CHAPTER 4

A DANGEROUS PERIOD FOR CROSS-STRAIT DETERRENCE: CHINESE MILITARY CAPABILITIES AND DECISION-MAKING FOR A WAR OVER TAIWAN

Key Findings

- Cross-Strait deterrence is in a period of dangerous uncertainty. Improvements in China's military capabilities have fundamentally transformed the strategic environment and weakened the military dimension of cross-Strait deterrence. China's increasingly coercive approach to Taiwan puts almost daily pressure on the cross-Strait status quo and increases the potential for a military crisis.
- Chinese leaders likely set 2020 as a key milestone for the People's Liberation Army (PLA) to develop the capabilities needed to invade Taiwan. To achieve this goal, for nearly two decades the PLA has systematically planned, trained, and built the forces it believes are required to invade the island. The PLA has already achieved the capabilities needed to conduct an air and naval blockade, cyberattacks, and missile strikes against Taiwan. PLA leaders now likely assess they have, or will soon have, the initial capability needed to conduct a high-risk invasion of Taiwan if ordered to do so by Chinese Communist Party (CCP) leaders. They will continue enhancing this capability in the coming years.
- Any near-term PLA invasion would remain a high-risk option. Such an operation would rely on the success of the PLA's more developed cyberattack, missile strike, and blockade capabilities to sufficiently degrade, isolate, or defeat Taiwan's defending forces as well as its anti-access and area denial capabilities to prevent decisive U.S. intervention. The PLA's current military sea and air lift capacity could carry an initial landing force of 25,000 or more troops. China has developed substantial capabilities to use civilian ships in military operations, providing capacity for the PLA to land additional troops on Taiwan after securing a beachhead.
- Given these developments, it has become less certain that U.S. conventional military forces alone will continue to deter China's leaders from initiating an attack on Taiwan. A deterrence failure is most likely to occur if Chinese leaders believe the United

States is not militarily capable of or politically willing to intervene, or if they interpret ambiguities in U.S. policy to mean that opportunistic Chinese aggression against Taiwan will not provoke a decisive U.S. response. General Secretary of the CCP Xi Jinping's higher tolerance for risk and desire to establish a lasting legacy could also contribute to a decision by China's leadership to attack Taiwan despite U.S. warnings.

- Still, whether and when to invade Taiwan is a political rather than a military question for CCP leaders, who continue to face substantial constraints on any decision to use force. These include the inherent uncertainty of a military confrontation with the United States, the extensive damage that would likely result to the Chinese economy, and the risk that an attack on Taiwan could prompt the formation of a coalition of countries determined to constrain any further growth in China's power and influence.
- Taiwan has taken important steps toward asymmetrically defending against a PLA attack, achieving successes in developing indigenous missiles threatening a PLA invasion or blockade. Nevertheless, Taiwan faces significant challenges from decades of underinvestment in defense, leaving it with low stockpiles of critical resources for enduring a PLA blockade. Some military leaders are also resisting steps to adopt a more asymmetric posture.

Recommendations

The Commission recommends:

- Congress enhance Taiwan's ability to purchase U.S. defense articles and accelerate the process for their sale and delivery to Taiwan by:
  - Authorizing and appropriating on a multiyear basis Foreign Military Financing Program funds for Taiwan to purchase defense articles from the United States and allowing Taiwan to use Foreign Military Financing funds to purchase arms through direct commercial contracts;
  - Amending the Foreign Assistance Act to make Taiwan eligible to receive priority delivery of U.S. excess defense articles; and
  - Directing the Administration to use the Special Defense Acquisition Fund to reduce defense procurement lead times for arms sales to Taiwan by pre-stocking defense articles needed to maintain cross-Strait deterrence.
- Congress take urgent measures to strengthen the credibility of U.S. military deterrence in the near term and to maintain the ability of the United States to uphold its obligations established in the Taiwan Relations Act to resist any resort to force that would jeopardize the security of Taiwan, including:
  - Authorizing and funding the deployment of large numbers of antiship cruise and ballistic missiles in the Indo-Pacific;
  - Authorizing and funding the requests of U.S. Indo-Pacific Command (INDOPACOM) for better and more survivable in-

telligence, surveillance, and reconnaissance in the East and South China Seas;

- Authorizing and funding the requests of INDOPACOM for hardening U.S. bases in the region, including robust missile defense;
- Authorizing and funding the stockpiling of large numbers of precision munitions in the Indo-Pacific; and
- Authorizing and funding programs that enable U.S. forces to continue operations in the event central command and control is disrupted.

Introduction

China's leaders have historically been deterred from attacking Taiwan by the threat of U.S. intervention and their fears that a war would disrupt their economy and global standing. Decades of concerted modernization have resulted in a PLA that today either has or is close to achieving an initial capability to invade Taiwan—one that remains under development but that China's leaders may employ at high risk—while deterring, delaying, or defeating U.S. military intervention. The PLA still suffers from significant weaknesses in joint operations and personnel quality but will continue working to address these shortfalls. The PLA's progress toward building an invasion capability has already undermined cross-Strait deterrence by diminishing the credibility of the U.S. threat to deny the PLA its objectives through intervention. The overall state of deterrence is now undeniably more fragile than before and could fail entirely if certain specific conditions are met.

Cross-Strait deterrence continues to hold today, however, because Chinese leaders remain deeply concerned about the risks and consequences of a decision to invade Taiwan. Specifically, Chinese leaders are currently deterred by the inherent uncertainties of launching an invasion and fighting the U.S. military. They are also concerned about the damage a war could do to China's economy and the possibility that an attack on Taiwan could prompt a U.S.-led coalition of countries determined to constrain any further growth of Chinese power and influence. As such, diplomatic and economic tools have also become increasingly important for maintaining peace and stability in the Taiwan Strait.

This section assesses the state of cross-Strait deterrence and identifies conditions under which it could fail to prevent a Chinese attack on Taiwan. First, the section examines the requirements for successful deterrence and the history of deterrence in the Taiwan Strait. Next, it discusses how decades of PLA modernization and planning have shifted the cross-Strait military balance and why the PLA either has or may soon have the capability to invade Taiwan, albeit at great military, economic, and political risk. While the PLA has the capabilities to execute various military campaigns against Taiwan, each of which could inflict great damage on the island, this section focuses on the PLA's emerging invasion capability as an existential threat facing Taiwan and a sharp challenge to U.S. deterrence.[1] Next, the section evaluates the factors in Chinese leaders' decision-making that could persuade them to initiate a war over

Taiwan or constrain such a decision. Finally, the section considers the implications of weakened cross-Strait deterrence for the United States. This section is based on the Commission's February 2021 hearing on the topic as well as consultations with U.S. government officials and nongovernmental experts and open source research and analysis.

Deterrence in the Taiwan Strait

In its simplest form, deterrence refers to the practice of discouraging an opponent from taking an unwanted action, such as military aggression.*[2] Deterrence relies on credible threats that create fear in the mind of the opponent that it will either suffer unacceptable retaliation or be unable to achieve its objectives should it undertake the unwanted action.†[3] States practicing deterrence often employ threats of military force, but they can also leverage nonmilitary tools of statecraft such as economic sanctions or diplomatic exclusion to deter aggression against themselves (direct deterrence) or third parties (extended deterrence).[4]

Successful deterrence in the Taiwan Strait requires several conditions. First, China must recognize that the United States has the capability and the will to carry out its threat to intervene in response to a Chinese attack on Taiwan.[5] Second, China must believe there are actions that could lead to a U.S. response and that costs will be imposed if China takes those actions.[6] China is increasingly testing the resolve of the United States and its allies and partners through coercive military and economic actions.[7] Finally, whether China can be deterred depends partly on its own reasons for undertaking aggression against Taiwan. These might include opportunism, dissatisfaction with the status quo, fear that the alternative is more dangerous to its interests, or other factors related to Chinese leaders' beliefs or behavioral tendencies that may not appear entirely rational.[8]

U.S. policies have also shaped Beijing's attitude toward the use of force over time. The CCP has identified unification with Taiwan as among its highest priorities.‡ From a political perspective, the United States' One China Policy maintains a diplomatic balance that accords Beijing official recognition, acknowledges but does not

*A state practicing "deterrence" seeks to persuade an opponent to refrain from undertaking a specific action, whereas a state practicing "compellence" seeks to persuade an opponent to undertake a specific action it otherwise might not want to carry out. Some academics also distinguish between strategies of "deterrence," which involve threats to discourage an action, and strategies of "dissuasion," which affect an opponent's cost-benefit calculus by pairing threats with assurances, concessions, or benefits for the purpose of making alternatives to a certain action more attractive. Michael J. Mazarr et al., "What Deters and Why: Exploring Requirements for Effective Deterrence of Interstate Aggression," *RAND Corporation*, 2018, 6–7.

†These approaches are known as "deterrence by punishment" and "deterrence by denial," respectively. Michael J. Mazarr, "Understanding Deterrence," *RAND Corporation*, 2018, 2; Glenn Snyder, "Deterrence and Power," *Journal of Conflict Resolution*, 4:2 (June 1960): 163.

‡Chinese officials have publicly described Taiwan's status as a "core interest" since 2003, and the country's legislature passed the Anti-Secession Law in 2005 enshrining "non-peaceful means" as a legal last resort to prevent "Taiwan independence." Every Chinese leader from Mao Zedong onward has threatened Taiwan with war if it declared independence and made the island's eventual "return" to China a theme of his public rhetoric. Michael Swaine, "China's Assertive Behavior Part One: On 'Core Interests,'" *China Leadership Monitor* 34 (February 22, 2011): 3, 7–8; Murray Scott Tanner and Peter W. MacKenzie, "China's Emerging National Security Interests and Their Impact on the People's Liberation Army," *CNA Corporation*, 2014, 21; Paul H.B. Godwin and Alice L. Miller, *China's Forbearance Has Limits: Chinese Threat and Retaliation Signaling and Its Implications for a Sino-American Military Confrontation*, NDU Press, April 2013, 69–104.

recognize Beijing's position on Taiwan sovereignty, and provides for a robust unofficial relationship between Taipei and Washington.*

From a military perspective, the United States has explicitly leveraged credible threats of intervention to deter a Chinese invasion of Taiwan in the past.† Between the early 1950s and 1979, the United States expressed its capability and will to defend Taiwan by committing itself to a formal alliance, maintaining a military command on the island, routinely sailing warships through the Taiwan Strait, training Taiwan's military, selling Taiwan arms, and threatening to use nuclear weapons against China on Taiwan's behalf.‡[9] The United States threatened to intervene with overwhelming military superiority, both conventional and strategic, to prevent CCP leaders from seizing Taiwan's offshore islands during the so-called "First Taiwan Strait Crisis" (1954–1955) and "Second Taiwan Strait Crisis" (1958).[10] In 1979, the U.S. Congress passed the Taiwan Relations Act (TRA), which committed the United States to provide Taiwan with defensive arms and services and required the United States to maintain the capacity to resist any efforts by China to change Taiwan's political status through force or coercion.[11] During the "Third Taiwan Strait Crisis" (1995–1996), the United States leveraged military threats to deter Chinese leaders from escalating their use of force beyond missile tests by deploying two aircraft carrier battle groups and an amphibious assault ship to waters near the island.[12]

Irrespective of the U.S. threat to intervene militarily during the Third Taiwan Straits Crisis, CCP leaders may also have decided against further provocation at that time because they worried a war over Taiwan could derail their efforts to build up China's wealth, power, and international status. In the mid-1990s, Chinese leaders were focused on acceding to the WTO, reforming the PLA, and repairing their tarnished image in the wake of the Tiananmen Square Massacre.[13] Cai Xia, a former professor at the CCP's Central Party School and dissident now living in exile, argues that Chinese leaders did not challenge the United States during the Third Taiwan Strait Crisis or after the 1999 bombing of the Chinese Embassy in Belgrade because they were anxious the United States could suppress China's rise if it chose to exercise all levers of national power.[14] "The CCP earnestly avoided sticking its neck out internationally for the

*The U.S. One China Policy is embodied in the three Joint Communiques, the TRA, and the Six Assurances. For more, see Congressional Research Service, "China/Taiwan: Evolution of the "One China" Policy—Key Statements from Washington, Beijing, and Taipei," January 5, 2015, 5–6.

†At the same time, the United States has attempted to deter Taiwan leaders from declaring independence. Observers have termed the U.S. strategy of attempting to deter both China and Taiwan from taking steps that undermine prospects for a peaceful resolution of Taiwan's political status "dual deterrence." David Keegan, "Strengthening Dual Deterrence on Taiwan: The Key to U.S.-China Strategic Stability," *Stimson Center*, July 6, 2021; Richard Bush, "A One-China Policy Primer," *Brookings Institution*, March 2017, 22.

