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Drivers, Trajectories and Prospects of Military Modernization in China

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Introduction

The Russian invasion of Ukraine has illustrated that outright military force, including against another sovereign State, has not disappeared from the repertoire of global power projection. In the Indo-Pacific, the Russian experience of fighting an increasingly protracted war against a well-armed military supported by Western States has evoked discussions on how to interpret the war in Ukraine in relation to a potential Chinese invasion of Taiwan (South China Morning Post, 2022). Ever since the end of the Chinese Civil War in 1949, after which the nationalist Guomindang (KMT) fled to Taiwan, the Chinese Communist Party (CCP) has considered Taiwan a breakaway province that the CCP would ultimately reunite with the communist mainland. President Xi Jinping has pledged to reunite Taiwan and China by 2049, the centennial anniversary of Communist rule in China (Kawashima, 2021). China's growing assertive in its neighborhood, including the *de facto* obliteration of the 'one country, two systems' policy in Hong Kong, has intensified concerns that China could seek to attain 'national reunification' by force (Overholt, 2019, p. 28). China routinely and increasingly violates Taiwan's air defense zone (Deutsche Welle, 2021) and has intensified its hostile naval posturing in the East and South China Seas. In 2021, US Navy Admiral John Aquilino suggested in front of the Senate Armed Services Committee that "*this problem [China invading Taiwan] is much closer to us than most think*" (Lendon, 2021). Aquilino has since faced pushback from various colleagues, including General Mark Milley, the chairman of the US' Joint Chiefs of Staff, who stated that "*there's no reason to do it [taking Taiwan] militarily, and they [the CCP leadership] know that. So, I think the probability is probably low, in the immediate, near-term future*" (Hille, 2021). Tensions nevertheless prevail, also due to China's rhetoric on Taiwan: during the 2022 Shangri-La Dialogue in Singapore, Chinese defense minister Wei Fenghe suggested that "*if anyone dares to secede Taiwan from China, we will ... fight at all costs and we will fight to the very end*", adding that "*no one should ever underestimate the resolve and ability of the Chinese armed forces to safeguard its territorial integrity*" (Al Jazeera, 2022).

China's increasingly aggressive military posturing in the Indo-Pacific is connected to Beijing's ambition to modernize and reform the People's Liberation Army (PLA). Driven by the immense economic growth it has registered since the 'Reform Era' initiated by Deng Xiaoping in the late 1970s, China now has the second-highest military spending in the world (Funaoile et al., 2021). Military capacity has historically been a key component of communist rule in China, with Mao Zedong famously asserting that "*power comes out of the barrel of a gun*" (Lovell, 2019, p. 26). The PLA played an indispensable role in the CCP's survival and ultimate victory in the Chinese Civil War. Technically the armed wing of the CCP, the PLA became China's armed forces after 1949 and currently operates under control of the Central Military Commission (CMC), chaired by Xi. Holding both the position of General Secretary of the CCP and Chairman of the CMC makes Xi the PRC's Commander-in-Chief. The PLA's command structure consequently ensures the PLA's allegiance to the Party rather than the State (despite the Party practically operating as the State).

The PLA currently consists of five branches: the Ground Forces (PLAGF), the Navy (PLAN), the Air Force (PLAAF), the Rocket Force (PLARF), and the Strategic Support Force

(PLASSF), which is tasked with organizing the PLA's cyber and space capabilities. This paper examines how the four conventional military branches (PLAGF, PLAN, PLAAF, PLARF) have developed since the 1990s in their doctrinal scope and their operational capacities. Shifts in operational scope and capacity are inherently linked to China's intent and ability to project military power within and beyond its borders. The trajectory and effects of PLA modernization can subsequently provide an insight into how the Indo-Pacific's regional order may develop in the coming decades.

The following chapter will discuss some of the drivers and overarching ambitions of the PLA's modernization while also examining how this development has played out in practice, for instance regarding military spending and the expansion of the domestic defense industry. The subsequent chapter examines how modernization has impacted the different service branches and what effects this has produced. The last chapter concludes the paper and assesses the progress and shortcomings of military modernization up until now.

