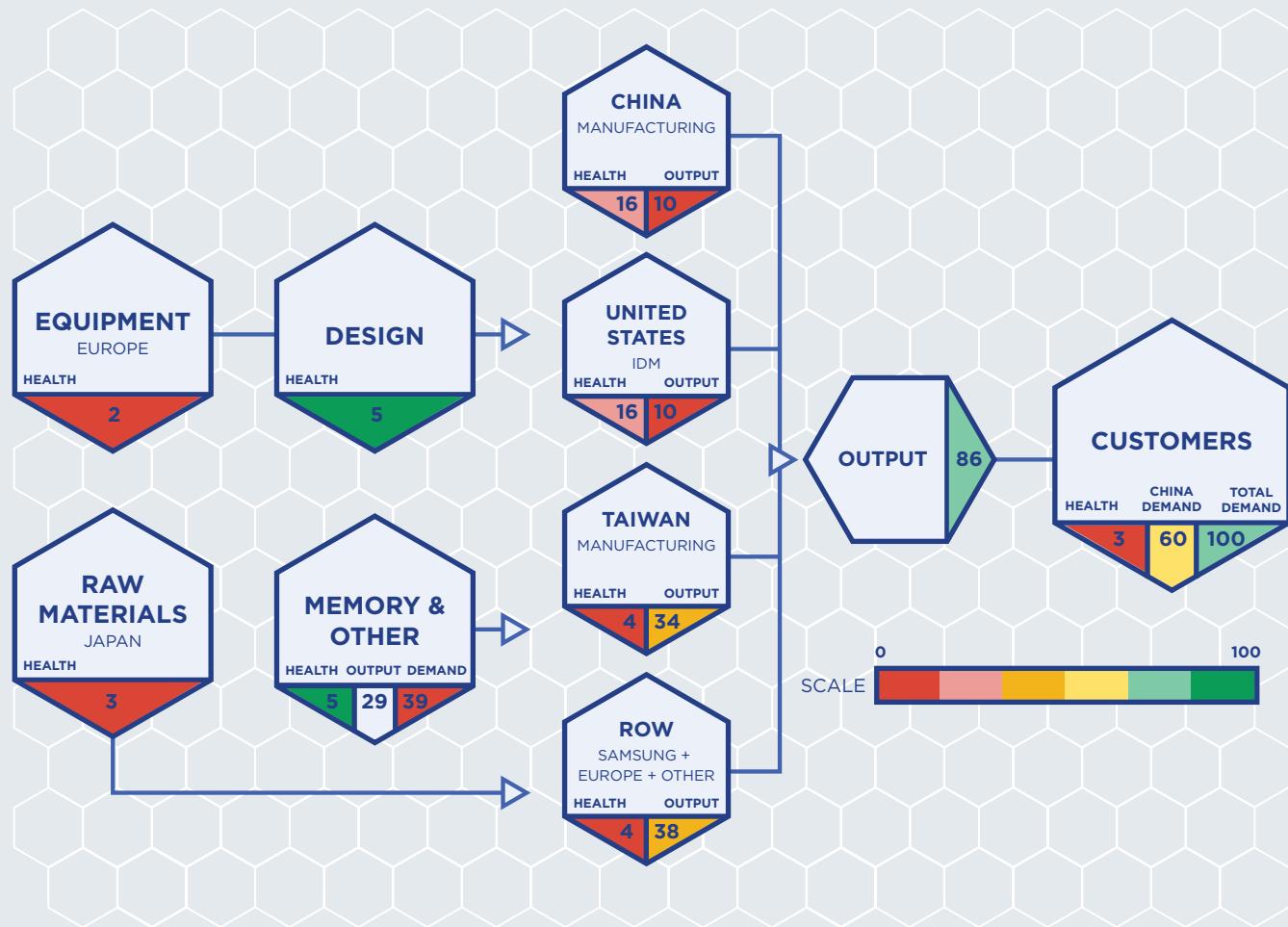
The teams were tasked with creating a strategy to respond to this crisis and gain the upper hand in the competition. To implement their strategy over the course of a one-year turn, the teams developed a set of diplomatic, informational, military, economic (DIME), and civil actions (see Appendix B). These actions were linked to targets, which could be people, organizations, or processes located in a particular country. The teams also were tasked with explaining the intended effect of their actions. For example, the China team could choose to conduct an offensive cyber operation (*action*) against TSMC foundry air filtration systems at its Hsinchu Science Park manufacturing facility (*target*) with the aim of thwarting fabrication of 2 nm chips (*effect*).

These actions sought to influence five key indices represented in the game. These included:

- *Public sentiment*, which represented public opinion and general support to the government and leadership
- *Technology levels*, which represented the amount of technology being used by a particular country
- *Health*, which tracks the financial health of companies located in a country
- *Output*, which represents the number of chips manufactured in a given year
- *Demand*, which represents the number of chips that customers in all sectors need and want.

Together, these indices represent a simplified qualitative model of the global semiconductor industry developed by the CNAS team. The components were semiconductor equipment manufacturers with a particular emphasis on the Dutch firm ASML; raw materials necessary for semiconductor fabrication with Japanese photoresists weighted more heavily; semiconductor design capability; memory chip production; a basic geographic breakdown featuring China, the United States, Taiwan, and rest-of-world; global semiconductor fabrication output; and the global customer base. The technology levels, the output to demand, and the health of companies represent how the model tracks the global semiconductor industry, while public sentiment tracked country stability and other domestic factors. The indices changed throughout the game as actions could improve or negatively impact them. The impact of the actions on select indices, such as public sentiment, had implications

## THE CHIPS ARE DOWN GAME BOARD



## SCORE BOARD

PUBLIC ATTITUDE		ACTIONS	FAB GENERATION	EDA GENERATION
TAIWAN	7	4	TAIWAN	5
REST OF WORLD	6	N/A	REST OF WORLD	5
UNITED STATES	4	5	UNITED STATES	5
CHINA	7	5	CHINA	3

IDM: Integrated Device Manufacturer | ROW: Rest of world | FAB: Semiconductor Fabrication Plant | EDA: Electronic Design Automation

for a team's resources and capacity. The success or failure of these actions was determined by the CNAS team, leveraging the set of rules it developed while creating a model of the semiconductor competition.

The teams could take actions independently or they could choose to cooperate with another team. Cooperative actions held a greater chance of creating an effect, given the shared resources and level of effort. Moreover, as certain actions—such as sanctions or enacting a no-fly or -sail zone—are more effective when enacted in conjunction with partners, the CNAS team factored this into the probability of success.