‡To deter further Chinese aggression after the first Taiwan Straits Crisis (1954–1955), President Dwight D. Eisenhower went to Congress in January 1955 for an authorization to use force. Congress subsequently passed a joint resolution that gave the U.S. president broad authority to employ the military "as he deems necessary" for the specific purpose of protecting Taiwan and the Pescadores from attack. The so-called "Formosa Resolution" was open-ended enough to allow the possible use of nuclear weapons, though it was never actually invoked. In the years afterward, President Eisenhower made several public threats to use nuclear weapons against the PRC if it attempted to invade Taiwan. Matthew Waxman, "Remembering Eisenhower's Formosa AUMF," *Lawfare*, January 29, 2019; Joint Resolution Authorizing the President to Employ the Armed Forces of the United States for [H. J. Res. 159] Protecting the Security of Formosa, the Pescadores and Related Positions and Territories of That Area, H.J. Res. 159, introduced January 28, 1955.

twenty years from 1989 to 2008, because the CCP needed time to become bigger and stronger," Ms. Cai wrote in a 2021 essay.[15] "Realizing that the power disparity between China and the U.S. was too great and that China was unable to directly confront the U.S., the CCP practiced 'forbearance' in [bilateral] encounters."[16]

Since the 2000s, however, the deterrent power of U.S. military threats has weakened as China's capabilities for invading Taiwan have grown. For the last two decades, Beijing has engaged in a purposeful and well-resourced effort to improve the PLA's capabilities, organization, training, and joint operations. As a result, the U.S. Department of Defense (DOD) assesses the PLA is now able to mount a full air and naval blockade of Taiwan and is capable of punishing the people of the island through missile, air, and cyberattacks.[17]

Moreover, the PLA has developed sea denial and power projection capabilities to potentially counter a U.S. intervention.*[18] Captain Thomas H. Shugart III, USN (Ret.), adjunct senior fellow with the Center for a New American Security, testified before the Commission that these capabilities create "uncertainty as to the spectrum of possible results in a cross-Strait conflict."[19] Taken together, these changes have shifted the conventional military balance in China's favor and highlight the diminishing efficacy of military threats as one of several tools the United States can leverage to deter China from invading Taiwan.

The Changing Cross-Strait Military Balance

As the Commission has documented in its past Reports, China has been engaged for decades in a well-resourced campaign to modernize the PLA, with the explicit goal of developing the capability to forcibly annex Taiwan through a cross-Strait invasion. As a result, the PLA can today execute a range of missions against Taiwan, including a full air and naval blockade, with a high confidence of success.

In addition, the PLA is nearing or already has an initial operational capability for a successful cross-Strait invasion—though at high risk of failure if the United States commits its forces to defend Taiwan. According to DOD, "initial operational capability" is "the first attainment of the capability to employ effectively a weapon, item of equipment, or system of approved specific characteristics that is manned or operated by an adequately trained, equipped, and supported military unit or force."[20] Initial operating capability is in contrast to full operational capability, a point at which a weapon or system's capabilities are mature and when the military is able to maintain the system, modernize it, and deploy it when needed.[21]

The PLA's development in this regard is the result of consistent and explicit planning over the last two decades. Executing those directives has required years of operational planning, dedicated investment (particularly in China's shipbuilding industrial base), sustained growth in the PLA's amphibious capability, the adaptation of civilian sealift to military purposes, and comprehensive advances in anti-access and area denial capabilities to deter, delay, or defeat U.S.

*For more on power projection, see U.S.-China Economic and Security Review Commission, Chapter 3, Section 2, "China's Growing Power Projection and Expeditionary Capabilities," in *2020 Annual Report to Congress*, December 2020, 404–405.

military intervention. Moreover, the PLA—again at the direction of the highest level of CCP authority—is continuing to develop its capabilities so as to enhance the confidence of Chinese leaders that it can successfully execute an invasion campaign.

For over a decade, the PLA has been able to prosecute a growing range of campaigns short of invasion intended to coerce Taiwan into submission. In 2008, DOD assessed that the PLA had achieved the capabilities necessary for firepower strikes and a limited blockade of Taiwan.[22] The PLA's plans for a joint firepower strike campaign involve launching missiles, rockets, and other munitions at targets in Taiwan to force Taiwan's leaders to submit to unification* with China. In 2015, the DOD annual report on China's military power did not include prior reports' assessment that the PLA could not enforce a full military blockade, suggesting the PLA had achieved that capability.[23] A PLA island blockade campaign would involve seizing control of the air and waters around Taiwan and shutting down Taiwan's economy by preventing the import of energy, food, and other essential goods until Taiwan's leadership capitulates. Between 2008 and 2015, the PLA began demonstrating the capability to conduct offensive cyber operations against military networks and critical infrastructure in Taiwan and the continental United States.[24] Cyber operations can bolster China's other campaign options or stoke social unrest that may compromise Taiwan public trust in its government or military.[25]

In testimony before the Commission, Lonnie Henley, former defense intelligence officer for East Asia with the Defense Intelligence Agency, assessed that China's government probably ordered the PLA to have an initial Taiwan invasion capability by 2020.[26] The 2020 milestone, which then General Secretary Hu Jintao established in 2004, reflects Chinese leaders' understanding that a military invasion of Taiwan is the most escalatory in a range of potential campaigns requiring years of focused planning, training, and technological innovation.†[27] These efforts appear to have borne fruit. Since 2018, DOD has suggested that China may have an invasion capability by noting the PLA has a military "option" to invade Taiwan.[28] In its latest report on China's military power, issued in 2020, DOD reiterated that China's military options include a "full-scale amphibious invasion to seize and occupy some or all of Taiwan or its offshore islands" and added new language suggesting China is

*The Chinese government maintains that Taiwan is an inalienable part of the state called "China" ruled by the PRC. For that reason, it refers to the process of absorbing Taiwan as "unification" or "reunification."

†General Secretary Hu established 2020 as an important milestone for other military modernization targets. In 2004, he also ordered the PLA to achieve "major progress" in being capable of fighting "modern local wars under informatized conditions" by 2020. These orders were publicized with additional detail in China's *2006 Defense White Paper*, which elaborated a three-step modernization process in which the PLA must "lay a solid foundation" for modernization by 2010, "make major progress" toward becoming an informationized force by 2020, and be "capable of winning informationized wars" by mid-century. General Secretary Hu added further detail to the 2020 milestone in his work report to the CCP's 18th National Congress in 2012, calling on the PLA to "basically accomplish mechanization and make significant progress in information construction" by 2020. Joel Wuthnow, written testimony for the U.S.-China Economic and Security Review Commission, *Hearing on U.S.-China in 2020: Enduring Problems and Emerging Challenges*, September 9, 2020, 24–25; Wanda Ayuso and Lonnie Henley, "Aspiring to Jointness: PLA Training, Exercises, and Doctrine, 2008–2012," in Roy Kamphausen, David Lai, and Travis Tanner, eds., *Assessing the People's Liberation Army in the Hu Jintao Era*, Strategic Studies Institute, 2014, 171–173, 187.

now "capable" of such an invasion.*[29] Similarly, Mr. Henley testified that as of 2020, the PLA has already built the initial capabilities it believes are necessary to invade Taiwan and win a war against intervening U.S. forces.[30]

While some other experts offer differing assessments of whether the PLA is currently ready to invade Taiwan, there is general consensus that the PLA is actively developing and quickly approaching an invasion capability. For example, in March 2021 then Commander of U.S. Indo-Pacific Command Admiral Philip S. Davidson testified before Congress that the PLA may be able to conquer Taiwan by 2027.[31] Former Central Intelligence Agency analyst and former national intelligence officer for Asia John Culver suggested the milestone was further out, in 2030 or 2035.†[32] By contrast, in October 2021, Taiwan Minister of National Defense Chiu Kuo-cheng told Taiwan's legislature that China currently has the capability to invade Taiwan, and that it will have a "comprehensive" invasion capability by 2025.[33]

Taiwan's leaders are working to blunt the PLA threat. After her election in 2016, President Tsai Ing-wen and her Administration have taken important first steps toward mitigating the PLA's advantages, but Taiwan's military continues to face large gaps in size, funding, and capabilities compared to the PLA. Taiwan's military capabilities extend the time Taiwan can effectively resist a PLA attack, but given the disparity with the PLA's size and resources, Taiwan will likely only be capable of resisting an invasion long enough for the United States and other partners to come to its aid.[34]

The PLA Reshapes Itself into an Invasion Force

The PLA's modernization, military training, and investments in its defense industrial base have demonstrated significant progress toward its 2020 invasion milestone. U.S. analyses published in 2000 determined the PLA would not be able to invade Taiwan even without U.S. military support of the island.[35] Since then, the PLA's advancements in power projection and precision strike capabilities, as

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*Beginning in 2018, DOD introduced language in its annual report on China's military power stating that China has a military option for a full-scale amphibious invasion of Taiwan. The introduction of this language, which was not included in prior versions of DOD's report, was significant and suggested the PLA may have had or was nearing the capability to invade Taiwan. In its 2020 report, DOD strengthened its assessment by reiterating that China had a military option for a full-scale invasion while suggesting the PLA also had the *capability* to invade Taiwan. Following a lengthy discussion of China's approach to a full invasion of the island, the report continued that China is "capable of accomplishing various amphibious operations short of a full-scale invasion of Taiwan *as well*," (emphasis added) implying these capabilities exist in addition to a full-scale invasion capability. Each year, DOD has caveated its assessment by explaining such an operation would carry "significant political and military risk." U.S. Department of Defense, *Annual Report to Congress: Military Power of the People's Republic of China 2020*, August 21, 2020, 114.

†Why ADM Davidson proposed 2027 is not immediately clear, but it is likely associated with the CCP's 19th Party Congress Fifth Plenum communique, released in 2020, introducing a vague benchmark of army-building in 2027, the centenary of the PLA's founding. While some published analysis argues this represents an acceleration of PLA modernization that pushes modernization targets from 2035 to 2027, there is no publicly available evidence that suggests such a change to the PLA's timetable. The 2027 centennial is more likely a symbolic benchmark for the PLA than a new step in military modernization. Similarly, while he did not provide his reasoning, Mr. Culver may have been referencing the PLA's existing 2035 benchmark to become a fully modern military for his estimate of when the PLA will achieve an invasion capability. John Culver and Ryan Haas, "Understanding Beijing's Motives Regarding Taiwan, and America's Role," *Brookings Institution*, March 30, 2021; Meia Nouwens, "Is China Speeding Up Military Modernisation? It May, But Not Yet," *Interpreter*, November 4, 2020; *Xinhua*, "Authorized Release: Communique from the Fifth Plenary Session of the Nineteenth CCP Central Committee" ((受权发布) 中国共产党第十九届中央委员会第五次全体会议公报), October 29, 2020. Translation.

well as the general modernization of the PLA Navy and Air Force, have eroded Taiwan's defensive advantages while posing a credible threat to intervening U.S. forces. The PLA continues to suffer from perennial weaknesses, including poor officer quality, a lack of warfighting experience, and what U.S. analysts consider a critical lack of amphibious lift for a direct beach assault of Taiwan. Nevertheless, the PLA is keenly aware of its shortcomings and is working to rectify them with continued modernization and training. Furthermore, PLA doctrine suggests civilian sealift may close the critical gap in amphibious lift.

Building an Invasion Force

Today, public sources suggest the PLA has the military air and sea lift capacity for a first-echelon invasion force of more than 25,000 troops.* The PLA's amphibious sealift capacity can transport approximately 20,000 troops in mechanized battalions, including hundreds of infantry fighting vehicles and main battle tanks (see Table 1).† One expert analysis found that a PLA Air Force airborne campaign would likely be able to contribute an additional light infantry brigade of approximately 5,000‡ troops with lightly armored vehicles and artillery.[36] The PLA Army also has two air assault brigades able to deploy approximately 3,200 troops by helicopter.[37] These numbers do not include either the PLA's expected combat losses or forces delivered by civilian air and sealift. It is unclear whether PLA planners assess the first-echelon landing force they could currently transport is large enough to set conditions for follow-on forces to invade and occupy Taiwan.

Table 1: China's Amphibious Capacity in 2021

Class	NATO Designator	Vehicle Type	Count	Troops and Vehicle Capacity
Type 067A	*YUNNAN*	Landing craft, utility	~30	1 tank *or* 2 infantry fighting vehicles *or* 1 infantry unit
Type 071	*YUZHAO*	Amphibious transport dock	6	800 troops; 60 armored vehicles; 4 helicopters
Type 072-II	*YUKAN*	Landing ship, tank	4	200 troops; 10 tanks
Type 072-II/III	*YUTING* I	Landing ship, tank	9	250 troops; 10 tanks; 2 helicopters
Type 072A/B	*YUTING* II	Landing ship, tank	15	250 troops; 10 tanks

*Using a force of this size to invade Taiwan would likely restrict PLA planners to limited circumstances in which the force could survive in the face of Taiwan's defenses and accomplish its mission. These circumstances almost certainly include a prerequisite condition that the PLA is able to attrite or otherwise make irrelevant to the initial conflict large parts of Taiwan's military, including through blockade, bombardment, and cyberattacks. Another prerequisite condition would almost certainly be that the PLA is able to prevent, delay, or deter military intervention from the United States or any other intervening country.

†Data compiled by Commission analysts in Table 1. *International Institute for Strategic Studies,* "The Military Balance 2021," 2021, 253–255.

‡The PLA has enough medium- and heavy-lift aircraft to transport more than 5,000 troops, but not all of these aircraft would likely be dedicated to transporting an invasion force, nor will all of the PLA's transport aircraft be configured to maximum troop capacity.

