

# The Taiwan Dilemma

“Are your customers concerned,” one financial analyst asked TSMC chairman Mark Liu, when China from time to time threatens “a war against Taiwan?” CEOs are used to tough questions on quarterly earnings calls, but they’re usually about missed profit targets or product launches gone wrong. At the time of this call, July 15, 2021, TSMC’s financials looked fine. The company had weathered the sanctioning of its second-largest customer, Huawei, with scarcely any impact on its performance. TSMC’s share price was near a record high. The global semiconductor shortage had made its business even more lucrative. For a time in 2021, it was the most valuable publicly traded company in Asia, one of the ten most valuable publicly traded companies in the world.

Yet the more indispensable TSMC has become, the more risk has risen—not to TSMC’s financials, but to its facilities. Even investors who for years chose to ignore the severity of the U.S.-China antagonism began looking nervously at the map of TSMC’s chip fabs, arrayed along the western coast of the Taiwan Strait. TSMC’s chairman insisted that there was no reason for concern. “As to the invasion of China, let me tell you,” he declared, “everybody wants to have a peaceful Taiwan Strait.” Taipei-born, Berkeley-educated, and Bell Labs-trained, Liu has an impeccable chipmaking record. His skill in assessing the risk of war, however, has yet to be tested. Peace in the Taiwan Strait “is to every country’s benefit,” he argued, given the world’s reliance on “the semiconductor supply chain in Taiwan. No one wants to disrupt it.”

The next day, July 16, dozens of People’s Liberation Army Type 05 amphibious armored vehicles stormed off the Chinese coast into the ocean. Though they look like tanks, these vehicles are equally capable of driving on beaches as they are of speeding through the water like small boats. They’d be instrumental in any PLA amphibious assault. After motoring into the ocean, dozens of these vehicles approached landing ships stationed off shore, driving from the water up onto the ships, where they prepared for “a long-distance sea-crossing,” Chinese state media reported. The landing ships steamed toward their target. Upon arrival, wide doors in the ships’ bows swung open and amphibious vehicles streamed off into the water, making the way to the beach and firing their guns as they went.

This time, it was just an exercise. Over the next few days, the PLA launched other drills near the north and south entrances to the Taiwan Strait. “We must train hard under scenarios just like those in real battles, be combat-ready at all times and resolutely safeguard national sovereignty and territorial integrity,” China’s *Global Times* newspaper quoted one battalion commander as saying. The newspaper pointedly noted that the exercises took place only three hundred kilometers from Pratas Island, a tiny atoll equidistant between Hong Kong and Taiwan and administered by the latter.

There are many ways a war over Taiwan could begin, but some defense planners think a ramped-up dispute over isolated Pratas Island is the most likely. One recent war game organized by American defense experts envisioned Chinese troops landing on the island and seizing the small Taiwanese garrison there without firing a shot. Taiwan and the U.S. would face the difficult choice of starting a war over an irrelevant atoll or establishing a precedent that China can slice off chunks of Taiwanese territory like pieces of soft salami. “Moderate” responses would include stationing large numbers of U.S. troops in Taiwan or launching cyberattacks on China, both of which could easily escalate into a full-blown conflict.

The Pentagon’s public reports on Chinese military power have identified multiple ways China could use force against Taiwan. The most straightforward—but most unlikely—is a D-Day style invasion, with hundreds of Chinese ships steaming across the Strait and landing thousands of PLA infantrymen on shore. The history of amphibious invasions is littered with disasters, however, and the Pentagon judges that such an operation would “strain” the PLA’s capabilities. China would have little difficulty in knocking out Taiwan’s airfields and naval facilities as well as electricity and other critical infrastructure before any assault, but even still, it would be a tough fight.

Other options would be easier for the PLA to implement, in the Pentagon’s judgment. A partial air and maritime blockade would be impossible for Taiwan to defeat on its own. Even if the U.S. and Japanese militaries joined Taiwan to try and break the blockade, it would be difficult to do. China has powerful weapons systems arrayed along its shores. A blockade wouldn’t need to be perfectly effective to strangle the island’s trade. Ending a blockade would require Taiwan and its friends—mainly, the U.S.—to disable hundreds of Chinese military systems sitting on Chinese territory. A blockade-busting operation could easily spiral into a bloody great power war.