In addition to player actions, participants had to contend with randomly occurring events in the game. These events often involved actions by actors otherwise not represented in the game and introduced new dilemmas and decision-making constraints for the teams. Following each year-long turn, the CNAS

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team adjudicated and briefed out the results of player actions and the additional events in narrative fashion before the teams could plan their actions in response. This dynamic drove the game for a total of four moves, ending the game in 2029.

The game was run once, with a static set of players. While the participants represented a wide array of expertise, a single game produces a particular set of outcomes and therefore is limited to a single potential future. As games are not predictive, this single future is merely indicative. Nevertheless, there are significant insights that can be derived from this game. To make up for the limited iteration, CNAS researchers bolstered their insights with additional research, drawing on the real-world behaviors and actions of the three countries represented in the game.

## **Key Insights from the Chips Are Down**

Following the game, the CNAS team examined gameplay and player discussion to identify a number of trends that emerged that have implications for the U.S.-China strategic competition and the global semiconductor industry. These insights are supplemented by further discussion of the relevant dynamics, national interests and objectives, and the global environment. Together, these represent lessons learned from the game.

### **Taiwan’s Silicon Shield**

Taiwan is the indispensable player in the global semiconductor industry. At the time of writing, Taiwan accounts for 92 percent of the world’s most advanced (below 10 nm) semiconductor manufacturing capacity, more than 50 percent of overall semiconductor manufacturing capacity, and a key source for silicon wafers.<sup>1</sup> By comparison, South Korea, the next largest, accounts for only 8 percent of the most advanced manufacturing capacity and around 19 percent of overall manufacturing capacity.<sup>2</sup> While the United States claims nearly half of global semiconductor industry revenue, it has only 12 percent of global manufacturing capacity. Overall, 75 percent of global semiconductor manufacturing capacity is centered in East Asia.<sup>3</sup>

The Taiwanese firm TSMC is the leading global contract semiconductor fabricator, accounting for approximately 53 percent of the global foundry market. The next largest supplier, Samsung of South Korea, accounts for about 17 percent of the market.<sup>4</sup>

Taiwan’s position is the end result of the ultimate techno-nationalist strategy: the marriage of technological prowess in electronics with national survival, dubbed a “silicon shield.”<sup>5</sup> For decades, this meant solid economic growth, prosperity, and security. Increasingly, this success runs the risk of becoming a double-edged sword.

While the Taiwan Relations Act codifies the U.S.-Taiwan defense relationship, it falls short of promising that Washington would come to Taiwan’s aid should it be attacked by China.<sup>6</sup> Taiwan’s silicon shield seeks to reinforce its security by making itself indispensable in the global market—and to the United States. In this respect, TSMC is Taiwan’s crown jewel. It produces a precious output—semiconductors—that major external actors need. This gives Taiwan’s leaders leverage to garner external interest in maintaining the status quo in the Taiwan Strait. It also provides Taiwan with a seat at the international negotiating table, as it bolsters Taipei’s diplomatic access.



A guest surveys various semiconductor manufacturing workspaces on monitors at the United Manufacturing Corporation in Hsinchu, Taiwan, in May 2000. Today, the Taiwanese firm TSMC is the leading global manufacturer of semiconductors, providing both a unique strength and potential vulnerability to the country's strategic positioning. (David Hartung/Getty Images)

With a rising, revisionist China growing more assertive, Taiwan's silicon shield hazards becoming a millstone around its neck. Technology is at the center of the global strategic competition, and no tech is more essential to this competition than semiconductors. It is no surprise then that Beijing, Washington, Tokyo, and Brussels are lavishing their attention on Taiwan and TSMC. China is luring semiconductor engineers and stealing vital technologies, while the United States, Japan, and the European Union are courting TSMC to help boost their capabilities at home and build resiliency in the semiconductor supply chain.

Driving these actions is an intensifying technology competition: China seeks to cut dependence on foreign technologies by indigenizing cutting-edge semiconductor manufacturing, while the United States and Europe want greater supply chain security and resilience. Taiwan holds the keys to both goals. China's control over Taiwan's semiconductor industry, as it stands today, would quickly provide Beijing with the capabilities it seeks, saving hundreds of billions of dollars and many years of effort. American and European coordination to bolster Taiwan's semiconductor industry would shore up supply chain resiliency and keep Chinese economic offensives at bay.

Taiwan thus finds itself in a politically and geographically fraught position. While Taiwan has been independently governed since 1949, China continues to view Taiwan as its territory and seeks to eventually "unify" Taiwan with mainland China.<sup>7</sup> Taiwan and China are separated by a 90-mile strait, compounding China's ability to launch a rapid invasion of the island.<sup>8</sup> Taiwan seeks to maintain its political and territorial sovereignty, despite the looming military threat of invasion by its neighbor—an action that U.S. officials believe could occur within the next six to ten years.<sup>9</sup>

As gameplay made clear, the Green team viewed preserving TSMC's dominant position in the global industry as inextricably linked to Taiwan's security. The Green team focused on maintaining its edge in the semiconductor industry by protecting the status quo, while simultaneously seeking to deepen U.S. dependency on TSMC to enhance Taiwanese security and retain a bulwark against potential Chinese aggression. Such an approach is akin to the oil-for-security model, wherein the United States promised to protect the oil-producing Persian Gulf states in a tacit agreement for unfettered access to energy.<sup>10</sup> In this case, semiconductors are the new oil, and Taiwan is trading access to semiconductors in return for security, thus using its semiconductor advantage to obtain its critical objective of safeguarding

its sovereignty. Maintaining a vested external interest in its semiconductor security works as an insurance policy for Taiwanese sovereignty, as the United States and other nations and commercial entities remain wedded to TSMC and wish to keep it out of China's hands. While many U.S. policymakers view security guarantees toward Taiwan through a geopolitical lens, Taiwan's leadership considers it much more an economic and technological issue. This perspective colored the Green team's other actions.

The Green team also sought to increase China's dependency on TSMC, in a bid to keep China's domestic production from threatening Taiwan's dominant position in the global market. Such a move also provided Taipei with leverage over Beijing if needed. Moreover, the Taiwan team sought to give as many actors as possible a stake in its semiconductor industry, including European nations. This internationalization of Taiwan's semiconductor industry further enhanced its security by diversifying the number of countries willing to protect TSMC and, by extension, Taiwan.