External pressures and the development of the modern defense architecture

This chapter initially discusses the political drivers of military modernization in China, specifically focusing on the effects of the Sino-Vietnamese War (1979), the First Gulf War (1990-1991), and the second Taiwan Straits Crisis (1995-1996). Using data from the Stockholm International Peace Research Institute (SIPRI), the chapter then maps how defense expenditures have developed and how the domestic defense industry has been transformed, especially through an emphasis on civil-military fusion projects. It must be noted that China generally underreports its actual military spending (Liff & Erickson, 2013). It is also difficult to discern how much the PLA spends on what activity as the National People's Congress (NPC) provides no data on this. As Funaiole et al. (2021) note, China's official defense budget reveals *"no details about specific spending priorities and likely undercounts actual defense expenditures. Compared to many countries, especially democracies, China is far less transparent about how it allocates its defense spending"*. Ambiguity consequently surrounds China's real defense expenditures.

Drivers and designs of military modernization

The PLA has been historically a force heavily focused on the projection of power via ground troops. During the Civil War, the PLA often employed guerilla tactics while eventually turning into a force that required the mass mobilization of Chinese citizens. After 1949, the PLA largely retained this structure (Maizland, 2020). The capacity to recruit significant forces in short periods of time was the PLA's largest strategic asset, allowing Mao to send human waves into Korea during the Korean War (Lin et al., 2009, p. 226). Until Mao's death, the PLA's structure and force focus remained informed by tactics that banked on the PLA's capacity to balance inferior fighting equipment with numerical superiority.

Following Mao's death in 1976 and Deng's ascendancy, however, it quickly became apparent that the PLA's mass-based force structure had become outdated in more modern, fast-paced conflicts. During the 1979 Sino-Vietnamese War, launched by Beijing as a response to Hanoi's 1978 offensive against the China-backed Khmer Rouge regime, the PLA did not record

a convincing victory. Logistical and communicational shortcomings were particularly apparent, specifically in a lack of jointness between different service branches (Bommakanti & Shivamurthy, 2021, p. 7). Effective jointness describes “*the process of integrating each of the military services together into a cohesive whole with the sum greater than its parts*” to “*allow the service branches to emphasize their strengths and mitigate their weaknesses*” (Noon & Bassler, 2021). The war in Vietnam had illustrated that numerical superiority was not always going to function as a decisive force multiplier. The PLA’s internal structure, a relic of the Civil War, had furthermore proven to be of limited effectiveness.

The CMC subsequently introduced doctrinal-organizational changes in the 1980s that were designed to transform the PLA into a more modern and capable force. This reorientation also reflected shifts in China’s strategic geography: compared to the 1940s, when the CCP had fought both the Japanese and the KMT, China no longer faced large-scale territorial conflicts but was more likely to encounter temporally limited, intensive conflicts in its regional periphery. Deng declared military modernization one of his ‘four modernizations’ (alongside agriculture, industry, and science/technology) (Naughton, 1993). While this modernization partially manifested in the acquisition of more modern equipment, modernization also sought to instill organizational-cultural changes to enhance the PLA’s professionalization as a fighting force (Li, 2017, p. 697). The war with Vietnam marked an important event in incentivizing the ambition to transform the PLA into a more modern, professionalized military.

The First Gulf War and the Taiwan Straits Crisis marked additional events highlighting to the CCP leadership that the PLA was not yet capable of fighting modern, increasingly technologically sophisticated wars. The US’ resounding military success in the First Gulf War highlighted how devastating military technology had become and how significant the technological defense gap was between the Chinese and Western militaries. The 1995/1996 Taiwan Straits Crisis compounded the anxiety surrounding American military superiority. Following a visit of the Taiwanese President Lee Teng-Hui to the US, which China interpreted as defying the US’ strategic ambiguity policy towards China and Taiwan, China fired several missiles into the Taiwan Strait. In response, the US deployed aircraft carriers to the Strait. Lacking a modern blue water navy and air power projection capacities, Beijing had to sit idly by as the US demonstrated its commitment to Taiwan’s *de facto* independence (Qi et al., 2006). The carrier deployment had directly exposed the imbalance between China’s and the US’ naval power projection in China’s immediate maritime environment (Qimao, 1996). The US’ success in the Gulf War and Washington’s intervention in Taiwan consequently heightened Beijing’s strategic anxieties.