Table 1: China's Amphibious Capacity in 2021—*Continued*

Class	NATO Designator	Vehicle Type	Count	Troops and Vehicle Capacity
Type 073 II	*YUDENG*	Landing ship, medium	1	500 troops *or* 5 tanks
Type 073A	*YUNSHU*	Landing ship, medium	10	6 tanks
Type 074	*YUHAI*	Landing ship, medium	10	250 troops; 2 tanks
Type 074A	*YUBEI*	Landing ship, medium	11	150 troops *or* 1 tank
Type 075	*YUSHEN*	Landing helicopter dock	3	900 troops with armored vehicles; 30 helicopters
Type 726	*YUYI*	Air-cushioned landing craft	10+	1 tank *or* 2 infantry fighting vehicles
Zubr	*POMORNIK*	Air-cushioned landing craft	4	360 troops *or* 3 tanks *or* 8 infantry fighting vehicles
		AMPHIBIOUS TOTAL		~20,000 troops with armored vehicles; 105 helicopters

Source: International Institute for Strategic Studies, "The Military Balance 2021," 2021, 253–255; Chad Peltier, Tate Nurkin, and Sean O'Connor, "China's Logistics Capabilities for Expeditionary Operations," *Jane's* (prepared for the U.S.-China Economic and Security Review Commission), April 15, 2020, 54; *ArmyStar*, "First Generation Domestic Production: Type 067 Small Landing Craft" (国产第一代: 067系列小型登陆艇), April 26, 2012. Translation; David Lague, "China Expands Its Amphibious Forces in Challenge to U.S. Supremacy beyond Asia," *Reuters*, July 20, 2020; Naval Technology, "Zubr Class (Pomornik)"; Military Today, "Shaanxi Y-8"; Military Factory, "Type 726," October 8, 2018; edited and compiled by Commission staff.

China's Civilian Fleet Can Deliver Follow-On Forces

The PLA may be able to use China's civilian fleet to deliver the follow-on forces needed to defeat Taiwan's defenses and conquer the island. The initial invasion force does not need to occupy the entire island. Instead, it needs to secure the beachheads and port facilities to allow civilian ships cooperating with the PLA to transport and safely unload follow-on forces.[38] Roll-on/roll-off (RORO) vessels are designed to quickly load and unload vehicles at a port facility, and they would likely be among the most important civilian ships for an invasion campaign. Civilian RORO crews assigned to transport second-echelon invasion forces can train for this operation at China's first dual-use RORO dock,* which began operations in December 2020.[39] All Chinese RORO ships built after the 2015 Technical Standards for New Civilian Ships to Implement National Defense Requirements are already tailored to military specifications, which according to state media serve to "convert the considerable potential of [China's] civilian fleet into military strength."[40] In 2018, Chinese experts on the PLA estimated China had 63 civilian RORO ships suitable for military operations.[41] China's militarily useful RORO fleet includes the Bohai Ferry Group's 11 "large-scale" ships, each

*The Qingdao Port is securely located in the Yellow Sea, where the majority of PLA Navy exercises reported by the Maritime Safety Administration are said to take place.

able to carry approximately 200–300 vehicles and 1,100 to 2,000 passengers.[42] According to independent analyst and former U.S. military attaché in Beijing Dennis Blasko, the largest of these has "a single-lift capacity of multiple infantry battalions or nearly an entire armored or artillery brigade."[43]

The PLA is also likely to combine civilian and military transports to land follow-on forces over beaches secured during the initial assault. While civilian ships typically rely on ports to offload, the PLA began developing the capability to unload troops and materiel at artificial piers as early as 2014.[44] It recently practiced this capability in 2020 during a PLA Joint Logistics Support Force exercise focused on using civilian vessels for sea crossing and the emergency disembarkation of infantry, trucks, and armored vehicles at a temporary dock.[45] A state media video of the exercise revealed the title "Eastern Transportation-Projection 2020A," with the "A" designation suggesting the PLA conducted other iterations of the exercise in 2020.[46] The exercise also included at least one Chinese RORO outfitted with a reinforced ramp system allowing amphibious fighting vehicles to deploy directly into the water without the need for a dock.[47] The PLA's ongoing efforts to develop this capability strongly suggest the military threat facing Taiwan will continue to sharpen in the coming years.

China's Defense Industry Can Surge Construction of a Future Invasion Fleet

China's defense industrial base has demonstrated the ability to quickly produce large amphibious assault vessels that would add significant additional lift capacity for an invasion force.[48] China has undertaken a massive shipbuilding drive that in 2019 alone produced more civilian and military ships than the United States produced over the four years of World War II.*[49] Among the ships launched in the last three years are three 30,000- to 40,000-ton Type 075 Landing Helicopter Dock amphibious assault ships.[50] Each Type 075 has an initial capacity of up to 30 helicopters and one mechanized battalion of 900 troops with landing craft.[51] Notably, the PLA Navy and Marine Corps do not currently have sufficient helicopters to fully exploit the Type 075's capacity, nor does the PLA yet have any short takeoff and vertical landing jets able to take off from the ship's flight deck.[52] Analysis from *Jane's* suggests China may operate a total of 12 Type 075 ships by 2030, providing amphibious lift capacity for an additional 8,100 mechanized troops to China's current fleet.[53]

The PLA is also greatly expanding its strategic airlift capacity. *Jane's* estimates the PLA Air Force may expand its current air fleet of deployable Y-20 heavy-lift aircraft to roughly 50 by 2025 and more than 100 by 2030.[54] This expansion would bring the total Y-20 airlift capacity to 6,000 and 12,000 fully equipped troops by 2025 and 2030, respectively.[55] The PLA is also expanding the infrastruc-

*The scale of China's shipbuilding industry has implications beyond building an invasion fleet. In 2020, U.S. Marine Corps Commandant General David Berger warned that in a protracted conflict, "the United States will be on the losing end of a production race—reversing the advantage we had in World War II when we last fought a peer competitor." Paul McLearty, "In War, Chinese Shipyards Could Outpace U.S. in Replacing Losses; Marine Commandant," *Breaking Defense*, June 17, 2020.

ture needed to support its growing air assault capacity, including at the Longtian and Huian airbases, both of which are within 200 kilometers (125 miles) of Taipei.[56]

Training an Invasion Force

The PLA has maintained a regular schedule of training events simulating a Taiwan invasion since 1994. Exercises within the last year demonstrate capabilities for a range of operations from the initial sea crossing to ground operations on Taiwan. Amphibious combined arms brigades regularly hold exercises maneuvering dozens of armored vehicles and hundreds of crew members in the Taiwan Strait off Guangdong Province to ensure quick battlefield access despite hazardous weather conditions in the Strait.[57] A 2020 exercise involved one thousand PLA soldiers responsible for defeating enemy antitank units to secure a landing zone for amphibious assault vehicles.[58] In a similar multiday exercise held in 2021, PLA forces defended a Type 071 amphibious transport dock against enemy beach defenses and aircraft before launching a beach assault.[59]

PLA exercises simulating a Taiwan invasion demonstrate significant improvements in joint operations. PLA landing forces in the Eastern and Southern Theater Commands regularly hold exercises pairing amphibious and air assaults with joint fire strikes from warplanes, artillery, and tanks.[60] A 2021 exercise featuring PLA air-ground coordination included phases in which a landed ground force identified targets, artillery launched firepower strikes against those targets, and PLA Army aviation rapidly airdropped additional forces from helicopters to advance the PLA's position.[61] PLA Army, Navy, and Air Force units have jointly participated in several exercises. For example, a 2019 joint exercise involved PLA aircraft circumnavigating Taiwan while PLA Navy vessels simulated striking adversaries and helicopters simulated an amphibious landing.[62] The PLA conducted a similar exercise in April 2021, when the PLA Navy's *Liaoning* carrier group was engaged in exercises east of Taiwan and a PLA Y-8 anti-submarine warfare aircraft took an extended flight path through the southern half of Taiwan's air defense identification zone, likely coordinating communications between the *Liaoning* carrier group and other PLA land-based aircraft around Taiwan.[63]

Chinese state media has reported gradual improvements to the PLA's amphibious forces. For example, when the PLA Navy Marine Corps was expanded to seven brigades in 2017, DOD reported that none of the new units were equipped to conduct amphibious landing exercises.[64] By 2020, state media began describing the service as having completed a years-long transition toward meeting basic standards such as concurrent air, land, and sea operations.[65] Similarly, PLA Army air assault exercises have mobilized dozens of attack and transport helicopters and may continue developing into a larger airlift capability.[66] The PLA Air Force's decision to equip its airborne corps with ZBD-03 amphibious infantry armored fighting vehicles and ongoing exercises with diverse transport aircraft similarly indicate PLA airlift will be an improving capability for a Taiwan invasion.[67]

The PLA's most mature capabilities for a joint island invasion are those it has exercised and incrementally improved for decades: am-

phibious landing, countering U.S. intervention, and naval strike, the latter targeting either Taiwan's land defenses or U.S. naval assets in the theater. Between 1994 and 2004, the PLA conducted nine large-scale joint exercises with amphibious invasion components on Dongshan, a small peninsula in the Taiwan Strait.[68] During this period, the PLA also began transitioning some of its traditional ground forces to amphibious assault forces, and by 2003 it had produced more PLA Army amphibious forces than were in the PLA Navy Marines.[69] The PLA then shifted to combine its amphibious landing exercises with naval strikes, with one joint PLA exercise held in 2007 specifically reported to simulate striking Taiwan's defenses in support of a landing operation's second wave.[70] Since 2010, the annual Mission Action transregional joint exercises continued cultivating the amphibious landing capability prioritized in the Dongshan exercises in joint operation with naval strike.[71] Ensuring Taiwan and other observers did not miss the point of these preparations, a 2015 PLA landing exercise included an assault on what appears to be a replica of Taiwan's presidential palace.[72] Similarly, the PLA's Zhurihe Training Base includes full-size replicas of parts of downtown Taipei, including elaborate mockups of the presidential palace and Ministry of Foreign Affairs building.[73]

Denying a U.S. Military Response

Approaching its 2020 invasion milestone, the PLA developed mature sea denial capabilities that can likely delay U.S. forces approaching the theater.* These delays would extend an already protracted timeline, giving the PLA a longer window of opportunity to shape battlefield conditions in a war against Taiwan. In March 2021, Admiral Davidson testified before Congress that U.S. military forces deploying from the west coast of the United States would need three weeks of transit to conduct operations west of Guam.[74] U.S. forces based in Japan would have a significantly shorter response time but may be hindered by early or preemptive missile strikes. For a preemptive attack on U.S. forces in Japan, the PLA has demonstrated the precision strike capability and missile inventory it would need to strike nearly every U.S. ship in port; more than 200 grounded U.S. aircraft; and all major fixed headquarters, logistics facilities, and runways in U.S. airbases.[75] The PLA Rocket Force trains for these scenarios, particularly to target high-value U.S. military aircraft while they remain parked.[76]

An attack on U.S. forces in Japan would be an extreme step that all but ensures a coordinated military response from the United States, Japan, and likely many other partner countries. CCP leaders would need to weigh the military benefits of such an attack against its serious military and political consequences. In addition to threatening U.S. and Japanese forces, a preemptive PLA attack

*The PLA considers its campaigns against Taiwan to necessarily involve war with the United States. Chinese policymakers became convinced that the United States is their greatest obstacle to unifying with Taiwan after the U.S. intervened in the 1995–1996 Taiwan Strait Crisis, and since then the PLA has explicitly planned for U.S. intervention in a future Taiwan campaign. Robert S. Ross, "The 1995–1996 Taiwan Strait Confrontation: Coercion, Credibility, and the Use of Force," *International Security* 25:2 (Fall 2000): 87–123, 120–121; Arthur S. Ding, "The Lessons of the 1995–1996 Military Taiwan Strait Crisis: Developing a New Strategy toward the United States and Taiwan," in Laurie Burkitt, Andrew Scobell, and Larry M. Wortzel, eds., *The Lessons of History: The Chinese People's Liberation Army at 75*, Strategic Studies Institute, 2003, 369.

on U.S. bases in Japan would threaten international forces making up UN Command-Rear headquartered at the base in Yokota, one of seven UN-designated bases in Japan.*[77]

The Possibility of Preemptive PLA Strikes on Taiwan and U.S. Forces

PLA doctrine suggests it may initiate an invasion of Taiwan with preemptive strikes targeting both Taiwan and U.S. bases in the region. The PLA anticipates U.S. intervention in such a conflict, suggesting it has a limited window of opportunity to set battlefield conditions or achieve objectives before the U.S. military arrives in force. Oriana Skylar Mastro, fellow at Stanford University's Freeman Spogli Institute for International Studies, testified before the Commission that PLA strategists believe victory in a Taiwan conflict is unlikely if the United States is given time to mobilize and respond in the theater, creating an imperative for the PLA to escalate rapidly.[78] An attack on U.S. forces in Japan, particularly preemptive strikes on ships in port and planes still on the ground, would severely delay and degrade a U.S. response.