The push to expand American and Chinese dependency on Taiwan's semiconductor industry suggests that Taiwan's leaders and TSMC are unlikely to make concessions that would significantly weaken U.S. or Chinese reliance on Taiwan's semiconductor production without strategic gains. This complicates both Washington's and Beijing's continued push to transfer technological assets and know-how of the state of the art, as Taiwan sees little to no benefit from this approach. Taipei recognizes the unique insurance stemming from being the leading

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global producer of leading-edge chips and is loath to give up this protection to accommodate the United States' and China's wishes to reduce their reliance. It also complicates U.S. efforts to overcome Taiwan's geography problem by reshoring critical semiconductor fabs to the United States and away from the Chinese threat.<sup>11</sup> Real-life events followed suit with game play. TSMC's commitments to set up new facilities in the United States and Japan, and potentially in Europe, involve capabilities at least two generations behind those in Taiwan, and the company has been coy about any discussion of dispersing cutting-edge foundries to other countries.<sup>12</sup>

## **An Intertwined Technological and Military Competition**

The struggle for semiconductors—particularly access to leading-edge chips and proprietary knowledge about chip production—has become ground zero of U.S.-China technology competition. U.S. policymakers have cited semiconductors and the supply chain issues surrounding them as critically important to U.S. national security.<sup>13</sup> China's leaders have worried about their dependence on foreign semiconductors for decades and continue to press on ambitious plans to indigenize the design, fabrication, assembly, and testing of chips.<sup>14</sup> As of late 2021, China is well short of the government-set goal of meeting 70 percent of its chip consumption with domestic production, with an estimated rate of 16 percent. Excluding foreign companies producing chips in China, that rate is only 6 percent.<sup>15</sup> A failure to achieve major progress in self-sufficiency is likely to factor into Chinese leaders' risk calculations when considering measures to gain control over Taiwan's semiconductor industry.

Meanwhile, the rhetoric surrounding the U.S.-China military competition increasingly has coalesced around a potential future battle over Taiwan. The emphasis of this discourse has been on a sudden, rapid Chinese military invasion of Taiwan—a fait accompli—to gain territorial control. It has become axiomatic within the U.S. government's foreign policy and military strategy circles that a military invasion is imminent and is how China will undermine Taiwan's sovereignty. Indeed, current and former U.S. officials have stated that China may seek to subjugate Taiwan by military means in the next five to ten years.<sup>16</sup>

The focus on a potential Chinese military invasion of Taiwan risks conflating the plausibility of such a scenario with probability. It unintentionally disregards alternate military strategies, such as blockade of Taiwan by sea.<sup>17</sup> More strikingly, it also largely ignores the context of the U.S.-China technology competition. Indeed, when the technological and military competitions are viewed together—as they were in The Chips Are Down game—they suggest a rising threat to Taiwan, which China views essential to both its economic and political aims. This indicates different pathways for China to gain control over Taiwan rather than the oft-discussed military invasion scenario. Such pathways instead emphasize China's use of gray zone tactics, which span across political, economic, informational, and military dimensions.<sup>18</sup>

Control over Taiwanese semiconductor facilities and human capital would give China roughly half of global chip fabrication capacity and almost all state-of-the-art manufacturing capacity, thereby de facto achieving



*A military drone is driven through China's 2019 Military Parade to celebrate the 70th anniversary of the founding of the People's Republic of China. At that same parade, China unveiled its hypersonic glide vehicle DF-17 Dongfeng medium-range ballistic missile, which was tested on July 27, 2021. The development of such technology relies on both semiconductor chips and complementary software. (Kevin Frayer/Getty Images)*

China's indigenization efforts.<sup>19</sup> Given the high stakes in obtaining a semiconductor advantage, there is reason to believe that a threat to China's access to Taiwanese semiconductors, coupled with Taiwan's increased independence, may be the impetus for China to physically, economically, or politically contest Taiwan to secure access and control. As a result, overly broad U.S.-imposed restrictions on leading-edge Taiwanese semiconductor exports into China could undermine Taiwan's security. It is unclear, however, where China's threshold lies with regard to semiconductors, or what tools would be employed should that threshold be violated. This ambiguous trigger point further complicates efforts by the political and military leadership of Taiwan, the United States, and U.S. allies to forecast and manage a crisis.

Military provocation aside, Taiwan's semiconductor industry may be one of the conduits through which China could gain significant control over Taiwan without firing a single shot. China has increasingly used its growing political, military, and economic power to exert pressure on countries to act according to China's

interests. Recent examples have ranged from enacting punitive measures on Australian exports following the Australian government's call for an international inquiry into the origins of COVID-19<sup>20</sup>; using Chinese coast guard and commercial vessels to physically coerce civilian fishing boats and exert China's territorial claims<sup>21</sup>; and arresting and jailing two Canadian citizens following Canada's arrest, at the request of the United States, of the chief financial officer of Huawei to the United States.<sup>22</sup> China has multiple levers of power—ranging from economic and financial to political to military to informational—at its disposal to coerce Taiwan's semiconductor industry as part of its broader economic and geopolitical aims to exert authority over Taipei.

China could employ a range of gray zone tactics to undermine TSMC's neutrality and independence, gaining control of the organization and the broader semiconductor industry over time. In the game, the Red team sought to leverage such instruments of economic, financial, informational, political, and military power to exert control over Taiwan's semiconductor industry and affect U.S. and global access to semiconductors, while ensuring China's access and bolstering its indigenization efforts. The team leveraged various forms of economic statecraft, such as the provision of conditional access to Chinese markets, financial institutions, and supply chains; financial and educational incentives to attract high-talent foreigners; and subsidies for joint research and development (R&D) efforts. The Red team also used more punitive economic actions, such as continuing restrictions on Taiwan's agricultural exports and tourism, and purchasing stakes in TSMC and foreign semiconductor industry companies, such as the Netherlands' ASML, to obtain preferential access to semiconductors.

The actions exerted by the Red team in the game reflect patterns of behavior already adopted by China's leadership. Long-standing trade practices often have required foreign firms to set up joint ventures in order to invest in China. These arrangements often have technology transfer requirements as well. The scale of permissible investment also varies. For example, foreign investment in medical institutions and healthcare services in China cannot exceed 70 percent; foreign investment in cloud computing cannot exceed 50 percent; and, in addition to setting film release dates, the Chinese government requires that at least 75 percent of movie revenue remain with Chinese film production companies.<sup>23</sup>

To attract foreign talent, the Chinese government is working to improve domestic education, reshore Chinese talent that has moved overseas, and provide incentives to entice new foreign talent.<sup>24</sup> This is reflected in the Chinese

Communist Party's "Made in China 2025" initiative, aimed at bolstering local centers of manufacturing and operations, including by providing major incentives for R&D.<sup>25</sup>

China also employed punitive economic measures against Taiwan. For example, China banned tropical fruit imports from Taiwan following a number of military actions, harming Taiwan's agricultural industry, as China is the largest importer of Taiwanese agricultural products.<sup>26</sup>