Even without a blockade, a Chinese air and missile campaign alone could defang Taiwan’s military and shut down the country’s economy without placing a single pair of Chinese boots on the ground. In a couple days, absent immediate U.S. and Japanese aid, Chinese air and missile forces could probably disarm key Taiwanese military assets—airfields, radar facilities, communications hubs, and the like—without severely impacting the island’s productive capacity.

TSMC’s chairman is certainly right that no one wants to “disrupt” the semiconductor supply chains that crisscross the Taiwan Strait. But both Washington and Beijing would like more control over them. The idea that China would simply destroy TSMC’s fabs out of spite doesn’t make sense, because China would suffer as much as anyone, especially since the U.S. and its friends would still have access to Intel’s and Samsung’s chip fabs. Nor has it ever been realistic that Chinese forces could invade and straightforwardly seize TSMC’s facilities. They’d soon discover that crucial materials and software updates for irreplaceable tools must be acquired from the U.S., Japan, and other countries. Moreover, if China were to invade, it’s unlikely to capture all TSMC employees. If China did, it would only take a handful of angry engineers to sabotage the entire operation. The PLA’s proven it can seize Himalayan peaks from India on the two countries’ disputed border, but grabbing the world’s most complex factories, full of explosive gases, dangerous chemicals, and the world’s most precise machinery—that’s a different matter entirely.

However, it’s easy to imagine a way that an accident, like a collision in air or at sea, could spiral into a disastrous war that neither side wants. It’s also perfectly reasonable to think China might conclude that military pressure without a full-scale invasion could decisively undermine America’s implicit security guarantee and fatally demoralize Taiwan. Beijing knows that Taiwan’s defense strategy is to fight long enough for the U.S. and Japan to arrive and help. The island is so small relative to the cross-strait superpower that there’s no realistic option besides counting on friends. Imagine if Beijing were to use its navy to impose customs checks on a fraction of the ships sailing in and out of Taipei. How would the U.S. respond? A blockade is an act of war, but no one would want to shoot first. If the U.S. did nothing, the impact on Taiwan’s will to fight could be devastating. If China then demanded that TSMC restart chip fabrication for Huawei and other Chinese companies, or even to transfer critical personnel and know-how to the mainland, would Taiwan be able to say no?

Such a series of moves would be risky for Beijing, but they wouldn’t be unthinkable. China’s ruling party has no higher goal than asserting control over Taiwan. Its leaders constantly promise to do so. The government has passed an “Anti-Secession Law” envisioning the potential use of what it calls “non-peaceful means” in the Taiwan Strait. It’s invested heavily in the type of military systems, like amphibious assault vehicles, needed for a cross-strait invasion. It exercises these capabilities regularly. Analysts uniformly agree that the military balance in the Strait has shifted decisively in China’s direction. Long gone are the days, as during the 1996 Taiwan Strait crisis, that the U.S. could simply sail an entire aircraft carrier battlegroup through the Strait to force Beijing to stand down. Now such an operation would be fraught with risk for the U.S. warships. Today Chinese missiles threaten not only U.S. ships around Taiwan but also bases as far away as Guam and Japan. The stronger the PLA gets, the less likely the U.S. is to risk war to defend Taiwan. If China were to try a campaign of limited military pressure on Taiwan, it’s more likely than ever that the U.S. might look at the correlation of forces and conclude that pushing back isn’t worth the risk.

If China were to succeed in pressuring Taiwan into giving Beijing equal access—or even preferential access—to TSMC’s fabs, the U.S. and Japan would surely respond by placing new limits on the export of advanced machinery and materials, which largely come from these two countries and their European allies. But it would take years to replicate Taiwan’s chipmaking capacity in other countries, and in the meantime we’d still depend on Taiwan. If so, we’d find ourselves not only reliant on China to assemble our iPhones. Beijing could conceivably gain influence or control over the only fabs with the technological capability and production capacity to churn out the chips we depend on.