PLA strategists likely anticipate that the United States will be less effective in expelling a concentrated† landing force than in destroying an amphibious fleet crossing the Taiwan Strait. According to *Science of Campaigns*, the invasion's sea crossing and landing phase is significantly more difficult than the ground operations following a landing.[79] The sea crossing's success depends on the PLA's ability to gain superiority over the information, air, and maritime domains.‡ PLA doctrine describes seizing these conditions by launching targeted cyberattacks and a "surprise, fierce, and continuous" firepower campaign bombarding an adversary's command infrastructure, air and naval bases, missiles, and air defense systems.[80]

The PLA Rocket Force has extended its strike range as far as Guam by amassing a stockpile of intermediate-range ballistic missiles (IRBMs) and launchers. DOD estimates China had 20 IRBMs in 2011 and "200+" in 2020.[81] The PLA Rocket Force's mass production of IRBM launchers suggests China may have a larger stockpile of IRBMs than DOD has explicitly stated (see Table 2). If the PLA maintained the 2:1 missile-to-launcher ratio it had in 2019, it would have a stockpile of approximately 400 IRBMs as of 2020, double the

*UN Command-Rear, currently led by an Australian officer, is subordinate to UN Command (which is based in Korea) and coordinates the transit of troops and supplies into Japan from Australia, Canada, France, Italy, New Zealand, the Philippines, Thailand, Turkey, and the United Kingdom (UK). Although UN Command-Rear only has five personnel at Yokota, it maintains key relationships between allied militaries and countries that participated in the Korean War. Seth Robson, "Bringing Up the Rear: U.S. Bases in Japan Support UN Command in S. Korea," *Stars and Stripes*, January 7, 2021; HQ United Nations Command-Rear, "United Nations Command-Rear Fact Sheet," November 25, 2014.

†The *Science of Campaigns* instructs invasion commanders to exert all efforts to concentrate their forces at landing points and achieve a preponderance of forces at those points, even if the overall invasion force cannot achieve theater-wide superiority. Zhang Yuliang, *Science of Campaigns*, National Defense University Press, 2006, 312–316. Translation.

‡Information superiority, air superiority, and maritime superiority are temporary conditions in which no adversary, such as Taiwan or U.S. forces, can effectively contest or deny the PLA's use of these domains.

"200+" DOD confirms.[82] These weapons can strike U.S. forces moving into the theater as well as the U.S. command and logistics facilities supporting them.[83] As early as 2015, a RAND study assessed the PLA could deliver enough ordinance on Guam to close Andersen Air Force Base to any large aircraft for over a week.[84] China's mass production of IRBMs magnifies that threat.

Table 2: China's Inventory of Ballistic Missile Launchers, 2018–2020

	2018	2019	2020
Short-range launchers	300	250	250
Medium-range launchers	125	150	150
Intermediate-range launchers	30	80	200

Source: U.S. Department of Defense Annual Reports to Congress, 2018 through 2020; compiled by Commission staff.

The PLA has important capabilities to counter U.S. intervention using its long-range bomber force and naval expansion. The PLA's long-range bomber fleet, which has grown to more than 230 aircraft in 2020, is expanding its combat radius and increasing its capacity for long-range air-launched antiship or land-attack missiles.[85] Additionally, PLA Navy destroyers carry the YJ-18 antiship cruise missile, which boasts an operational range of 290 nautical miles (nm), dramatically beyond the U.S. equivalent Harpoon or Naval Strike Missile, which range 70 nm and 100 nm, respectively.*[86]

Recently, Chinese state media have significantly increased their attention on PLA aviators training to intercept U.S. forces at sea. State media reports from late 2020 onward repeatedly describe large groups of PLA helicopter and fixed-wing aircraft pilots practicing long-range "sea skimming" flight paths, staying low to avoid enemy detection, to strike distant maritime targets.[87] While the PLA has conducted similar exercises for years, the spike in their reports may indicate a new focus or greater frequency of exercises developing this capability.[88] One of the recent reports describes PLA forces targeting a "powerful enemy," using the common Chinese euphemism for the United States.[89] Reports also indicate a sharp increase in PLA maritime strike exercises that incorporate airborne early warning and control aircraft to identify targets and relay intelligence to other warplanes. State media claimed the PLA conducted hundreds of such exercises in the first quarter of 2021 alone.[90]

PLA Weaknesses Undermine Beijing's Confidence in Invasion

China's leaders note persistent weaknesses in the PLA's operational effectiveness and harbor significant concerns about its invasion capability despite the PLA's focused efforts to resolve these

*Earlier this year the U.S. Navy received the Block V Tomahawk, which likely outranges the YJ-18. Tomahawk missiles have previously been used for land-attack functions, and open sources have not confirmed that the Block V Tomahawk can accurately strike ships at sea. This capability may be reserved for the Block V Maritime Strike Tomahawk, which the U.S. Navy is not scheduled to receive until late 2023. Richard Scott, "USN Receives First Block V Tomahawk Cruise Missile," *Jane's*, March 26, 2021; Xavier Vavasseur, "Raytheon Delivers First Batch of Block V Tomahawk Missiles to US Navy," *Naval News*, March 26, 2021.

weaknesses.* The PLA has yet to train commanders and staff able to plan, coordinate, and conduct the joint operations necessary to invade Taiwan.[91] For an invasion to succeed, commanders leading PLA forces responsible for air control, sea control, and amphibious assault must be able to achieve their operational objectives and secure access for follow-on forces while facing communications disruptions and incoming fire. These operations require a highly adaptable force led by commanders able to make battlefield decisions, yet it is precisely these qualities Chinese leaders have repeatedly found to be lacking in the PLA.[92] For over a decade, Chinese leaders have used varying slogans pointing to the low aptitude of some PLA personnel, resistance to new operational concepts, and unrealistic training.[93] One report describes a chronic reluctance toward improvements in which "many leaders went through the motions of reform without internalizing it; their uniforms have changed, but their mindsets have not; and their ideas cannot keep up with the needs of a strong military."[94] The decade-long persistence of these weaknesses suggests the PLA faces continued challenges in training the force needed to assure a successful invasion.

In addition to poor commander quality, PLA leaders continue to identify joint operations as another critical weakness that may undermine Chinese leaders' confidence in the PLA's ability to invade Taiwan. The PLA's plans for war require a joint capability that RAND Corporation senior international defense researcher Mark Cozad assessed to be a "massive and underappreciated departure from the mechanized, attrition-based model that the PLA has relied on since the People's Republic of China's (PRC) founding."[95] Developing this joint operational capability was an important objective of the major military reorganization General Secretary Xi announced in 2015. More than five years after the reorganization began, however, Chinese state media continues to identify PLA jointness as a weakness to be mediated.[96] For example, the PLA's weaknesses in coordinating between its units undermines the PLA Air Force's ability to provide ground forces with close air support, which would be vital in an amphibious assault on Taiwan.[97]

The PLA's shortcomings extend to industrial and logistical system failures that could compromise the deployment or sustainment of China's invasion force. According to Mr. Cozad, PLA support capabilities, such as its defense industrial base and the logistical sustainment necessary to maintain a large urban warfare operation, remain lacking.[98] Ongoing technological challenges in China's defense industrial base make the PLA wholly dependent on Russian imports† for the military high-bypass turbofan engines used in its

*One of Chinese leaders' most prevalent criticisms of the PLA is the "Five Incapables," which highlight that PLA officers cannot make judgments about battlefield situations, understand their superiors' intentions, make operational decisions, effectively deploy troops, or handle unexpected situations. The PLA considers these weaknesses to undermine the PLA's combat leadership capabilities at every level of command. For more on Chinese leaders' criticism of PLA weaknesses, see U.S.-China Economic and Security Review Commission, Chapter 2, "Beijing's Internal and External Challenges" in *2019 Annual Report to Congress*, November 2019, 119–168; Dennis J. Blasko, written testimony for the U.S.-China Economic and Security Review Commission, *Hearing on What Keeps Xi Up at Night: Beijing's Internal and External Challenges*, February 7, 2019, 7.

†Russia is not the only country assisting Chinese aeroengine development. French helicopters and helicopter engines are the predecessors of Chinese Z-8, Z-9, and Z-11 military utility helicopters, and France's Safran Helicopter Engines continues to cooperate closely with the state-owned Aero Engine Corporation of China on production supply chains. Peter Wood, Alden Wahlstrom,

strategic transport aircraft.[99] While the PLA Joint Logistics Support Force demonstrated an early capability to deploy and sustain troops for several weeks in response to the novel coronavirus (COVID-19) pandemic, it has not yet demonstrated these capabilities beyond China's borders or under the pressures of war.[100] Further, state media regularly report that PLA support units commit mistakes surprising for a professional military. One notable report from early 2021 described a specialized transport company neglecting to apply antifreeze to its trucks, leading gas lines to freeze ahead of a training exercise.[101]

Taiwan Takes Initial Steps toward an Asymmetric Defense Posture

As the PLA became larger and better prepared for invasion over the last decade, Taiwan's military shrank as a result of an extended period of flatline defense spending. Between 2011 and 2020, Taiwan's number of ground personnel, artillery pieces, and coastal patrol vessels declined while the PLA produced new aircraft carriers, destroyers, and the large tank landing ships needed for an amphibious invasion (see Table 3). To confront this challenge, since 2017 Taiwan's government has taken initial steps to adopt an asymmetric defense strategy such as the one outlined in the Overall Defense Concept (ODC).*[102] The Tsai Administration also began making regular increases to Taiwan's defense budget. Still, the Taiwan military continues to face significant challenges. In testimony before the Commission, Kharis Templeman, research fellow at Stanford University's Hoover Institution, argued that the capability gap between China and Taiwan has become so great that Taiwan can no longer deter a PLA attack using only military means.[103]

Table 3: The Cross-Strait Military Balance, 2011 and 2020

	Taiwan	China (in-the-ater)	China (total)	Taiwan	China (in-the-ater)	China (total)
	2011			2020		
Ground Personnel	130,000	400,000	1,250,000	88,000	412,000	1,030,000
Artillery Pieces	1,600	3,400	8,000	1,100	N/A	6,300
Aircraft Carriers	0	0	0	0	1	2
Destroyers	4	16	26	4	23	32
Frigates	22	44	53	22	37	49

and Roger Cliff, "China's Aeroengine Industry," *China Aerospace Studies Institute*, March 2020, 35.

*The future of the ODC is not clear. Although it was referenced in Taiwan's 2017 and 2019 *National Defense Reports*, no reference to the ODC has appeared in the 2017 or 2021 *Quadrennial Defense Review*. Both documents are published by Taiwan's Ministry of National Defense. The *Quadrennial Defense Review* gives a strategic vision for Taiwan's defense and military strategy, while the *National Defense Report* describes Taiwan's current national defense policy and its implementation. Taiwan Ministry of National Defense, *Quadrennial Defense Review 2021*, March 2021; Taiwan Ministry of National Defense, *Quadrennial Defense Review 2017*, March 2017; Taiwan Ministry of National Defense, *National Defense Report*, September 2019, 6; Taiwan Ministry of National Defense, *National Defense Report*, December 2017, 138.

Table 3: The Cross-Strait Military Balance, 2011 and 2020—*Continued*

	Taiwan	China (in-the-ater)	China (total)	Taiwan	China (in-the-ater)	China (total)
	2011			2020		
Tank Landing Ships	12	25	27	14	35	37
Medium Landing Ships	4	21	28	0	16	21
Attack Submarines	4	35	54	2	34	52
Coastal Patrol Vessels	61	68	86	44	68	86
Fighter Aircraft	388	330	1,680	400	600	1,500
Bomber Aircraft	22	160	620	0	250	450
Transport Aircraft	21	40	450	30	20	400

Source: U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2020*, August 21, 2020, 164–166; U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2011*, May 6, 2011, 72–78; compiled by Commission staff.