In the game, the Red team's economic actions were paired with diplomatic, informational, and military activities. These included negotiating preferential trade agreements with other countries, developing complex disinformation campaigns to alter public perception, and demonstrations of force, such as the search and seizure of Taiwanese ships. Such gameplay options echo recent Chinese government actions. For example, China is currently pursuing 10 new free trade agreements (FTAs), with eight more under consideration to enhance Beijing's economic reach.<sup>27</sup> Moreover, China has also leveraged disinformation to shape global narratives in its favor. In 2021, it launched a disinformation campaign claiming COVID-19 outbreaks at TSMC and its Hsinchu Science Park facility,<sup>28</sup> and it is believed that China produces approximately 450 million planted social media comments every year.<sup>29</sup> Militarily, China routinely and increasingly violates Taiwan's air defense identification zone with aircraft incursions, and such actions often are tied to important political events.<sup>30</sup>

China's use of gray zone tactics against a particular target—in this case, Taiwan's semiconductor industry—is far from certain or even the most likely scenario. But as gameplay in *The Chips Are Down* demonstrated, predatory

### CHINA'S COERCIVE ACTIONS

The actions played by the Red team in this particular game do not represent the full universe of Chinese gray zone tactics that could be leveraged against Taiwan. The CNAS Gaming Lab developed a list of gray zone tactics China could adopt, drawing from various real-world examples of China's economic, diplomatic, informational, and military actions, as part of the game development process. These are listed in Appendix B. Upon review of these actions and the combination of tactics played by the Red team in the game, it is possible to imagine other amalgamations of activities that may gradually provide China with the ability to exert greater control over TSMC, undermining its independence.

financial practices, informational operations, and economic manipulation provided China with means to achieve its objectives while avoiding the economic, political, and military escalation that likely would accompany an outright military invasion. It also is worth noting that in the game, military power was used mostly in conjunction with other tools to buttress economic objectives or to distract from the Red team's long-term strategy. Military tools were widely viewed by the Red team as too blunt an instrument when other forms of coercion would achieve their aims more easily without risking blowback.

This suggests that there is a need for the national security community to shift from viewing the technological competition and military coercion in two separate silos. Rather, Chinese efforts to gain control over Taiwan's economy, political system, and territory are likely to be multifaceted and involve both gray zone tactics *and* conventional military activity. This requires a more holistic view of China's economic, diplomatic, informational, and military coercion—a view that perceives how China could use both gray zone tactics and conventional military aggression to achieve its aims.

### Misaligned Interests

The game illustrated a fundamental lack of alignment between the United States and Taiwan on semiconductors. A U.S. objective—both in the game and in the real world—is to enhance its domestic semiconductor industry through the transfer of critical know-how, reshoring foundries, and making supply chains more diverse and resilient. Taiwan, as previously mentioned, seeks to remain the chief producer of semiconductors and to ensure American dependency on TSMC. These divergent objectives and interests complicated U.S.-Taiwan policy coordination on semiconductors and related issues. It also has led to the United States and Taiwan working at cross-purpose.

In the game, negotiations to increase the sharing of technology and onshore leading-edge TSMC fabs



An employee works the end of a smartphone production line at Huawei in Dongguan, China. The PRC has consistently bolstered its research, development, and manufacturing efforts across technology spaces, with sights set on the semiconductor industry. (Kevin Frayer/Getty Images)

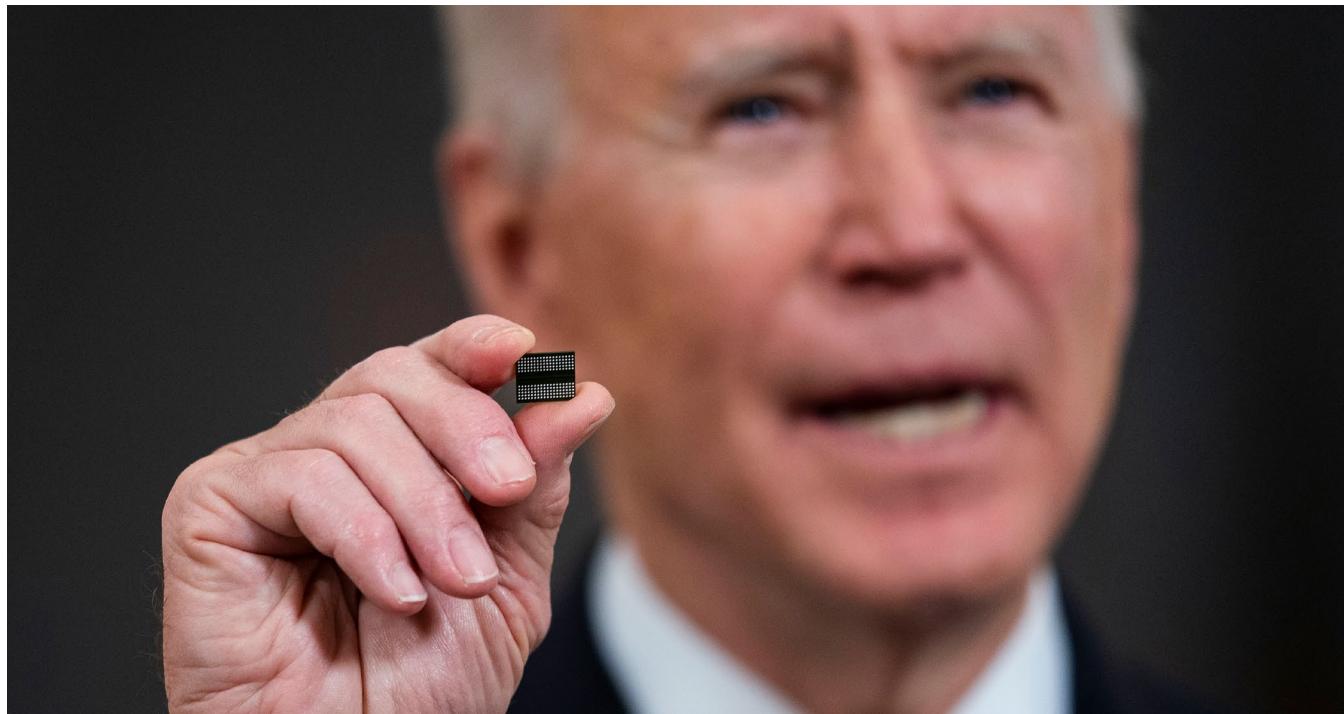
in the United States repeatedly failed. This led to a fissure in the U.S.-Taiwan relationship, as the Blue team threatened to renege on the defense commitments made under the Taiwan Relations Act. This attempt to pressure the Green team to agree to onshore fabs ultimately faltered and resulted in strained relations. In a real-life parallel, the founder of TSMC, Morris Chang, opined on the impossibility of complete U.S. semiconductor self-sufficiency and criticized Intel's chief executive officer for painting Taiwan and South Korea as unsafe locations.<sup>31</sup> TSMC later turned down the United States' request for sensitive company information as part of a voluntary review of the global semiconductor shortage.<sup>32</sup>