Historical and contemporary discourses in China reflect the relevance of these incidents and the aspiration to modernize the PLA. In 1993, the CMC, then chaired by President Jiang Zemin, released a new Military Strategy that urged the PLA to develop the capacity to fight “*local wars under modern high technology conditions*” (Fravel, 2008, p. 126). In 1995, Jiang formulated the ambition for the PLA to undergo “*two transformations*”: (1) from “*an army preparing to fight local wars under ordinary conditions to an army preparing to fight and win local wars under modern, high-tech conditions*” and (2) from “*an army based on quantity to an army based on quality*” (quoted in Cheng, 2011, p. 5). Building on Deng’s aspiration to structurally reform the PLA, Jiang’s discourse exemplifies the role of external events in shaping China’s threat perception. The Military Strategy published under Jiang in 1993 has

been updated twice since then: the 2004 update stressed the need to develop the PLA's informatized capacities, especially in regard to establishing and improving jointness between different service branches, while the 2015 update reasserted the need to expand China's naval capacities (Cooper III, 2018, p. 4). Xi's contemporary rhetoric has been consistent with these previous discourses. Xi has argued that,

“[w]e will make it our mission to see that by 2035, the modernization of our national defense and our forces is basically complete, and that by the mid-21st century our people's armed forces have been fully transformed into world-class forces” (quoted in Lei, 2017).

The current rhetorical and practical focus on military modernization thus enjoys a high degree of historical-strategic continuity, reflecting the ambition to transform the PLA into a force that can rival the force projection capacities of other modern military powers, most notably the US.

To sum up, modernizing the PLA has been an explicit political objective since the late 1970s that was accelerated in the 1990s. This ambition is the result of three events/periods (the Sino-Vietnamese War, the First Gulf War, and the Taiwan Straits Crisis) that highlighted that the PLA's mass-mobilization structure, a result of the Civil War, was insufficiently suited for fighting modern wars that relied on increasingly sophisticated technologies and the effective jointness of service branches. Military modernization programs would consequently seek to prepare the PLA for increasingly sophisticated military operations.

Tracing defense expenditures

Owing to its immense economic growth following the start of the Reform Era, China has been able to dramatically upscale its investment in the PLA. It can be generally assumed that a qualitative and/or quantitative improvement of the PLA would be tied to growing military expenditures, with surging expenditures enabling the substitution of outdated weapon systems with more modern technologies, the professionalization of the armed forces (for instance by making a career in the PLA a more attractive career by raising wages and pensions), and the recapitalization of ineffectively used funds to R&D (research and development). Increased investment, both in total or relative terms, is naturally also indicative of a government's priorities as the military is prioritized/not prioritized over other government-provided services. Table 1 summarizes China's military expenditures since 1989.

Table 1: Chinese military spending, 1989-2021

Year	Total military expenditure	Share of GDP (in %)	Share of government spending (in %)
1989	20067,7	2,45	13,21
1990	21815,4	2,45	13,75

1991	23187,8	2,31	14,25
1992	28199,3	2,45	16,87
1993	25931,7	1,93	14,80
1994	24951,5	1,69	14,09
1995	25916,0	1,69	15,16
1996	27455,7	1,65	14,95
1997	29290,2	1,63	14,09
1998	31981,3	1,66	13,06
1999	38987,8	1,87	12,52
2000	42200,0	1,83	11,34
2001	50037,8	1,98	11,42
2002	57470,7	2,05	11,19
2003	62197,2	1,98	10,97
2004	68508,5	1,93	10,88
2005	75231,2	1,85	10,23
2006	86596,0	1,85	10,19
2007	95191,6	1,74	9,63
2008	104150,1	1,71	7,65
2009	126379,8	1,89	7,40
2010	132604,4	1,74	6,97

2011	142352,9	1,67	6,17
2012	156979,0	1,69	6,04
2013	169742,5	1,70	5,97
2014	183291,4	1,73	5,97
2015	197680,5	1,75	5,60
2016	209060,1	1,77	5,55
2017	221917,6	1,75	5,43
2018	234916,7	1,74	5,10
2019	246361,2	1,73	4,91
2020	257973,4	1,80	4,75
2021	270016,6	1,74	5,03

Source: SIPRI (2022).

While China's relative share of military spending (in % of GDP) has remained largely consistent over the past thirty years, recently converging at around 1,9%, its total military expenditures have increased more than tenfold due to rising government revenues, enabled by growing economic prosperity. It is also worth noting that defense expenditures do not include the expenses incurred by nominally domestic security forces. The budget for the People's Armed Police (PAP), for example, is not included in the overall defense expenditures (Cordesman & Lin, 2015, p. 393). The CCP's real expenditures on internal and external security are therefore presumably higher than suggested here.

The growth in total expenditures has been accompanied by a reduction in the PLA's size, reflecting the aim to create a leaner, more professional force. Figure 2 highlights that especially the number of PLAGF personnel, reserves, and paramilitaries has shrunk significantly since the 1980s, epitomizing the shift from a mass-focused PLA to a skill-focused PLA.