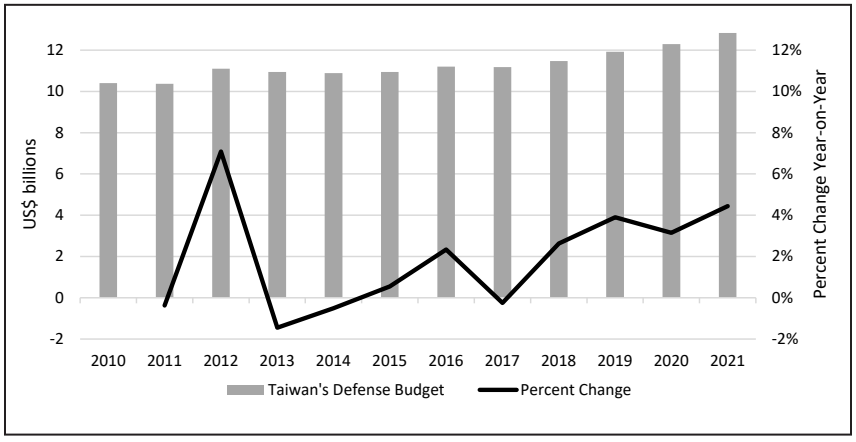
Progress and Challenges in Taiwan's Military Reforms

Taking office in 2016, the Tsai Administration began urging changes to Taiwan's defense policies toward an asymmetric posture, characterized by large numbers of low-cost weapons and warfighting concepts that emphasize denying an invading PLA force from reaching its objectives.[104] The Tsai Administration embraced an approach that envisions saturating the waters closest to Taiwan with sea mines, shore-based firepower, and air strikes while concentrating fire on landing beaches to prevent the PLA from establishing a beachhead.[105] Civilian infrastructure such as offshore wind farms would be constructed as obstacles where beaches are most vulnerable, and Taiwan's reserve forces would wage urban and guerilla warfare should these measures fail.[106] President Tsai's embrace of an asymmetric posture is a significant break from prior defense plans, which envisioned defeating the PLA by maintaining command of the air and seas around Taiwan with expensive traditional platforms such as fighters, frigates, and submarines.[107]

The Tsai Administration also ended Taiwan's history of flat defense spending since the early 2000s.[108] As shown in Figure 1, Taiwan's defense budget has steadily increased between 2 and 5 percent every year since 2016, with one exception in 2017.[109] In September 2021, the Tsai Administration announced that in addition to its annual defense budget, Taiwan will spend $8.6 billion between 2022 and 2026 to enhance its naval and air defense capabilities.[110] Nevertheless, Taiwan's recent spending increases are primarily important as a long-term trend that bolsters but is insufficient to uphold cross-Strait deterrence. U.S. experts, including then Acting Assistant Secretary of Defense for Indo-Pacific Security Affairs David Helvey, generally caution that the current increases,

taken alone, would leave Taiwan's defense spending too low to maintain a strong defensive posture against China.[111]

Figure 1: Taiwan's Defense Budget, 2010–2021



Source: Various.[112]

President Tsai has called for sweeping reforms to Taiwan's military to address longstanding deficits in readiness and military efficiency.[113] Central to Taiwan's military reforms is the problem of an all-volunteer recruitment model that constantly falls short of its quotas, leaving many units understrength.[114] Some frontline ground combat units are reportedly at 60 percent of their authorized end strength.[115] Furthermore, Taiwan's military must recruit from a society in which military service is often regarded with disdain and military careers are often seen as a last resort.[116] Despite these challenges, President Tsai has endeavored to reverse the Taiwan public's negative perception of its military, including by urging soldiers to wear their uniforms in public and by personally donning a helmet and flak jacket in view of news cameras.[117]

Taiwan's military also suffers significant shortfalls in active duty and reserve force training. Recruits spend more time on administrative briefs and yard work than on combat tactics, and the combat training they do undergo remains highly scripted.[118] These problems are most acute in Taiwan's reserve forces, where Taiwan's defense ministry assesses that only one-third of its 2.3 million reservists were demobilized recently enough to be effective if they were to be mobilized for conflict.[119] Of that fraction, over 40 percent have only completed basic training and another 45 percent were conscripts who served for no more than four months.[120] Nor does Taiwan have the requisite bureaucratic capacity to mobilize most of its reserves. Taiwan's Ministry of National Defense can mobilize only 260,000 reservists quickly enough to respond to a crisis, though its capacity will likely improve under the new Defense Reserve Mobilization Agency set to begin operations in January 2022.[121]

Gauging the Taiwan Public's Will to Fight

Public opinion data on how willing the Taiwan public is to fight a potential PLA invasion show uneven results. For example, in 2016 the World Value Survey found 81.1 percent of Taiwan citizens would support Taiwan in a war through actions such as taking up arms or providing logistical support, while the Chengchi University Election Research Center survey found only 22.8 percent of Taiwan citizens would fight for Taiwan in a war against China.[122] The Taiwan National Security Survey, conducted regularly since 2002, shows that the percentage of Taiwan citizens who would fight against a Chinese attack by joining the military, resist without joining the military, or otherwise comply with government decisions doubled from 15.2 percent in 2018 to approximately 32 percent in 2020.[123] Between 2019 and 2020, the percentage of respondents who stated that they would instead flee the country, surrender, or accept the situation declined from approximately 45 percent to 32 percent, and approximately one-quarter of all respondents did not know how they would react.[124]

Dr. Templeman identified several trends from public opinion surveys in Taiwan. He found that while the Taiwan public is not confident in its own military's ability to repel a PLA attack, it is generally confident that the United States will intervene and that at least two-thirds of all other Taiwan citizens will also join the fight.[125] If Taiwan's civilians do not have visible evidence of both, however, they report being much less likely to support a war effort or resist an invader themselves.

Austin Wang, assistant professor of political science at University of Nevada, Las Vegas, conducted research into Taiwan public opinion that reached similar findings. According to his study, the Taiwan public's will to fight may increase or decrease by as much as 10 percent if it is told whether other Taiwan citizens will join the fight.[126] In Dr. Wang's control group, this represented an increase from 50 percent to 60 percent of respondents who are willing to fight if told others would do the same.[127]

Successes and Setbacks in Aligning Taiwan's Military Procurements and Defense Strategy

The Tsai Administration has begun to align its military procurements with an asymmetric posture, with the most significant success in tactical missile development.[128] In 2021, Taiwan accelerated the mass production of its Hsiung Feng-3 sea-skimming antiship missiles and completed production of Tien Kung-3 interceptor missiles, used to strike incoming missiles and aircraft, ahead of schedule.[129] Taiwan has also begun mass production of multiple long-range missile variants* that are likely to be mobile and able to strike targets

*At least one of these missile variants is very likely to be Taiwan's Yun Feng land attack cruise missile, which the National Chung-Shan Institute of Science and Technology tested for the first time in April 2020. With an upper operational range of 2,000 kilometers, the Yun Feng will be able to reach multiple targets within China, including Beijing. In 2019, Taiwan began developing at least 20 Yun Feng missiles and 10 mobile launch platforms. Alessandra Giovanzanti, "Update: Taiwan Prioritising Development of Long-Range, Precision-Strike Capabilities," *Jane's Defence Weekly*, March 26, 2021; Gavin Phipps, "Taiwan Test-Fires Locally Developed Yun Feng LACM," *Jane's Defence Weekly*, April 28, 2020.

within China as far away as Beijing.[130] These capabilities directly challenge the PLA's land-based air and missile defense systems, a key strength that Mr. Henley testified would be the center of gravity in a conflict over Taiwan.[131] Taiwan has also begun indigenous production of other asymmetric platforms, recently launching the first of four planned fast minelayer ships.[132]

Taiwan's adoption of an asymmetric military posture remains an ongoing process. Writing in *Foreign Affairs* in October 2021, President Tsai wrote, "in addition to investments in traditional platforms such as combat aircraft, Taiwan has made hefty investments in asymmetric capabilities, including mobile land-based antiship cruise missiles."[133] Taiwan's arms purchases from the United States since President Tsai took office show that Taiwan's government currently spends more heavily on platforms typically considered to be traditional capabilities than on capabilities viewed as asymmetric.* Since 2017, Taiwan spent approximately $19.03 billion on U.S. arms (see Table 4).[134] Taipei spent approximately $6.3 billion, or 34.4 percent of the total, on capabilities typically viewed as asymmetric such as coastal defense cruise missiles and the survivable High Mobility Artillery Rocket Systems (HIMARS).[135] In contrast, it invested $12.1 billion, or 64 percent of the total, on traditional capabilities such as F-16 fighters, submarine-launched torpedoes, and Abrams tanks. Two purchases in the same time period, worth approximately $680 million, went toward logistics or communications support ($400 million for logistics support and $280 million for communications systems) that do not neatly fit either category.[136]

Table 4: Taiwan's Arms Purchases from the United States, 2017–2021, Year-to-Date

Year	Purchased Arms	Approximate Cost (USD)
2017	Upgrades to electronic warfare systems supporting four KEELUNG-class destroyers	$80 million
2017	56 AGM-154C JSOW air-to-ground missiles	$186 million
2017	Converting 168 MK-46 Mod 5 aerial anti-submarine torpedoes to MK-54 lightweight torpedoes	$175 million
2017	46 MK 48 Mod 6AT submarine-launched torpedoes	$250 million
2017	16 SM-2 missiles	$125 million
2017	50 AGM-88B high-speed antiradiation missiles	$148 million
2017	Logistics support	$400 million
2018	Spare parts and repair for F-16, C-130, F-5, and other aircraft systems	$330 million

*Characterizations of modern weapons as "traditional" and "asymmetric" are widely used but imprecise. Distinguishing between traditional and asymmetric weapons can be challenging. For this section, arms are loosely considered "traditional" if they more closely fit use of Taiwan's air force to seize command of the air space around Taiwan and its navy to retain command of the seas around the island. "Asymmetric" arms are those that more closely fit employment of large numbers of relatively inexpensive weapons to deny the PLA's unimpeded use of the air and seas around Taiwan.

Table 4: Taiwan's Arms Purchases from the United States, 2017–2021, Year-to-Date—*Continued*

Year	Purchased Arms	Approximate Cost (USD)
2019	F-16 pilot training, maintenance, and logistics support	$500 million
2019	250 Block I-92F man-portable air-defense system Stinger missiles	$224 million
2019	108 M1A2T Abrams tanks, 122 M2 machine guns, 216 M240 machine guns, transport vehicles, and tank rounds	$2 billion
2019	66 F-16C/D aircraft	$8 billion
2020	18 MK 48 Mod 6 submarine-launched torpedoes	$180 million
2020	Recertification, test, and repair of Patriot missiles	$620 million
2020	11 HIMARS launchers and 64 Army Tactical Missile Systems missiles	$436 million
2020	135 AGM-84H Standoff Land Attack Missile Expanded Response missiles	$1.008 billion
2020	6 MS-110 reconnaissance pod aircraft attachments	$367 million
2020	100 Harpoon coastal defense cruise missiles, 400 RGM-85L-4 Harpoon antiship missiles	$2.37 billion
2020	4 MQ-9B drones	$600 million
2020	Field Information Communication System	$280 million
2021	40 M109A6 Paladin Medium Self-Propelled Howitzer Systems	$750 million

Source: Various.[137]

Taiwan's continued purchases of expensive traditional platforms from the United States indicates bureaucratic resistance against the ODC. George Mason University assistant professor Michael Hunzeker told the Commission that resistance from high-ranking Taiwan military and defense officials leaves the ODC's future "in doubt" as they creatively interpret the ODC's guidance to adopt an asymmetric posture to instead maintain the traditional program of record.[138] Maintaining some traditional capabilities does continue to serve Taiwan's defense, and Taiwan's Ministry of National Defense emphasizes synergizing asymmetric and traditional capabilities.[139] Dr. Templeman testified that the ODC itself calls for maintaining a "low quantity of high-quality platforms" to conduct peacetime missions.[140] He further noted, however, that Taiwan's continued procurement of traditional platforms threatens to dominate much of Taiwan's procurement budget for years, leaving fewer resources available to realize the ODC's emphasis on asymmetric systems.[141]

The asymmetric systems that Taiwan does receive from the United States are subject to long delays in the U.S. foreign military sales process. For example, the U.S. government approved a sale of 56 air-to-ground missiles, an urgently needed asymmetric capability,

to Taiwan in June 2017. DOD, however, is not likely to award a contract to manufacture these missiles until 2022, with expected completion some time in 2025.[142] Similarly, the HIMARS system is not expected to arrive in Taiwan until 2027, seven years after the U.S. government first approved the sale.[143] Further, procuring and fielding asymmetric systems is only the first step in a years-long transition to an asymmetric posture. Taiwan's military will need to make changes to doctrine, training, and culture after procurement to implement the ODC.[144]

The traditional platforms Taiwan's military continues to purchase from the United States are also highly vulnerable to PLA Rocket Force attack. As early as 2009, a RAND study had determined that a combination of PLA Rocket Force and Air Force strikes could largely neutralize Taiwan's air force and pose similar risks to its navy.* Taiwan's missile defenses are highly unlikely to prevent these strikes.[145] Taiwan's Patriot missile defense batteries are likely to fire two interceptors at each incoming missile, meaning its current stockpile is sufficient to target approximately 322 PLA short-range ballistic missiles. The actual number of interceptions will likely be lower as interceptors miss their targets or batteries are destroyed.†[146] Taiwan's missile defenses may improve by 2022, when Taiwan is expected to field 12 indigenously developed Tien Kung-III missile defense batteries, though Taiwan analysts consider these to be less accurate than Patriot systems.[147] Taiwan's traditional platforms and air defense interceptors are also vulnerable to the PLA's electronic warfare capabilities. In 2021, Taiwan's Ministry of National Defense assessed in a public report on China's military power that the PLA now has the initial capability to paralyze Taiwan's operations systems for air defense, sea control, and countermeasures against the PLA.[148]

Taiwan's government has not yet matched its investment in expensive platforms with corresponding investment in a logistics and supply system needed to operate those platforms during war. Dr. Hunzeker told the Commission that Taiwan's munitions stockpiles are insufficient for an extended conflict, referencing one report indicating Taiwan's policy is to maintain less than half of the munitions necessary for two days of air combat during peacetime.[149] The shortages extend to Taiwan's ground force. Taiwan soldiers report chronic shortages of ammunition, fuel, and repair services, noting these are only provided during major exercises.[150] Due to a lack of replacement parts, fewer than half of Taiwan's foreign-purchased

*The RAND study found that 60 to 200 short-range ballistic missiles could temporarily close most of Taiwan's fighter bases, preventing most of its fourth-generation fighters from getting off the ground. A later RAND study found a follow-on attack of 100 fourth-generation strike fighters with 600 precision-guided munitions would then be able to destroy all of Taiwan's parked aircraft except for approximately 200 sheltered in an underground facility, which would be pinned down and unable to operate. Michael J. Lostumbo et al., "Air Defense Options for Taiwan: An Assessment of Relative Costs and Operational Benefits," *RAND Corporation*, 2016, 16–17; David A. Shlapak et al., "A Question of Balance: Political Context and Military Aspects of the China-Taiwan Dispute," *RAND Corporation*, 2009, 51.