This misalignment extends to U.S. and Taiwanese approaches to China. The U.S. approach aims to keep China a few generations behind by incrementally and at times haphazardly tightening limits on critical semiconductor players in China.<sup>33</sup> While Taiwan also imposes restrictions on China's activity related to semiconductors, it has found itself at times in the middle of a trade war between the United States and China, leading Taiwanese and U.S. leaders to not always see eye-to-eye.<sup>34</sup> In March 2021, Taiwan's minister of economy stated that tensions from the U.S.-China trade wars are incentivizing China to increase efforts to poach

Taiwan's semiconductor talent.<sup>35</sup> Moreover, the United States has used a mix of political influence and export controls to shape TSMC relationships with Chinese companies such as Huawei in accordance with Washington's preferred approach.<sup>36</sup>

These dynamics are further complicated by the involvement of other actors in the semiconductor industry, such as South Korea, Japan, and the Netherlands. While these nations were not part of the game as formal teams, they were represented by injects to the game created by the CNAS team and, on occasion, other players. For example, the Red team purchased a majority share in ASML to secure access to extreme ultraviolet lithography equipment for which the Dutch government is blocking sales to Chinese entities. This aligns with the Trump administration's real-world efforts in 2019 to pressure the Dutch not to sell critical chip manufacturing technology to China.<sup>37</sup> Where possible, the CNAS team highlighted the national objectives of external actors in the game, as these accurately reflected the complicated semiconductor ecosystem.

The lack of alignment between the United States and Taiwan, and between each state and other critical actors in the semiconductor industry, creates significant vulnerabilities that China can exploit. In the game, the Red team sought to take advantage of national-level



*U.S. President Joe Biden holds up a semiconductor while delivering remarks at the White House on February 24, 2021, before signing an executive order focused on securing America's supply chains. (Doug Mills/Pool/Getty Images)*

differences to drive wedges between the United States, Taiwan, and other nations. For example, the Red team provided significant economic and educational incentives to recruit talent from Taiwan, South Korea, Japan, and the Netherlands. The aim was to undermine these nations' domestic industries, while placing pressure on these capitals to act more competitively against each other.

China may also employ multifaceted gray zone tactics—as previously described—to exploit the misalignment of interests and create fissures in bilateral and multilateral relations. Taiwan, the United States, and its global partners are all vulnerable to low-level coercion by China. China has exploited the diverging interests and policy differences between the United States and its partners, making it difficult for these tech-leading democracies to formulate effective multilateral responses to gray zone tactics. Each of these nations holds different thresholds for what would constitute a Chinese action that merits a response. For many, ironclad attribution of a coercive action—such as a cyber attack that occurred during game play—would be necessary to prompt a response. This complicates efforts to develop multilateral responses to Chinese coercion and exploitation of existing vulnerabilities.

### **What Happens in Taiwan Will Not Stay in Taiwan**

Global semiconductor supply chains are vast and interdependent, but actions in Asia have outsized impact. This is the heart of why Chinese coercion of Taiwan's semiconductor industry is such a critical issue. Further complicating this is the inability of any actor in this industry—including Taiwan—to achieve total self-sufficiency. As such, what happens in Taiwan will not stay in Taiwan, and is of relevance to every actor in the semiconductor ecosystem.

It is difficult for Taiwan, the United States, or other countries to unilaterally counter China's economic strength and strategic objectives. The economic pull of Chinese markets makes unilateral actions like export controls or blacklists often ineffective and, at times, counterproductive. Many of these actions may inadvertently motivate other international firms to de-Americanize their supply chains. For example, the CEO of ASML stated during an earnings call in fall 2020 that the company was looking at non-U.S. alternatives for metrology process tools to work around export restrictions.<sup>38</sup> In 2020, Lam Research announced plans to expand semiconductor manufacturing equipment production in Malaysia.<sup>39</sup> This provides a unique advantage for China.

The geopolitical significance of Taiwan cannot be understated; it is a distillation of the technological, political, and military “strategic competition” between the United States and China. Unifying Taiwan with the mainland remains one of China’s top priorities and a plausible future scenario, which leaves the United States with a choice to make with regards to semiconductors.<sup>40</sup> If Taiwan really is a looming flashpoint, then America’s next steps will be critical. The United States can mirror China’s semiconductor indigenization efforts in pursuit of technological autarky, or lean more fully on multilateral cooperation to bolster Taiwan as a key democratic foothold in the region, in an era of ever-increasing globalization. While the United States could devote more focus and funding to generating and maintaining talent bases, R&D, and other strategic efforts to boost the backstop of a robust national semiconductor industry, such efforts should be partnered with a strategy of collaboration with like-minded tech-leading partners.

China has consistently shown preference for gray zone tactics with hybrid displays of force over blatant military action. A military takeover of Taiwan is possible but unlikely within the next two years, according to U.S. Chairman of the Joint Chiefs of Staff Mark Milley.<sup>41</sup> Far more imminent is an industry invasion, as com-

**The geopolitical significance of Taiwan cannot be understated; it is a distillation of the technological, political, and military “strategic competition” between the United States and China.**

mandeering Taiwan's semiconductor industry via a combination of diplomatic, informational, military, economic, and civil actions would serve both of China's goals: achieving chip self-reliance while snuffing out a key competitor whom other critical states rely on. If the United States were to wash its hands of this tug-of-war, it would devastate the global semiconductor industry and quake the balance of strategic competition with China on the whole.

The United States has several cards it can play to counter China's predatory efforts to influence Taiwan, undermining its economic and political independence and attempting to shape the global order in Beijing's favor. But combining its hand with other players would increase the effectiveness of U.S. actions and policy



*U.S. President Joe Biden announces a new national security initiative, AUKUS, together with UK Prime Minister Boris Johnson (R) and Australian Prime Minister Scott Morrison (L) at the White House on September 15, 2021. The new partnership will focus on countering aggression in the Indo-Pacific region. (Win McNamee/Getty Images)*

responses. This strategic interplay would mitigate the geopolitical risks of engaging more interdependently with Taiwan, while highlighting the strengths of such a strategic partnership. For example, in the game, the Blue team sought to incorporate existing multilateral groups, such as the Quadrilateral Security Dialogue—comprising Australia, India, Japan, and the United States—in their responses to China. This indicates a recognition that multilateral responses are more helpful than bilateral actions in establishing an effective technology policy.