Such a scenario would be disastrous for America’s economic and geopolitical position. It would be even worse if a war knocked out TSMC’s fabs. The world economy and the supply chains that crisscross Asia and the Taiwan Strait are predicated on this precarious peace. Every company that’s invested on either side of the Taiwan Strait, from Apple to Huawei to TSMC, is implicitly betting on peace. Trillions of dollars are invested in firms and facilities within easy missile shot of the Taiwan Strait, from Hong Kong to Hsinchu. The world’s chip industry, as well as the assembly of all the electronic goods chips enable, depends more on the Taiwan Strait and the South China coast than on any other chunk of the world’s territory except Silicon Valley.

Business as usual is not nearly as fraught in California’s tech epicenter. Much of Silicon Valley’s knowledge could be easily relocated in case of war or earthquake. This was tested during the pandemic, when almost all the region’s workers were told to sit at home. Big tech firms’ profits even went up. If Facebook’s fancy headquarters were to sink into the San Andreas Fault, the company might barely notice.

If TSMC’s fabs were to slip into the Chelungpu Fault, whose movement caused Taiwan’s last big earthquake in 1999, the reverberations would shake the global economy. It would only take a handful of explosions, deliberate or accidental, to cause comparable damage. Some back-of-the-envelope calculations illustrate what’s at stake. Taiwan produces 11 percent of the world’s memory chips. More important, it fabricates 37 percent of the world’s logic chips. Computers, phones, data centers, and most other electronic devices simply can’t work without them, so if Taiwan’s fabs were knocked offline, we’d produce 37 percent less computing power during the following year.

The impact on the world economy would be catastrophic. The post-COVID semiconductor shortage was a reminder that chips aren’t only needed in phones and computers. Airplanes and autos, microwaves and manufacturing equipment—products of all types would face devastating delays. Around one-third of PC processor production, including chips designed by Apple and AMD, would be knocked offline until new fabs could be built elsewhere. Growth in data center capacity would slow dramatically, especially for servers focused on AI algorithms, which are more reliant on Taiwan-manufactured chips from companies like Nvidia and AMD. Other data infrastructure would be hit harder. New 5G radio units, for example, require chips from several different firms, many of which are made in Taiwan. There’d be an almost complete halt to the rollout of 5G networks.

It would make sense to halt cell phone network upgrades because it would be extremely difficult to buy a new phone, too. Most smartphone processors are fabricated in Taiwan, as are many of the ten or more chips that go into a typical phone. Autos often need hundreds of chips to work, so we’d face delays far more severe than the shortages of 2021. Of course, if a war broke out, we’d need to think about a lot more than chips. China’s vast electronics assembly infrastructure could be cut off. We’d have to find other people to screw together whatever phones and computers we had components for.

Yet it would be far easier to find new assembly workers—as difficult as that would be—than to replicate Taiwan’s chipmaking facilities. The challenge wouldn’t simply be building new fabs. Those facilities would need trained personnel, unless somehow many TSMC staff could be exfiltrated from Taiwan. Even still, new fabs must be stocked

with machinery, like tools from ASML and Applied Materials. During the 2021- 2022 chip shortage, ASML and Applied Materials both announced they were facing delays in producing machinery because they couldn't acquire enough semiconductors. In case of a Taiwan crisis, they'd face delays in acquiring the chips their machinery requires.

After a disaster in Taiwan, in other words, the total costs would be measured in the trillions. Losing 37 percent of our production of computing power each year could well be more costly than the COVID pandemic and its economically disastrous lockdowns. It would take at least half a decade to rebuild the lost chipmaking capacity. These days, when we look five years out we hope to be building 5G networks and metaverses, but if Taiwan were taken offline we might find ourselves struggling to acquire dishwashers.