†Past assessments determined Taiwan has at most 200 PAC-2 and 444 PAC-3 interceptors across nine deployed Patriot batteries, with one battery held in reserve. Some media reports suggest Taiwan's stockpile of PAC-3 interceptors has dwindled to 300. Wang Jionghua, "Ministry of National Defense Invests 20 Billion Yuan to Purchase Approximately 300 PAC-3 Anti-Aircraft Missiles to Counter CCP Aircraft" (國防部投200億採購近300枚愛三防空飛彈 抗中防共機), *Apple Daily*, December 6, 2020. Translation; William S. Murray, "Asymmetric Options for Taiwan's Deterrence and Defense," in Ming-chin Monique Chu and Scott L. Kastner, *Globalization and Security Relations across the Taiwan Strait: In the Shadow of China*, Routledge, 2015, 65.

armored vehicles are fully operational at any point in time. If the PLA imposed a full air and sea blockade, Taiwan's military and populace would only be able to resist invasion with dilapidated, poorly maintained equipment, much of which is reportedly not mission capable.[151] Moreover, few estimates of Taiwan's current stockpiles of critical materials and its estimated wartime consumption rate exist in the open source, leaving Taiwan's ability to resist a PLA blockade unclear.[152]

Taiwan's Ability to Endure a PLA Blockade: Trade and Infrastructure Vulnerabilities

As a small, trade-dependent island, Taiwan's economy is highly vulnerable to a Chinese naval and air blockade. In 2019, for example, Taiwan imported nearly 68 percent of its annual food consumption and 97.9 percent of its energy supply.[153] Taiwan government estimates suggest the island could rely on domestic stockpiles of food and energy for several months in the event of a blockade. According to an April 2020 study by the Taiwan Council of Agriculture, the island had enough food on hand to cover domestic needs for approximately six months.[154] In contrast, in June 2020 Taiwan's Ministry of Economic Affairs estimated the island's stores of foodstuffs such as flour and canned food could last just one to three months.[155] The Bureau of Energy at Taiwan's Ministry of Economic Affairs estimated in August 2021 that domestic oil reserves could last for 158 days.*[156] Stockpiles of these resources could last longer than official estimates suggest if Taiwan authorities rationed their distribution amid a PLA blockade.

Taiwan's economy is exposed to more immediate vulnerabilities that could be exploited by China in the event of a cross-Strait contingency. Short-term power outages in May 2021 revealed fragilities in the island's aging power infrastructure and highlighted its vulnerability to a potential cyberattack or kinetic disruption by China.[157] Chinese threat actors have demonstrated the capability to execute such disruptions. For example, an investigation by cybersecurity firm Recorded Future found Chinese state-backed cyber actors successfully hacked into India's power sector in mid-2020 amid conflict on the Sino-Indian border. The investigation found the attack suggested an ability to "pre-position [power grid] access to support China's strategic objectives… like geostrategic signaling during heightened tensions or as a precursor to kinetic escalation."[158] In testimony before the Commission, assistant professor of political science and international affairs at George Washington University Fiona Cunningham noted Taiwan's civilian critical infrastructure would be among the main targets of cyber operations in the event of a cross-Strait contingency.[159]

*According to Taiwan's Petroleum Administration Act, oil refinery operators and importers are required to maintain an oil security stockpile of no less than 60 days' supply, while the government must also maintain an oil security stockpile of no less than 30 days' supply. Taiwan's Ministry of Economic Affairs Bureau of Energy, *Management of Oil Security Stockpile*, December 24, 2019.

Chinese Decision-Making for a War over Taiwan

The PLA's growing capabilities undermine deterrence because they diminish the credibility of the United States' threat to deny the PLA its objectives through military intervention. The state of cross-Strait deterrence is undeniably more fragile today as a result. Even so, whether and when to attack Taiwan is ultimately a political rather than a military question for CCP leaders. Factors such as a judgment by CCP leaders that the U.S. threat to intervene militarily is not credible, their misreading of ambiguities in U.S. policy, or General Secretary Xi's ambition could all contribute to a deterrence failure whereby the leadership orders the PLA to attack Taiwan. Such an attack could include a variety of military campaigns, but this section focuses specifically on decision-making for a blockade or an invasion of the island.

Nonetheless, cross-Strait deterrence continues to hold for now because Chinese leaders still face substantial constraints on any decision to use force. These include the inherent uncertainty of a confrontation with the U.S. military, the damage a war would do to the Chinese economy, and the risk that the United States could organize a determined coalition of countries to counter any further expansion of the CCP's power and influence. Chinese leaders would also need to consider the difficulty and expense of controlling Taiwan's population of 23 million people after an invasion. Moreover, Chinese leaders may independently decide against an invasion of Taiwan if they prioritize other policy objectives over resolving the Taiwan issue or they yield to pressure from other actors in the Chinese political establishment who oppose a conflict.

Factors That Could Lead to Deterrence Failure

Chinese officials have repeatedly stated that they will attack Taiwan if the island declares independence.[160] Short of such a declaration by Taiwan, the United States' efforts to deter China from attacking Taiwan could fail if any of the following conditions are met.

If CCP Leaders Judge the Threat of U.S. Military Intervention Is Not Credible

China must believe the United States has both the capability and the will to credibly carry out its threats if it is to be successfully deterred from invading Taiwan.[161] The PLA's progress toward capabilities for invasion and sea denial over the last 20 years could lead Chinese leaders to view the U.S. threat as less credible than before. Chinese leaders could decide to invade Taiwan if they arrive at the conclusion that the U.S. threat to intervene militarily has lost credibility altogether. That in turn could occur if Chinese leaders judge the U.S. military is too weak to mount an effective intervention, or if they believe U.S. leaders are unwilling to intervene for fear of the costs associated with imposing punishment.

CCP leaders could judge the U.S. military is incapable of denying the PLA its objectives when they believe their initial invasion capability has matured or when they have achieved a highly favorable local balance of forces. They could assess that the local balance of forces is highly favorable to China if U.S. forces within the first and second island chains are either so minimal or so vulnerable to the

PLA's anti-access and area denial capabilities that they are unlikely to create risks of escalation or prevent a fait accompli.* [162] If Beijing judges the United States is "distracted" by another military conflict, or U.S. allies signal that they will not allow the U.S. military to use their bases or forces for operations in a Taiwan conflict, Beijing could also conclude the United States is incapable of carrying out the threat to intervene.

CCP leaders today believe an asymmetry of stakes exists between China and the United States, failing to appreciate the importance the United States places on Taiwan's democracy and its own reputation in the eyes of allies.[163] They could interpret future U.S. foreign policy developments, debate among U.S. policymakers about whether defending Taiwan is "worth it," or calls by segments of the U.S. public to avoid conflict with China as evidence the U.S. government lacks the will to intervene. For example, the Chinese state tabloid *Global Times* argued in several August 2021 editorials that the United States' withdrawal from Afghanistan shows it cannot not be trusted to come to Taiwan's defense during a war.[164]

If CCP Leaders Misread U.S. Policy, Predicting There Will Be No Decisive U.S. Response

To avoid a breakdown of deterrence, China must believe there are actions that could lead to a U.S. response and that costs will be imposed if China takes those actions.[165] A lack of clarity in U.S. policy could contribute to a deterrence failure if Chinese leaders interpret that policy to mean opportunistic aggression against Taiwan might not provoke a quick or decisive U.S. response.

Many in Washington credit the longstanding practice of "strategic ambiguity" with preserving stability in the Taiwan Strait for decades, but some would argue that it could lead China to perceive an inconsistent or hesitant U.S. commitment to Taiwan.† By remaining opaque about U.S. intentions, strategic ambiguity aims to create sufficient uncertainty among leaders in Beijing and Taipei to deter an unprovoked Chinese attack on Taiwan as well as rash moves by Taiwan's leaders that could entrap the United States in a war.[166] This "dual deterrence" approach maximizes the United States' freedom of action, but U.S. gestures and statements intended to deter both parties could potentially cause Chinese leaders to perceive a contradictory, changeable, or reluctant U.S. commitment.[167] Moreover, U.S. officials have suggested that an unprovoked Chinese attack on Taiwan might result in U.S. intervention, but they have not specified how the United States would react to other belligerent Chinese

*Though the local balance of forces is often viewed as an important proxy for the defender's capability to deny a potential aggressor its military objectives, it is not strictly necessary for successful deterrence. The potential aggressor may have the military advantage but choose not to pursue an aggressive course of action in a locality because of its concern for the broader ramifications of that course of action. By the same token, potential aggressors have faced a defender that has clear advantages in the local balance of forces and have chosen to attack anyway. According to Michael J. Mazarr of RAND, a defender need only have local forces sufficient to raise the cost of a potential attack, create escalation risks, and deny the aggressor a quick and easy victory. Michael J. Mazarr, "Understanding Deterrence," *RAND Corporation*, 2018, 5–6.

†"Strategic ambiguity" refers to an informal policy the U.S. government has practiced since the late 1970s whereby the United States does not explicitly state whether it will come to Taiwan's defense in the event of a Chinese attack. Michael J. Mazarr et al., "What Deters and Why: The State of Deterrence in Korea and the Taiwan Strait," *RAND Corporation*, 2021, 48; Richard C. Bush, "Untying the Knot: Making Peace in the Taiwan Strait," *Brookings Institution*, 2005, 255–256.

activities below that threshold, such as a blockade or coercive activities in the gray zone.[168]

The TRA is another element of U.S. policy that contains ambiguities Chinese leaders might mistakenly interpret as signs the United States will not respond decisively to aggression against Taiwan. The TRA describes efforts to determine the future of the people of Taiwan by nonpeaceful means as a matter of "grave concern" to the United States, language that intentionally evokes similar clauses in mutual defense treaties and implies the potential for military costs.[169] It also requires the U.S. military to maintain the capacity "to resist any resort to force or other forms of coercion that would jeopardize the security, or the social or economic system, of the people on Taiwan."[170] Moreover, the TRA implies that China might incur significant diplomatic costs for aggression, stating that "diplomatic relations with the People's Republic of China rests upon the expectation that the future of Taiwan will be determined by peaceful means."[171] But the TRA does not obligate the U.S. government to respond militarily to an attack, leaving as open questions how quickly and with what level of force the United States would react to Chinese aggression.

Some Chinese scholars and commentators have argued that ambiguities in U.S. policy undermine deterrence, but it is not clear how the top Chinese leadership views this question.*[172] The perceived lack of clarity in U.S. policy toward Taiwan may be less relevant to deterrence failure than other factors, however, given that Chinese leaders already assume U.S. intervention.

If a Risk-Tolerant and Ambitious General Secretary Xi Discounts U.S. Intervention

Some deterrence theorists identify specific leaders' biases, beliefs, and cognitive styles as important factors that affect whether the states they lead are successfully deterred from pursuing aggression.[173] General Secretary Xi's heightened tolerance for risk and his ambition to leave his mark as one of the greatest leaders in PRC history could increase the likelihood that China attacks Taiwan.

General Secretary Xi has displayed an appetite for risk that could motivate him to order an invasion of Taiwan despite U.S. deterrent threats. Under General Secretary Xi's watch, China has regularized its intrusions into waters around Japan's Senkaku Islands; successfully militarized the South China Sea; rammed fishing boats from other South China Sea claimant countries; constructed roads, villages, and security installations on territory belonging to Bhutan; and imposed a so-called National Security Law in Hong Kong despite international protestation and warnings.[174] Equally striking is that he has chosen to pursue China's interests aggressively on multiple fronts at the same time. General Secretary Xi may therefore be more willing than Chinese leaders before him to take the risk of invading Taiwan, especially if he believes he may already have the military capability to do so.[175] He could

*For example, Yan Xuetong, director of the Institute of International Studies at Tsinghua University, argues that decisions by both the United States and China to adopt "strategic clarity" would stabilize cross-Strait relations by making clear to each side the other party's "red lines." Georgetown University Initiative for U.S.-China Dialogue on Global Issues, "America's Taiwan Policy: Debating Strategic Ambiguity and the Future of Asian Security," October 12, 2020.

even believe that China's diplomatic influence and economic heft will largely insulate it from the fallout over a Chinese attempt to invade Taiwan. China has successfully wielded both in the past to force other countries to cease arms sales to Taiwan and punish them for engagement with the island.[176]

General Secretary Xi could also order an invasion of Taiwan if he decides unification is necessary to secure his personal legacy before he leaves office. In public speeches, General Secretary Xi has emphasized Taiwan's importance, warned that the cross-Strait political impasse "cannot be passed on from generation to generation," and linked unification to his signature project of "national rejuvenation."[177] Dr. Mastro argues that this linkage has "moved the goalpost from preventing Taiwan independence, which means living with the 40-year-long status quo, to an actual change in the nature of the cross-Strait relationship, which is substantially less achievable without the use of force."[178] Because General Secretary Xi abolished term limits on the presidency in 2018 and has so far not nominated a successor, it is unclear when he intends to retire or if he plans to do so at all.[179] He may believe that only he is capable of steering China through a complex international environment to solve some of the country's most important internal and external challenges.[180] That sense of unique historical mission could very well mean General Secretary Xi views unifying Taiwan with the Mainland as a problem he must solve within the next ten to 15 years, before old age precludes him from leadership.[181]

Finally, strategic or political events could heighten General Secretary Xi's sense of urgency to achieve Taiwan's unification with the Mainland while he believes conditions are still relatively favorable.[182] For example, if future deployments of U.S. forces and new weapons systems in the Indo-Pacific suggest a negative shift in the balance of power is imminent, he may feel urgency to invade Taiwan before the military balance becomes less advantageous. Alternatively, if both major political parties in Taiwan utterly reject eventual unification with China in any form under any circumstance, and a majority of the Taiwan public continues to identify as exclusively "Taiwanese," General Secretary Xi may conclude that there is not—or soon will not be—any future in which the Taiwan public will accept unification on Beijing's terms.[183] With all "peaceful means" exhausted, he may believe force is his only option left.