A group of leading techno-democracies—including Australia, France, Germany, India, Italy, Japan, the Netherlands, South Korea, the United Kingdom, and the United States, among others—have the economic clout and geopolitical heft to coordinate a number of policy

**If the U.S. were to wash its hands of this tug-of-war, it would devastate the global semiconductor industry and quake the balance of strategic competition with China on the whole.**

efforts, such as R&D of next-generation microelectronics, remapping supply chains, crafting effective plurilateral export controls, strengthening investment screening, and countering economic coercion. The scope, cost, and complexity of the global semiconductor supply chain requires cooperation at this scale.

## Securing Semiconductors: Recommendations for the United States

The insights derived from the game highlight four distinct challenges for the United States as it seeks to secure the global semiconductor industry and uphold its commitments to Taiwan's security. Nevertheless, there are clear steps the U.S. government and industry can take to overcome each challenge.

### Challenge 1: Taiwan's security is inextricably intertwined with its semiconductor industry.

Taiwan's security is largely dependent on its semiconductor industry, and TSMC in particular. Taipei's long-standing techno-nationalist strategy entrenches the notion that the United States and other actors have a vested interest in Taiwan's sovereignty. A senior Taiwanese official underscored this point by noting that "peace in the Taiwan Strait is key to the island's ability to ensure continuous supply [of chips]."<sup>42</sup>

In light of this, U.S. government and industry must temper expectations about Taiwan agreeing to broad geographic diversification of cutting-edge fabrication capacity. It is unlikely that Taiwan would be enthusiastic about reshoring efforts, given its desire to retain the production of leading-edge chips on its territory as added security. TSMC's planned new facility in Arizona is slated to be two generations behind facilities in Taiwan once production begins in 2024.

### Recommendation 1: The White House and Congress should focus on areas of shared cooperation that would produce mutually beneficial outcomes.

Such areas include maintaining intellectual property dominance, fostering a semiconductor design ecosystem, and attracting and developing talent. Where possible, the United States and Taiwan should work to identify parts of the supply ecosystem—such as assembly and packaging—that could be reshored in the United States. Such steps would allow Taiwan to retain its silicon shield while enabling the geographic diversification of a critical good. Fabless semiconductor design companies represent TSMC's largest customer base—without fabless companies, foundries like TSMC wouldn't exist. Given threats to U.S. leadership in design posed by China, and a comparatively low bar for entry into the market, ensuring a strong semiconductor design ecosystem would be mutually beneficial for both Taiwan and the United States.

## **Challenge 2: China may leverage gray zone tactics to exert de facto control over Taiwan's semiconductor industry—and Taiwan.**

For the United States, China's gray zone activities represent a pernicious problem. They illustrate the changing nature of strategic competition, where China works at the seams of security, technology, economics, information, and diplomacy. Gray zone tactics have proven difficult for the United States to counter, in part because of their purposeful ambiguity and because they do not align with traditional views of international competition nor how the U.S. government is organized.

### **Recommendation 2: The NSC should strengthen interagency planning processes to incorporate China's gray zone coercion of Taiwan and TSMC to better counter the threat posed by China.**

At present, the interagency is organized in a bifurcated way, with departments focused on the scenarios in which their equities are most represented. For example, the U.S. Department of Defense focuses on a potential military invasion of Taiwan, while other parts of the U.S. government—namely the Departments of Treasury and Commerce—focus on other elements of the threat. As the DoD's available resources far exceed the departments and agencies concentrated on an economic- or technology-focused scenario, the military scenario has received greater attention. This explains the siloed views of future competition with China over Taiwan.

Disproportionate focus on one potential pathway to conflict puts the United States at risk of missing vital signals that could suggest an alternate course of action. The United States should incorporate gray zone scenarios into its interagency planning processes related to Taiwan. Such a scenario could involve stand-alone gray zone coercion or occur in concert with a traditional invasion scenario or significant military action with significant economic impacts, such as a blockade. Doing so would help the U.S. interagency and the intelligence community develop signposts for when China might choose to act against Taiwan or Taiwan's semiconductor industry. At present, the U.S. government and its counterparts in Taipei have a poor understanding of Beijing's thresholds and when crossing these thresholds may trigger China to act. Improving these indications would enable the U.S. interagency to understand when resources and responses may be required and forecast the potential impact of U.S. policies on Chinese thresholds.

Moreover, the United States should prepare detailed contingency plans if China is poised to gain control over Taiwan's semiconductor-related infrastructure and engineering talent. Options include blocking shipments of chemical precursors, other necessary raw materials, and semiconductor manufacturing equipment to the island; taking advantage of the island's dependence on energy imports such as by a blockade; evacuating Taiwan's semiconductor industry workforce to the United States and other countries to secure key know-how; and scuttling the island's semiconductor fabs to render them inoperable.

Given the complexity of the situation and the myriad of U.S. departments and agencies involved in managing a potential Taiwan crisis, it is important that a single element of the interagency takes the lead in this process. The National Security Council, given its holistic mandate, is best positioned to coordinate such an interagency planning process and incorporate Chinese gray zone tactics into such planning.

## **Challenge 3: Misaligned U.S. and Taiwan interests and semiconductor objectives create opportunities for Chinese exploitation.**

Failure to coordinate U.S. and Taiwanese interests and objectives for their prospective semiconductor industries creates gaps that China has and is likely to continue to exploit. For example, Beijing has used measures ranging from preferred market access to tax incentives to poaching of human talent, misinformation campaigns, and industrial espionage in its quest to gain an upper hand. These vulnerabilities can and should be rectified, but such symmetry requires the involvement of both industry and government.

For example, onshoring critical leading-edge fabs and foundries on U.S. soil is a deeply problematic objective from the perspective of Taipei. While the United States should continue to strengthen its domestic industry and seek to build chip-manufacturing facilities and talent through incentives such as the CHIPS Act, it must temper expectations on the scope and scale of what the U.S. government can achieve on its own. Rebuilding homegrown capabilities in cutting-edge semiconductor fabrication, such as by Intel, likely would take a decade and tens of billions of dollars, given that no U.S. companies are able to manufacture at the same nodes as TSMC. And of course, success in this area is not guaranteed, especially given Intel's recent struggles. In the interim, Washington should pursue a pragmatic course of action focusing on reshoring critical parts of the semiconductor

ecosystem that are palatable to Taiwan, but that have the added benefit of bolstering U.S. domestic production and reducing vulnerabilities within the supply chain. Incentivizing new TSMC fabs onshore has the added benefit of training more U.S. employees, as TSMC has sent engineers from Arizona to Taiwan for training, providing a pathway for U.S. talent to obtain critical know-how that will be the foundation for advancing the U.S. semiconductor industry.