Table 2: PLA personnel, 1980-2020 (in millions)

Branch	1980	1985	1990	1995	2000	2005	2010	2015	2020
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PLAGF	3.6	3.16	2.3	2.2	1.7	1.6	1.6	1.6	0.965
PLAN	0.63	0.35	0.26	0.26	0.22	0.255	0.255	0.235	0.260
PLAAF	0.4	0.49	0.47	0.47	0.42	0.4	0.33	0.398	0.395
Strategic Forces/ Coast Guard	0	0	0.09	0.09	0.1	0.1	0.1	0.1	0.145
PLARF	0	0	0	0	0	0	0	0	0.120
Reserves	0	5	4	1.2	0.55	0.8	0.51	0.51	0.51
Paramilitary	7	4.3	12	1.2	1.1	1.5	0.66	0.66	0.50
Others	0	0	0	0	0	0	0	0	0.15
Total personnel	11.63	13.3	16.32	5.42	4.49	4.665	3.455	3.503	3.045

Source: Bommakanti & Shivamurthy (2021, p. 3).

Figure 2 exemplifies the shifting prioritization of service branches. As discussed above, the NPC does not specify the expenditures for the various service branches, largely leaving analysts guessing as to what branch is prioritized. The personnel data nevertheless indicates that the professionalization of the PLA's personnel force has largely come at the expense of the PLAGF, the reserves, and paramilitary units. Although other branches and sub-branches have also decreased in size, the ground forces are the most impacted branch. This would indicate that the three other service branches are viewed as increasingly important in ensuring power projection capacities.

Development of the domestic defense industry

China has historically relied on Soviet/Russian defense equipment and technology and bilateral defense ties remain strong today. Like many other Asian countries, most notably India, China was a major buyer of Soviet (and, following the collapse of the USSR, Russian) military technologies in the second half of the 20th century, including through technology transfers (Maizland, 2020). Defense relations have retained their significance following the USSR's collapse: according to the ChinaPower Project (2021), a research initiative of the Center for Strategic and International Studies (CSIS), Russia supplied 75.5% of all arms imported by China between 2015 and 2019. One of the most recent major Chinese acquisitions has been the purchase of the Russian S-400 Triumf surface-to-air (SAM) in a deal worth 3 billion US\$ (Bowen, 2021). Russian influence is also visible on an organizational level, with Chinese restructuring efforts of the PLA's division and brigade units mirroring post-2014 Russian

reforms (Singh, 2020). As such, bilateral defense ties, especially in connection to the maintenance of Soviet/Russian legacy equipment, remain important for China today.

The creation of a competitive domestic defense industry is nevertheless a clear attempt to reduce China's dependency on Russian equipment and technologies. China has registered a significant increase in internationally recognized State-owned enterprises (SOEs) in the defense sector that mainly cater to the PLA (McGerty & Nouwens, 2021). State-guidance over SOEs provides China with a competitive advantage when compared to Western suppliers such as Lockheed Martin which, despite their close historical ties to Western State buyers, are still market-driven entities (Cockburn, 2021). This degree of market control by the State is also embodied in the lack of competition between defense SOEs: rather than directly competing in the development and production of particular services and technological areas (such as aerospace and shipbuilding), SOEs have specialized in specific sub-branches of the market, allowing them to be more cost-effective (ChinaPower Project, 2021). The degree of State-control over firm policy here indicates the close connection between the CCP, the PLA, and the domestic defense industry.

The growth of Chinese defense SOEs has also allowed China to emerge as a major arms exporter, especially to countries that other firms may be hesitant to supply. State-directed policy and the artificially created absence of domestic competitors has allowed defense SOEs such as AVIC, CETC, CSGC, and Norinco to directly focus on foreign markets, reflecting the CCP's broader ambition to move SOEs up global value chains (McGerty & Nouwens, 2021). Figure 3 summarizes the main buyers of Chinese defense exports since the Reform Era.

Table 3: Top five buyers of Chinese arms, 1979-2021

Buyer	Total value of acquisition (in million US\$)
Pakistan	14518
Iraq	4369
Iran	4212
Bangladesh	4079
Burma/Myanmar	3375

Source: SIPRI (2022a).