Factors Sustaining Deterrence

The following discussion of factors sustaining deterrence assumes that the basic political settlement underpinning U.S. relations with both Taiwan and China has not changed. This includes, for example, the United States' One China Policy, which refers to the U.S. government position that the PRC—rather than the Republic of China government on Taiwan—is the sole legal government of the state called "China."[184] It also includes the U.S. government position that Taiwan's political status is unresolved, rather than a recognition that the island is an independent country.[185] These policies historically contributed to a political environment in which deterrence succeeded by tempering Beijing's impulse to achieve unification through the use of force.

Uncertainty about Winning a War against the U.S. Military

Because the PLA's initial invasion capability only allows the force to accomplish its operational goals under limited conditions and at high risk, CCP leaders may still be deterred from ordering an attack on Taiwan at present by the uncertainty inherent in a war with the U.S. military. Failed attempts by the PLA to invade Taiwan or to counter U.S. intervention could unleash a chain of events that undermine the CCP's popular legitimacy and generate calls for political change.[186] CCP leaders' desires to avoid uncertainty and ensure internal stability are important considerations constraining their decision to initiate armed conflict, providing the United States with an opportunity to bolster deterrence by amplifying the factors that make a PLA victory uncertain.[187] According to Mr. Cozad, Chinese leaders do not dismiss U.S. military capabilities, and they recognize the United States "possesses considerable strength that can be deployed globally with the support of a vast network of global bases, allies, and partners."[188] He argues that Beijing will need to weigh the costs of action seriously before "placing an inexperienced, untested military with widely acknowledged shortcomings into an environment that is intensely hostile toward China and which would likely involve the support of the United States."[189] Chinese leaders may also recognize it would be difficult to prevent a conflict with the U.S. military from escalating or spreading beyond the Taiwan Strait.[190]

Uncertainty about the PLA's ability to prevail in a war over Taiwan would become even more acute if the United States successfully persuades key allies, such as Japan, to join military operations against China. Japan maintains a highly professional military equipped with modern hardware and intelligence, surveillance, and reconnaissance capabilities.[191] Recent events suggest Japanese leaders are deeply concerned about a crisis in the Taiwan Strait and could act with the United States to bolster deterrence. At a meeting of the "2+2" ministerial dialogue in March 2021, Japanese and U.S. defense chiefs agreed to closely cooperate in the event of a military clash between China and Taiwan.*[192] In July 2021, Japanese Deputy Prime Minister Taro Aso said his country would need to defend Taiwan with the United States if the island was invaded.[193] Joint statements released after U.S.-Japan and U.S.-South Korea presidential summits in 2021 explicitly referred to the importance of peace and stability in the Taiwan Strait, underscoring growing allied concern.[194]

Another key U.S. ally with a highly professional military, Australia, has also made statements reflecting its concern about the potential for Chinese aggression toward Taiwan. In March 2021, the U.S. Embassy in Australia's Chargé d'Affaires Michael Goldman confirmed that the United States and Australia were undertaking "strategic planning" to consider potential joint responses to a war over Taiwan.[195] A month later, Australian Defense Minister Peter Dutton told news media that a conflict involving China over Taiwan

*In April 2021, news media cited Japanese government sources indicating that Japan was studying how the Japanese Self-Defense Force could respond to a military conflict between the United States and China over Taiwan within the confines of the country's security laws. For more, see *Japan Times*, "Japan Studies SDF Response in Event of a Taiwan Strait Conflict," April 25, 2021.

"should not be discounted" and that Australia maintains high levels of readiness to meet any threats against its allies in the region.[196]

Economic Costs of a War and Disruptions to Global Trade

When deciding whether to invade Taiwan, another important consideration for China's leaders will be the costs of resulting disruption to the Chinese economy. The most productive segments of China's economy stand to be directly affected by the destabilization of global supply chains and trade flows in the Indo-Pacific region. According to the World Bank, goods trade equaled roughly a third ($4.6 trillion) of China's gross domestic product (GDP) in 2020 ($14.7 trillion).*[197] China's Indo-Pacific neighbors who would be exposed to any cross-Strait contingency participate in much of this trading activity, with ASEAN becoming China's top trading partner in 2020 and Japan and South Korea serving as China's fourth- and fifth-largest trading partners, respectively, in that same year.[198]

A Chinese invasion of Taiwan would particularly affect the economies of China's coastal provinces, whose roles as global manufacturing and trade hubs contribute significantly to China's overall economic strength. For example, in the first half of 2021 the coastal provinces of Guangdong, Fujian, Jiangsu, and Shandong as well as the Shanghai municipality accounted for 36.5 percent of China's GDP.[199] The nonstate sector in these provinces also employed 155.8 million workers in 2019, with more than half of them working in the manufacturing and wholesale and retail trade sectors.†[200] In the same period, these coastal provinces processed $2.8 trillion, or 62 percent, of China's $4.5 trillion worth of global goods trade.‡[201] China's decision to invade Taiwan would severely disrupt all of this trading activity, with repercussions spreading to China's entire economy and straining domestic political stability.

Invasion Risks Derailing China's Competitiveness in Electronics Manufacturing

While China's leaders may prioritize the political objective of unification ahead of undamaged access to Taiwan's semiconductor capabilities, a Chinese invasion will disrupt, at least temporarily, industrial activity in China's globally competitive electronics manufacturing sector. This is because China's leadership in electronics manufacturing is attributable to supply chain links with Taiwan and other Indo-Pacific economies. As the world's main manufacturing hub for electronics, China is the destination for approximately 35 percent of total global semiconductor sales, with many of these semiconductors re-shipped overseas in devices

*China's $4.6 trillion worth of goods trade accounted for 13.1 percent of global goods exports and imports ($35.6 trillion) in 2020, the largest share of any country. World Trade Organization, "Merchandise Imports (Current US$)," *World Bank*, September 15, 2021; World Trade Organization, "Merchandise Exports (Current US$)," *World Bank*, September 15, 2021.

†In 2019, there were 405.2 million private enterprise employees and self-employed individuals in China. China's National Bureau of Statistics reports that a total of 774.7 million persons were employed in China in 2019. China's National Bureau of Statistics, *2020 China Statistical Yearbook: Employment and Wages: 4-6 Number of Industrial and Commercial Registered Employed Persons in Private Enterprises and Self-Employed Individuals by Sector and Region (End of 2019)*, 2020.

‡Unless noted otherwise, this section uses the following exchange rate throughout: $1 = renminbi (RMB) 6.43.

Invasion Risks Derailing China's Competitiveness in Electronics Manufacturing—*Continued*

made in China and exported to other countries.[202] China is the top importer of Taiwan semiconductors, with Taiwan accounting for 35.3 percent ($124.1 billion) of China's total semiconductor imports in 2020 ($350.8 billion).*[203]

A Chinese invasion of Taiwan would likely halt production at the island's foundries, putting cross-Strait production networks and trillions of dollars in mainland electronics manufacturing assets and revenues at risk. In 2020, China's information and communication technology equipment manufacturing sector generated some $1.9 trillion in revenue, with total manufacturing assets in the industry standing at $2 trillion.[204] Taiwan's singular leadership in the global semiconductor supply chain would be difficult for China to recreate in the short term. Taiwan is home to the world's most advanced semiconductor manufacturer, Taiwan Semiconductor Manufacturing Company (TSMC),† and it hosts 20 percent of global semiconductor manufacturing capacity (for more information on the location of advanced semiconductor manufacturing capabilities, see Addendum: Selected Advanced Semiconductor Foundries by Location).[205]

If China invaded Taiwan, damage inflicted on the island's foundries during a conflict would prevent their immediate use once seized.[206] For example, uncontrolled shutdowns to semiconductor manufacturing facilities would damage equipment, the repair or replacement of which would take months or years depending on the equipment involved.[207] Additionally, U.S. allies and partners that serve as chief suppliers to Taiwan's semiconductor industry could impose sanctions and embargoes following a Chinese invasion of the island.‡ This would leave Beijing with highly advanced

*China's imports of semiconductors grew from $305.9 billion in 2019 to $350.8 billion in 2020, up 14.7 percent year-on-year, suggesting China is struggling to achieve semiconductor self-sufficiency. Semiconductor market research firm IC Insights estimates Chinese semiconductor manufacturers produced only 6 percent of the semiconductors used by Chinese firms in 2020. IC Insights, "China Forecast to Fall Far Short of Its 'Made in China 2025' Goals for ICs," January 6, 2021; UN Comtrade database.

†TSMC's leadership in advanced semiconductor manufacturing is attributable to the firm's decision to pioneer the "pure-play" foundry model of semiconductor production. A pure-play foundry focuses exclusively on semiconductor device fabrication, leaving chip design to other firms. This model contrasts with the "integrated device manufacturer" model, in which firms both design and fabricate semiconductors. While U.S. firms such as Qualcomm and Nvidia specialize in the design of advanced semiconductors, they contract foundries to manufacture them, including those owned by TSMC. This is because the United States otherwise lacks the capacity to manufacture at the leading edge. According to the Semiconductor Industry Association, the U.S. share of global semiconductor manufacturing has declined from 37 percent in 1990 to 12 percent in 2020. Antonio Varas et al., "Strengthening the Global Semiconductor Supply Chain in an Uncertain Era," *Semiconductor Industry Association*, April 2021, 47; Jan-Peter Kleinhans and Nurzat Baisakova, "The Global Semiconductor Value Chain," *Stiftung Neue Verantwortung*, October 2020, 6; John VerWey, "Chinese Semiconductor Industrial Policy: Prospects for Future Success," *United States International Trade Commission Journal of International Commerce and Economics*, August 2019, 6.

‡Taiwan's semiconductor foundries rely on an array of complex global supply lines using advanced manufacturing equipment developed in the United States and Japan, specialized lithography equipment produced exclusively in the Netherlands, and silicon ingots refined in a multistage process conducted across Japan and South Korea using silicon dioxide mined in the United States. Antonio Varas et al., "Strengthening the Global Semiconductor Supply Chain in an Uncertain Era," *Semiconductor Industry Association*, April 2021, 27; Tim De Chant, "The Chip Choke Point," *Wire China*, February 7, 2021.

Invasion Risks Derailing China's Competitiveness in Electronics Manufacturing—*Continued*

semiconductor manufacturing assets but without the resources needed to operate them in the immediate term.*[208]

In the long run, China's leaders are aware of the vulnerability their dependence on Taiwan semiconductors creates and are prioritizing the pursuit of technological self-sufficiency in mitigating it. In time, China's progress in technological development could alter Chinese leaders' perception of the costs of damage to Taiwan foundries and China's economy in the event of invasion. The speed with which China could restore the productive capacity of Taiwan foundries will also shape Chinese leaders' perceptions of these costs.

The United States Could Mobilize a Broad Coalition to Oppose CCP Global Ambitions

The United States' ability to marshal a coalition of countries opposed to the further expansion of China's international power and influence could also deter Chinese leaders from invading Taiwan. Such a coalition would be deeply concerning to Chinese leaders because it could frustrate their efforts to build a consensus around Chinese global leadership, promote China's agenda in international organizations, and increase the global flow of goods, services, technology, and talent to China from business and academic exchanges. A coalition could be especially effective if it encompassed countries beyond the United States' traditional partners in Europe, Asia, and North America.