**Recommendation 3A: The United States and Taiwan should embark on a continued bilateral dialogue on semiconductors and security to better align their objectives.**

By focusing on both semiconductors and security concerns, the United States and Taiwan can emphasize the mutually reinforcing links between their economic and national securities, and better prepare for strategic competition with China. This, in turn, will reduce potential tensions in the relationship that China could attempt to exploit through economic coercion or disinformation.

**Recommendation 3B: U.S. and Taiwanese leaders should include other relevant allies and partners with stakes in the semiconductor industry, such as South Korea, the Netherlands, Germany, France, Italy, the United Kingdom, and Israel.**

India also would be a logical candidate for inclusion, given its aspirations and potential for becoming a major player in the global semiconductor industry. This will provide a platform to further coordination among like-minded nations and curb China's ability to exploit divergent interests and objectives. It will also create a shared understanding of the thresholds required for a U.S. national-level response to develop and lead multilateral actions following Chinese gray zone coercion. These multilateral dialogues should include industry stakeholders whenever feasible in the form of formal Track 1.5 dialogues. The scale and complexity of global semiconductor supply chains, and the great cost of remapping them, requires engaging companies from the beginning to address potential gaps between governments and industry objectives.

**Challenge 4: U.S. unilateral actions are insufficient to counter China's coercion of Taiwan.**

Unilateral U.S. actions against China's gray zone coercion of Taiwan have failed to sufficiently respond or deter further antagonism. International coordination is needed to build a more effective counter to China's multifaceted actions. Establishing such an ad hoc effort, however, has been difficult due to differences in interests, objectives, and thresholds of response.

**Recommendation 4: The United States should build and lead a consortium of like-minded nations, committed to the diversification and security of semiconductor supply chains.**

Such a group would put "skin in the game" by engaging in capacity building activities such as investing in collaborative R&D and new design, fabrication, testing, and packaging infrastructure to make global supply chains more diversified, secure, and resilient. This consortium would convene a series of issue-focused working groups, bringing together members of government, industry, and academia from these countries to enhance discussion and collaboration.

This body also would coordinate on punitive actions, such as export controls and investment screenings, against Chinese economic and political aggression. Previous U.S. efforts to curb Chinese behavior through export controls have been ineffective, largely because China has been able to skirt the cost by working with other nations. Enforcing multilateral export controls and sanctions would improve the efficacy of these tools. A common approach to investment screenings would ensure that more potential avenues for Chinese technology acquisition—such as purchasing of majority stakes in critical technology companies—are closed.

Here, too, such dialogue and coordination should extend past governments. It is essential that industry is included in crafting collaborative efforts. Multilateral governmental dialogues should involve critical industry partners, including designers like AMD or Qualcomm, fabricators like TSMC or Intel, and upstream equipment suppliers like ASML. Not only should industry have better understanding for the rationale underpinning actions against China, they also play a pivotal role in developing multilateral R&D networks that are the best tool to positioning the United States and its partners ahead of China in this technological competition.

Challenge	Priority Actions
Taiwan's security is intertwined with TSMC, making it reluctant to offshore technology.	<ul style="list-style-type: none"> <li>▪ Refocus U.S.-Taiwan semiconductor cooperation on areas of mutual benefit, including semiconductor design.</li> <li>▪ Prioritize intellectual property dominance, attracting talent, and reshoring key components of the supply ecosystem.</li> <li>▪ Continue to strengthen the U.S.-Taiwan security relationship for reassurance.</li> </ul>
China may choose to use gray zone tactics to exert influence over Taiwan, rather than invade militarily.	<ul style="list-style-type: none"> <li>▪ Enhance interagency planning—including the development of contingency plans—for China's gray zone coercion of Taiwan.</li> <li>▪ Improve recognition of indications and warnings to better understand China's economic and political thresholds and how it might respond.</li> </ul>
The U.S. and Taiwan's national interests and semiconductor objectives are misaligned.	<ul style="list-style-type: none"> <li>▪ Enhance bilateral dialogue on semiconductors to promote understanding, and better illustrate the links between the two nation's economic and national security interests.</li> <li>▪ Expand to multilateral dialogues with other relevant allies and partners to further enhance understanding and establish common policies.</li> </ul>
U.S. unilateral actions to counter China's coercion of Taiwan's semiconductor industry and other predatory practices are only marginally effective.	<ul style="list-style-type: none"> <li>▪ Enhance multilateral coordination to counter Chinese coercion, particularly on punitive actions.</li> <li>▪ Develop a consortium of like-minded countries that are willing to diversify and secure supply chains and invest in collaborative R&amp;D.</li> <li>▪ Promote industry-government-academia dialogue and collaboration, including through collaborative R&amp;D programs.</li> </ul>

## Conclusion

China will not wait for the United States to get its innovation and supply chain resilience house in order, nor is Beijing likely to come knocking on Washington's front door. Gray zone tactics, or coercive actions marked by strategic ambiguity, render China a complex competitor. Strategic competition with Beijing requires enhanced cross-industry, bilateral, and multilateral dialogue and cooperation between the world's leading techno-democracies. Greater prioritization of intellectual property, talent cultivation and retention, and adequately funded R&D is needed to maintain a competitive edge and counter Chinese coercion, especially with regards to the global semiconductor industry.

Modern life depends on supply chain resilience and access to chips at every level, from transportation to digital communications to life-sustaining medical equipment and beyond. Failure to stabilize and protect supply chains and chip access related to Taiwan will have devastating impacts on everyday life in the United States and abroad, far beyond the inconvenience of holiday shipping delays. Trillions of dollars in economic activity hang in the balance. The key insights drawn from The Chips Are Down game further illuminate the gravity of the U.S.-China competition and global competition for semiconductors, clarifying the web of elements and distinctions that are vital to safeguarding semiconductor supply chains, minimizing associated risks, and assuming a proactive posture in the fight for technology leadership.