Chinese arms have been notably sold to markets Western firms have been hesitant (or incapable) of supplying. The size of Chinese arms exports to Pakistan reflects the growing dependency of Pakistan on Chinese support, especially during the now terminated administration of Imran Khan. China's deliveries to both Iran and Iraq spiked during the Iran-Iraq War (1980-1988). SOEs have also consistently delivered arms to Burma/Myanmar,

including at times when other international actors had imposed arms embargoes on the country (Poletti & Sicurelli, 2022). The buyers of Chinese arms can therefore be broadly categorized as States that democratic countries have frequently had ambiguous relations with.

An important component of China's defense industry has been the emphasis on civil-military fusion projects and joint ventures with non-Chinese firms. As any other industrial branch, the defense industry depends on R&D in various fields, including (and especially) emerging technologies. Civil-military fusion here describes "*a large push to fuse the defense and commercial economies*" (Laskai, 2018). Xi has pushed for defense SOEs to collaborate with domestic and foreign non-defense entities in joint commercial ventures to acquire and develop technologies and knowledge, especially regarding automation and AI capabilities (Maizland, 2020). Such joint (defense) ventures curb the time and resources SOEs spend on conducting R&D themselves, allowing SOEs to absorb the scientific advances made elsewhere (ChinaPower Project, 2021). The positive impact of joint ventures in terms of technology acquisition is compounded by the acceleration of domestic R&D investment, which has grown by the factor 35 between 1991 and 2018.

Civil-military fusion projects epitomize the heavily regulated and State-led nature of the Chinese defense market. While civil-military fusion frameworks exist elsewhere, what differentiates the Chinese approach is "*the state-directed nature of the Chinese strategy. The U.S. Department of Defense does not tell companies that they need to participate in certain initiatives or which dual-use technologies to develop, though it of course does send market signals*" (Levesque, 2021). China has also illegally acquired and copied military and dual-use technology, both from defense partners such as Russia (Simes, 2019) and via cyber and corporate espionage in Europe (Cerulus, 2018) and the US (Bateman, 2022, p. 65). The theft of intellectual property inevitably raises economic concerns for Western defense firms while enabling China to rapidly develop increasingly sophisticated military technologies.

Conclusively, China has launched a large-scale military modernization program characterized by doctrinal, operational, and technological transformations. The liberalization of the Chinese economy through the Reform Era has enabled an explosion of total military expenditures. Doctrinally and operationally, the 1979 war with Vietnam, the First Gulf War, and the Taiwan Straits Crisis had exposed the PLA's lack of (modern) combat readiness. Reflecting China's broader expansion on the global stage, China has sought to diminish its dependency on foreign suppliers by developing and expanding its domestic defense industry. To do so, it has extensively invested in R&D, civil-military fusion projects, and corporate espionage. The expansion of the Chinese defense industry, although primarily focused on supplying the domestic market, has also allowed Chinese defense SOEs to become increasingly relevant in the global defense market.

Modernization of PLA service branches

PLAGF

The PLAGF has historically constituted the PLA's primary service branch due to its role in the Civil War and the nature of China's threat perceptions under Mao following the victory against the KMT. As previously discussed, Mao's military command depended on mass appeal and

mass recruitment to establish a ground force that could disrupt and ultimately defeat the Nationalists through its numerical superiority (Fairbank & Goldman, 2006). Mass recruitment allowed the CCP to defeat an adversary that had access to significantly better arms, having been a main recipient of Western and Soviet arms transfers since the 1920s. The PLAGF remained the PLA's main strategic asset after 1949, allowing for the consolidation of domestic rule and selective intervention in the region. China's main strategic threats remained continental, including during the Korean War, the 1962 Sino-Indian War, and 1979 Sino-Vietnamese War. Following the Sino-Soviet split, any military threat emanating from Moscow was also a largely continental one. As China did not have the technological or operational means to seriously challenge American naval supremacy in the East and South China Seas, the PRC continued to rely on the PLAGF as a force multiplier.

As discussed above, the PLAGF has arguably been the primary victim of the PLA's modernization and professionalization campaigns. This is the result of the strategic lessons learned from the Sino-Vietnamese War, the First Gulf War, and the Taiwan Straits Crisis. None of these comparatively short conflicts/incidents had favored the deployment of large-scale ground forces, instead relying on technological sophistication and effective jointness, especially between naval and air forces. The relative deprioritization of the PLAGF, reflected in the decrease in available ground forces and the enhanced professionalization of the available forces, indicates this doctrinal shift towards a leaner fighting force. Reduced size does notably not necessarily translate into reduced capacity if funds are channeled into the creation of a more professional and sophisticated force.