Statements by Chinese officials at the highest levels already betray anxiety about a coalition of countries opposing China, attesting to the deterrent power of diplomatic threats. General Secretary Xi warned against attempts to build an alliance of democracies to counter China in his January 2021 speech at the Davos World Economic Forum.[209] "To build small circles or start a new Cold War, to reject, threaten or intimidate others, to willfully impose decoupling, supply disruption or sanctions, and to create isolation or estrangement will only push the world into division and even confrontation," he said in a veiled reference to U.S. efforts rallying allies and partners around a common China-focused agenda.[210] Before the acrimonious March summit in Anchorage, Alaska, then Chinese Ambassador to the United States Cui Tiankai expressed dissatisfaction at U.S. talks with allies in advance of the meeting, implying they were aimed at China and harmful to the U.S.-China relationship.[211] After the summit, China's foreign ministry insisted in a statement that it "has always resolutely opposed the U.S. side… ganging up to form

*For example, according to customer and supplier data aggregated by S&P Global, TSMC relies on 26 companies to supply it with manufacturing equipment, specialty gases, chemicals, raw materials, and other inputs necessary for semiconductor manufacturing. Only six of these 26 suppliers are based in Taiwan. Separately, U.S. allies and partners dominate key supply chain segments for semiconductor manufacturing. For example, Germany is the sole global supplier of extreme ultraviolet laser amplifiers and mirrors used in lithography, while Japan accounts for 95 percent of crystal machining tools used in silicon wafer manufacturing and handling. John VerWey, "From TSMC to Tungsten: Semiconductor Supply Chain Risks," *Semi-Literate*, May 3, 2021; S&P Capital IQ database.

anti-China cliques" and complained that other countries should "not [be] reduced to being anti-China tools of the U.S."[212]

U.S. allies and partners took steps in 2021 that increased their presence in the Indo-Pacific and suggested that such a coalition may be starting to coalesce. France, the United Kingdom (UK), Germany, the Netherlands, Canada, Japan, India, Australia, and New Zealand all sent warships to the South China Sea over the course of the year, signaling their concerns with Beijing's aggressive behavior in the region.[213] In September 2021, the United States, the UK, and Australia also jointly announced a trilateral security pact known as AUKUS that most observers perceived as a move to counterbalance China.[214] (For more on AUKUS, see Chapter 3, Section 1, "Year in Review: Security, Politics, and Foreign Affairs.") In October 2021, the United States, Japan, and the UK also conducted a joint naval patrol involving four allied aircraft carriers in the Western Pacific.[216]

Chinese Leaders Prefer to Prioritize Goals Other than Taiwan

Independent of the United States' deterrent threats, Chinese leaders may decide against a military attack on Taiwan if they believe unification is a less urgent priority than other policy goals, such as the political and economic requirements for national rejuvenation. Chinese leaders may also rule out such an operation if they believe their current coercive strategy toward Taiwan will eventually succeed.

General Secretary Xi has warned that resolving Taiwan's status cannot be postponed indefinitely, but he has neither specified a timeline for unification nor focused his energies on cross-Strait issues. Rather, General Secretary Xi has committed himself to the two centenary goals of achieving a moderately prosperous society by 2021 and transforming China into a modern socialist country by 2049, both of which constitute the foundation for his "Chinese dream" of national rejuvenation.[217] To that end, General Secretary Xi has spent much of his tenure consolidating domestic political control, investing resources into poverty alleviation programs, promoting the Belt and Road Initiative, modernizing the PLA, and overseeing a drive for technological self-sufficiency.[218] Chinese leaders may view Taiwan as an important but less urgent priority than other initiatives.[219] More broadly, they understand that initiating a war over Taiwan would lead to a diversion of resources and focus from these more urgent priorities.[220]

Past Chinese leaders have often set aside the task of resolving the Taiwan issue to focus on priorities they deemed more pressing. During a secret meeting to negotiate normalization with the United States in 1973, Chairman Mao Zedong suggested his government was in no hurry to take the island forcibly, remarking to then Secretary of State Henry Kissinger, "I say that we can do without Taiwan for the time being, and let it come after one hundred years."[221] On January 1, 1979, the same day U.S.-China relations became "official," the National People's Congress released a "Message to Compatriots in Taiwan" declaring an end to Beijing's periodic shelling of Taipei-controlled islands and establishing peaceful cross-Strait exchange as a guiding principle for the "reunification of the motherland."[222] Soon afterward, then paramount leader Deng Xiaoping

proposed a political solution for eventual unification called "one country, two systems," and in the decades afterward a raft of new policies deepened economic and cultural ties across the Strait.[223] Deng himself reportedly remarked that China could wait one thousand years to unify Taiwan with the Mainland.[224] Underscoring this shift of priorities, Chinese foreign policy from the late 1970s onward focused not on resolving Taiwan's status but rather on economic development, a task that sometimes came at the expense of the PLA's budget.[225] General Secretaries Jiang Zemin and Hu Jintao both threatened force to deter what they regarded as provocative moves by Taiwan presidents toward independence, but they did not take proactive steps to compel unification.[226]

Chinese leaders may also continue to decide against an invasion of Taiwan if they believe unification can be accomplished through their current coercive strategy. China's official policy statements on Taiwan, such as its proposal for the 14th Five-Year Plan and Premier Li Keqiang's annual government work report, continue to refer to unification by "peaceful" means.[227] Chinese leaders may judge their current strategy toward Taiwan, which some have termed "coercion without violence," is succeeding in demoralizing Taiwan's people and demonstrating that other countries can do little to mitigate its interference.[228] If so, they may be willing to wait patiently until their coercive strategies cause Taiwan's people to lose hope and bloodlessly capitulate to Beijing.

Domestic Constituencies Could Oppose an Invasion

A final constraint on Chinese decision-making is the potential for certain constituencies within the domestic political establishment to oppose an invasion. Some high-ranking Party officials frustrated by General Secretary Xi's unilateral leadership style and confrontational approach to foreign policy issues might voice their opposition to a war (for more on disagreements among Chinese elites, see Chapter 1, Section 1, "The Chinese Communist Party's Ambitions and Challenges at Its Centennial"). Accountable for hitting certain domestic growth targets, the Party secretaries of Guangdong, Fujian, Jiangsu, Shanghai, and Shandong might express concerns to the top CCP leadership that a war could devastate economic activity in their provinces.[229] The owners of private Chinese businesses in those provinces would have similar concerns. Though the PLA is often portrayed as a belligerent institution pushing for war, some of its high-ranking officials and strategists may also oppose an invasion due to the difficulties of controlling a hostile population of 23 million people and overseeing post-war reconstruction on the island. For example, Major General Qiao Liang, a notoriously hawkish professor at China's National Defense University, argued in a 2020 commentary that such realities would make an invasion of Taiwan in the near term "a heavy burden on our backs" and stymie China's larger ambitions of national rejuvenation.[230]

Because General Secretary Xi has made himself the top authority within China's governance system, he will also need to consider that a failed Taiwan campaign could threaten his hold on power. While General Secretary Xi has consolidated power during his tenure, becoming the so-called "chairman of everything," he still requires the

support of a coalition of elites and interest groups to stay in office.[231] Richard McGregor of the Lowy Institute and Jude Blanchette of the Center for Strategic and International Studies argue that this coalition's support is conditional on "shifting domestic and international variables" that presumably affect these various elites' agendas and livelihoods. "While the precise bargain between [General Secretary] Xi and members of the political, economic, or military elite are unknown, a dramatic economic slowdown or the repeated mishandling of international crises would likely make [General Secretary] Xi's job of managing his ruling coalition more difficult and tenuous," Mr. McGregor and Mr. Blanchette write.[232] A failed military operation against Taiwan could produce either of these conditions, potentially alienating many of General Secretary Xi's supporters.

Implications for the United States

For the first time, the United States and Taiwan face Chinese leaders who have or will soon have an initial military capability to invade Taiwan despite U.S. intervention. While U.S. and Taiwan military capabilities were once insurmountable challenges for the PLA, decades of focused efforts to build an invasion capability have substantially shifted the military balance in China's favor. Just as General Secretary Xi and other Chinese leaders cannot be certain the PLA would prevail in a war, leaders in the United States and Taiwan cannot be sure their militaries would deter or defeat the PLA. Nonetheless, Chinese leaders remain deeply concerned about the risks associated with a failed invasion as well as the economic disruptions and diplomatic backlash that would follow. Cross-Strait relations have therefore entered a dangerous period of uncertainty in which the military means of deterrence the United States relied upon in the past will not be as effective for sustaining deterrence in the future.

The deterrence challenges for U.S. and Taiwan leaders are becoming more acute. Over the next five years, U.S. plans to retire older platforms in anticipation of a smaller, more modern force may appear to Chinese leaders as a "window of opportunity" during which the U.S. military's ability to intervene is at its weakest. The United States has scheduled a mass retirement of 48 active duty ships and 256 aircraft by 2026, including one aircraft carrier, 11 cruisers, and 13 submarines.[233] Moreover, Chinese leaders' political will to bring Taiwan under PRC control will endure, and all trends suggest their military capabilities will continue to grow.

The stakes of maintaining cross-Strait deterrence also extend to the integrity of the U.S.-led security architecture in the Indo-Pacific region. Taiwan is an important U.S. partner and a beacon for democracy in the region. Losing a war over Taiwan, or losing the credibility to defend a vibrant democracy and important security partner, will undermine perceptions of U.S. security guarantees for countries in the Indo-Pacific region. Similarly, a PLA that has successfully conquered Taiwan will have done so despite U.S. political and potentially military opposition, effectively establishing China as the dominant power in Asia and diminishing U.S. influence in the region.

The maintenance of cross-Strait deterrence is also consequential to the global economy given the centrality of Taiwan's semiconductor foundries to global technology supply chains. The loss of or damage to Taiwan's semiconductor industry in a Chinese invasion would be nearly impossible to replace in the short term. The United States, China, and the world are highly dependent on Taiwan-produced semiconductors and vulnerable to risks stemming from broader disruptions to global supply chains. According to the Semiconductor Industry Association, a complete disruption of Taiwan's semiconductor foundries for one year could result in a $490 billion loss in revenue for the global consumer electronics industry.[234] Shortfalls in the supply of semiconductors used in automobiles in late 2020 and early 2021 underscored the vulnerability of concentrated semiconductor production in Taiwan, as automobile manufacturers scrambled to meet resurgent demand and U.S., German, and Japanese government officials urged Taipei to resolve the shortages.[235] As China intensifies its military intimidation of Taiwan, U.S. policymakers and businesses will need to understand the risks wrought by their exposure to Taiwan's semiconductor manufacturing sector. U.S. efforts to diversify technology supply chains away from Taiwan may deepen the island's economic dependence on the Mainland, effectively undermining the security of a valued U.S. partner.

These heightened stakes may require U.S. policymakers to reassess elements of longstanding U.S. policy toward Taiwan. Commentators are debating whether the United States should discard strategic ambiguity, which critics say now invites China to test the status quo in the Taiwan Strait, in favor of "strategic clarity," or a public, unambiguous commitment to defend Taiwan.[236] The main sticking point is whether successful deterrence depends more on expressions of political will or on demonstrations of military capacity. Most proponents of strategic clarity argue that Beijing would interpret a public U.S. commitment to defend Taiwan as an expression of steadfast political will that might in itself be sufficient to deter an attack on the island.[237] Proponents of strategic ambiguity tend to respond that an unambiguous commitment to Taiwan's defense will not be credible in the absence of major shifts to U.S. force posture and capabilities in the Indo-Pacific; it may also disincentivize Taiwan from making needed investments in defense and could even increase the risk of war by provoking a Chinese preemptive attack on U.S. and Taiwan forces.[238]

The United States has historically leaned on its conventional military advantages to deter China, at times overlooking other viable options to strengthen deterrence. Economic and diplomatic measures offer alternative means to shape Beijing's perception of the international environment or the potential consequences of an invasion.[239] Maintaining cross-Strait stability in the future may require the United States to leverage a range of diplomatic and economic tools to convince Chinese leaders that an increasingly capable and confident PLA cannot win a war over Taiwan at acceptable levels of cost or risk. The question is whether and to what extent those tools will be effective if the PLA continues to consolidate its military advantages within the first island chain.

Addendum: Selected Advanced Semiconductor Foundries by Location

Foundry Location	Company Headquarters	Company	Operating Model	Chip Type	Most Advanced Process Technology (Nanometer Size)
Taiwan	Taiwan	TSMC	Foundry	Logic	**3 nm**
	United States	Micron	IDM	Memory	16 nm
South Korea	South Korea	Samsung	IDM	Logic, Memory	**5 nm**
United States	United States	Intel	IDM	Logic	**10 nm**
	South Korea	Samsung	Foundry	Logic	11 nm
China	China	Semiconductor Manufacturing International Corporation	Foundry	Logic	**14 nm**
	Taiwan	TSMC	Foundry	Logic	16 nm
	South Korea	SK Hynix	IDM	Memory	18 nm
	United States	Intel	IDM	Memory	20 nm
Japan	United States/Japan	Flash Alliance*	IDM	Memory	**15 nm**
	Japan	Renesas	IDM	Logic, DAO	40 nm

Note: DAO = discrete, analog, and optoelectronics and sensors. Bold text indicates most advanced process technology based on foundry location.

Source: Mathieu Duchâtel, "The Weak Links in China's Drive for Semiconductors," *Institut Montaigne*, January 2021, 11–12; Saif M. Khan, "Securing Semiconductor Supply Chains," *Center for Security and Emerging Technology*, January 2021, 44–45; John VerWey, "Chinese Semiconductor Industrial Policy: Past and Present," *United States International Trade Commission Journal of International Commerce and Economics*, July 2019, 5; Flash Ventures, "Commitments, Contingencies and Guarantees," *U.S. Securities and Exchange Commission*, September 27, 2016; S&P Capital IQ database.

*As of June 1, 2017, Flash Alliance operates as a subsidiary of U.S. data storage firm Western Digital. S&P Capital IQ database.

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