Taiwan's president Tsai Ing-wen recently argued in *Foreign Affairs* that the island's chip industry is a "'silicon shield' that allows Taiwan to protect itself and others from aggressive attempts by authoritarian regimes to disrupt global supply chains." That's a highly optimistic way of looking at the situation. The island's chip industry certainly forces the U.S. to take Taiwan's defense more seriously. However, the concentration of semiconductor production in Taiwan also puts the world economy at risk if the "silicon shield" doesn't deter China.

In a 2021 poll, most Taiwanese reported thinking that a war between China and Taiwan was either unlikely (45 percent) or impossible (17 percent). The Russian invasion of Ukraine, however, is a reminder that just because the Taiwan Strait has been mostly peaceful for the past few decades, a war of conquest is far from unthinkable. The Russia-Ukraine War also illustrates the extent to which any large conflict will be determined in part by a country's position in the semiconductor supply chain, which will shape its ability to wield military and economic power.

Russia's chip industry, which lagged behind Silicon Valley since the days of Soviet minister Shokin and the founding of Zelenograd, had decayed since the Cold War ended, as most Russian customers chose to stop buying from domestic chipmakers and outsourced production to TSMC. The only remaining customers were Russia's defense and space industries, which were not big enough buyers of chips to fund advanced chipmaking at home. As a result, even high priority defense projects in Russia struggled to acquire the chips they needed. Russia's equivalent of GPS satellites, for example, have faced wrenching delays due to problems sourcing semiconductors.

Russia's ongoing difficulties with fabricating and acquiring chips explains why the country's drones shot down over Ukraine are full of foreign microelectronics. It also explains why Russia's military continues to rely extensively on non-precision-guided munitions. A recent analysis of Russia's war in Syria found that up to 95 percent of munitions dropped were unguided. The fact that Russia faced shortages of guided cruise missiles within several weeks of attacking Ukraine is also partly due to the sorry state of its semiconductor industry. Meanwhile, Ukraine has received huge stockpiles of guided munitions from the West, such as Javelin anti-tank missiles that rely on over 200 semiconductors each as they home in on enemy tanks.

Russia's dependence on foreign semiconductor technology has given the United States and its allies a powerful point of leverage. After Russia invaded, the U.S. rolled out sweeping restrictions on the sale of certain types of chips across Russia's tech, defense, and telecoms sectors, which was coordinated with partners in Europe, Japan, South Korea, and Taiwan. Key chipmakers from America's Intel to Taiwan's TSMC have now cut off the Kremlin. Russia's manufacturing sector has faced wrenching disruptions, with a substantial portion of Russian auto production knocked offline. Even in sensitive sectors like defense, Russian factories are taking evasive maneuvers such as deploying chips intended for dishwashers into missile systems, according to U.S. intelligence. Russia has little recourse other than to cut its consumption of chips, because its chipmaking capabilities today are even weaker than during the heyday of the space race.

The emerging Cold War between the U.S. and China, however, will be a less lopsided match when it comes to semiconductors, given Beijing's investment in the industry and given that much of the chipmaking capacity America relies on is within easy range of PLA missiles. It would be naïve to assume that what happened in Ukraine couldn't happen in East Asia. Looking at the role of semiconductors in the Russia-Ukraine War, Chinese government analysts have publicly argued that if tensions between the U.S. and China intensify, "we must seize TSMC."

Cold War I had its own standoffs over Taiwan, in 1954 and again in 1958, after Mao Zedong's military barraged Taiwanese-held islands with artillery. Today Taiwan is within range of far more destructive Chinese forces—not only an array of short- and medium-range missiles but also aircraft from the Longtian and Huian airbases on the Chinese side of the Strait, from which it's only a seven-minute flight to Taiwan. Not coincidentally, in 2021, these airbases were upgraded with new bunkers, runway extensions, and missile defenses. A new Taiwan Strait crisis would be far more dangerous than the crises of the 1950s. There'd still be the risk of nuclear war, especially given China's growing atomic arsenal. But rather than a standoff over an impoverished island, this time the battleground would be the beating heart of the digital world. What's worse is that unlike in the 1950s, it's not clear the People's Liberation Army would eventually back down. This time, Beijing might wager that it could well win.