## APPENDIX A: THE CHIPS ARE DOWN TEAM OBJECTIVES

UNITED STATES	TAIWAN	CHINA
GENERAL ORDER	GENERAL ORDER	GENERAL ORDER
Specific Objectives	Specific Objectives	Specific Objectives
<p>The president of the United States has determined that the United States must stand up to China's aggression, help Taiwan maintain control of its semiconductor industry, and ensure U.S. access to leading-edge chips. The president has stood up an interagency task force intended to address this issue and coordinate with Taiwanese counterparts.</p>	<p>The president of Taiwan has ordered that it must protect its position as the world leader in semiconductor processes for high-end manufacturing against all forms of disruption and competition. The president also has ordered all elements of the Taiwanese government and civil society to aggressively defend Taiwan's sovereignty against any Chinese incursion. The president has stood up a coordinating committee to address this issue and cooperate with U.S. officials in this effort.</p>	<p>The Standing Committee of the Communist Party Central Committee has decided Taiwan's semi-independence and the United States' disregard for China's economic and military strength will not stand. It authorizes the execution of the Semiconductor Conflict Campaign designed to erode the semiconductor industry in Taiwan so China can exert control over it and take prominence in the manufacture of chips worldwide.</p>
<p>Maintain U.S. access to Taiwanese semiconductor markets and assist Taiwan in defending its industrial sector against information attacks</p> <hr/> <p>Ensure that China is deterred throughout the region through the use of coalitions, partnerships, and alliances</p> <hr/> <p>Ensure that China does not become the dominant producer of semiconductors in the world, and limit China's access to the most sophisticated manufacturing technology and other resources</p> <hr/> <p>Build U.S. domestic semiconductor capacity, particularly in the higher-end, smaller dimension, chip plants</p> <hr/> <p>Protect U.S. intellectual property and its current advantage in software</p> <hr/> <p>Protect U.S. allies' advantage in manufacture of production machinery and raw materials</p> <hr/> <p>Remain under the threshold of armed conflict with China.</p>	<p>Ensure that the Taiwanese semiconductor industry retains its place as the most advanced, productive, and efficient producer of semiconductors in the world</p> <hr/> <p>Deter any Chinese aggression while remaining under the threshold of armed conflict</p> <hr/> <p>Strengthen Taiwan's partnership with the United States</p> <hr/> <p>Maintain peace and stability within Taiwan to reassure the population.</p>	<p>Establish Chinese control over Taiwan's semiconductor industry in order to affect United States' and others' ability to access supply while insuring Chinese industrial supply</p> <hr/> <p>Develop a stable supply base for semiconductors to Chinese domestic industry</p> <hr/> <p>Eliminate foreign dependencies in machinery, technology, and personnel in the domestic Chinese semiconductor industry</p> <hr/> <p>Increase the domestic semiconductor capacity for China and decrease dependencies on foreign sources, especially those of the United States, Korea, and Japan</p> <hr/> <p>Disrupt the supply of semiconductors to the United States and other allied countries</p> <hr/> <p>Ensure Taiwan remains a dependent province of China, and that Taiwan does not drift toward independence</p> <hr/> <p>Fracture, disrupt, and discredit the current relationship between the United States and Taiwan</p> <hr/> <p>Remain under the threshold of military conflict with the United States and Taiwan.</p>

## APPENDIX B: THE CHIPS ARE DOWN ACTIONS

DIPLOMATIC ACTIONS	INFORMATIONAL ACTIONS	MILITARY ACTIONS
<ul style="list-style-type: none"> <li>– Negotiate a trade agreement with another country**</li> <li>– Develop a partnership with another country, corporation, or political party to collaborate on an issue</li> <li>– Issue a demarche**</li> <li>– Enter into or upgrade a partnership or alliance**</li> <li>– Declare diplomats and other individuals as persona non grata**</li> <li>– Fund aligned political groups or organizations.</li> </ul>	<ul style="list-style-type: none"> <li>– Release adverse information about individuals/organizations~</li> <li>– Manipulate and release financial information to affect markets and capital</li> <li>– Issue public statement</li> <li>– Create and release synthetic information (deep fakes, dis/misinformation, etc.)</li> <li>– Enact or relax information controls and policies** (restrict social media platforms, keywords, or subjects)</li> <li>– Provide communications equipment to promote dissent or nationalism</li> <li>– Enact social media campaign</li> <li>– Censor or influence media** (influence content, promote propaganda, or restrict information).</li> </ul>	<ul style="list-style-type: none"> <li>– Enact a physical or information blockade**</li> <li>– Enact a no-fly zone or no-sail zone** (can be around disputed islands, or against nations, but it must be enforceable)</li> <li>– Undertake a freedom of navigation operation**</li> <li>– Launch incursions into other air or sea space**</li> <li>– Aggressively maneuver near adversary assets or territory**</li> <li>– Provocation: minor incursion or intrusion into another country's space**</li> <li>– Undertake military exercise** (either solo or with another country)</li> <li>– Additional spending commitments to the military**</li> <li>– Provide military aid or sell arms**</li> <li>– Increase or enhance intelligence collection**</li> <li>– Increase alert level for your military forces**</li> <li>– Use jamming or electronic warfare to disrupt communications.**</li> </ul>
ECONOMIC ACTIONS	CYBER ACTIONS	CIVIL ACTIONS
<p><b>Financial Manipulation</b></p> <ul style="list-style-type: none"> <li>– Manipulate stocks and bonds</li> <li>– Manipulate markets by hoarding</li> <li>– Affect a target's ability to get financial support from the markets</li> <li>– Purchase companies or majority stakes in companies.</li> </ul> <p><b>Investment</b></p> <ul style="list-style-type: none"> <li>– Provide investment to develop a new fab plant in another country**</li> <li>– Invest in the domestic semiconductor industry to build capacity or capability**</li> <li>– Invest in software research and development</li> <li>– Invest in research and development</li> <li>– Train and educate semiconductor work force</li> <li>– Enhance the level of technology at fab plants</li> <li>– Improve infrastructure to enhance supply chains.</li> </ul>	<p><b>Defensive</b></p> <ul style="list-style-type: none"> <li>– Invest in people, software, and hardware to increase cyber security*</li> <li>– Implement standards and regulations to increase cyber security</li> <li>– Increase cyber security awareness and training</li> <li>– Enact Great Firewall to censor internet access* (Red team [PLA] action).</li> </ul> <p><b>Offensive   Execute attack against system to:</b></p> <ul style="list-style-type: none"> <li>– Exfiltrate data from the system (specify target data if necessary)</li> <li>– Disrupt system operations (manipulate data, reduce confidence in system)</li> <li>– Disable system (reversibly stop the system from working)</li> <li>– Destroy system (irreversibly disable the system)</li> <li>– Launch Great Cannon, a large scale distributed denial-of-service attack* (Red team [PLA] action).</li> </ul>	<p><b>Defensive</b></p> <ul style="list-style-type: none"> <li>– Seize assets of individuals or corporations**</li> <li>– Enact and enforce sanctions**</li> <li>– Nationalize assets** (Red team [PLA] action).</li> </ul> <p><b>Offensive</b></p> <ul style="list-style-type: none"> <li>– Kidnap individual (may include rendition**)</li> <li>– Extort or bribe individual</li> <li>– Assassinate individuals</li> <li>– Detain or deport individuals**</li> <li>– Steal intellectual property or funds</li> <li>– Physically sabotage infrastructure</li> <li>– Armed attack to take over a physical location.</li> </ul>

\*sector-specific | \*\*government actors only | \*\*\*non-state actors only | ~ notes actions that are required to enact other actions

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