The aim to enhance the PLAGF's integration into a jointness-emphasizing framework is reflected in shifts in the PLA's organizational structure. The CCP has historically organized China in military regions that have been subdivided into districts and sub-districts. Since coming to power, Xi has reorganized the domestic structure into five military regions (see Figure 4). The respective theater commands report to the CMC and exercise administrative and operational control in their theaters over the four military service branches, theoretically allowing the theater commands to coordinate between the branches more efficiently (Cordesman, 2016). Maizland (2020) also notes that internal reforms "*have focused on streamlining its [the PLA's] top-heavy command structure; creating smaller, more agile units; and empowering lower-level commander*".

Figure 1: China's regional military commands



Source: Maizland (2020).

The respective regional commands are also partially tasked with organizing the non-continental force posturing, making enhanced jointness a key component of the reorganization in theater commands. Figure 5 summarizes the areas of responsibility of the five commands.

Table 4: Geographical scopes of regional military commands

Theater command	Geographical scope of operations
Central Command	Beijing, security for CCP leadership and support for other theater commands
Northern Command	Korean Peninsula, borders with Russia and Mongolia, Yellow Sea
Eastern Command	Taiwan, East China Sea, Senkaku/Diaoyu Islands, Japan
Western Command	Border with India, counterterrorism
Southern Command	South China Sea, borders with countries Southeast Asia

Source: Maizland (2020).

The operational and geographical scope of the PLAGF’s commands indicates that the PLAGF continues to occupy some level of domestic security function. Alongside the PAP, the

PLAGF maintains an active domestic presence in the Western Command to perform security functions in Tibet and Xinjiang. The PLAGF could also directly intervene in Beijing in case of Tiananmen-like mass demonstrations.

To sum up, the PLAGF has undergone a significant internal restructuring process in recent years and decades. Modernization measures have sought to upgrade the PLAGF by professionalizing its fighting forces and ensuring access to qualitatively better equipment. Reflecting an attempt to develop a more comprehensive military posture that also effectively incorporates air and maritime capacities, resources have shifted away from the ground forces.

PLAN

The PLAN has arguably been the biggest benefactor of the PLA's shift towards a more jointness-emphasizing force. The lack of sophisticated naval forces exposed the Qing Empire to European, American, and Japanese expansionism following the Opium Wars, reigning in China's 'century of humiliation' (Qi et al., 2006). During the Cold War, the US' seemingly unassailable dominance along the 'first island chain' running down from the Japanese archipelago to the Indonesian archipelago meant that the PLAN lacked both the scope, operational resources, and strategic space to operate beyond what the Chinese strategic community has frequently referred to as the 'near seas' (the Yellow Sea, the East China Sea, and the South China Sea) (Li, 2009). As such, China did not enjoy sufficient political space for the development of a blue water navy that could project power in its immediate maritime environment and beyond.

In line with the broader modernization program launched in the 1990s, Beijing has aimed to transform the PLAN into a sophisticated naval force. The relative regional stability in the near seas following the end of the Cold War allowed China to launch Jiang's two transformations whilst the Taiwan Straits Crisis fostered an immediate strategic incentive. Jiang envisaged PLAN modernization to follow a three-step process: (1) laying a "*solid foundation*" by 2010, (2) making "*major progress*" by 2020 and (3) establish the capacity to win "*informationalized wars*" by 2050 (Upadhyaya, 2017, p. 66). China has ramped up its indigenous anti-ship ballistic missiles development program and has expanded its surface and subsurface fleet through acquisitions from Russia and indigenous productions (Upadhyaya, 2017). The PLAN's overall size has consequently grown significantly since the 1990s (Figure 6).

Table 5: Number of selected PLAN vessels, 1994/2012

Type of vessel	No. of vessels in 1994	No. of vessels in 2012
Submarine	4	52
Destroyer	1	13

Frigate	1	65
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Source: ChinaPower Project (2018) & O'Rourke (2014).

The post-1990s modernization program transformed the PLAN from a coast guard-like organization to one that can increasingly operate as a blue water navy. Since 2012, China's naval capacities have accelerated further (see Figure 7).

Table 6: PLA-N surface combatants and submarines, 2012/2020

Type of vessel	No. of vessels in 2012	No. of vessels in 2020
Aircraft carriers	2	0
Cruisers	1	0
Destroyers	28	13
Frigates	52	65
Corvettes	43	0
Nuclear-powered ballistic missile submarines	4	3
Nuclear-powered attack submarines	6	5
Diesel-electric attack submarines	48	52
Diesel-electric ballistic missile submarines	1	1

Source: ChinaPower Project (2018).

The growth of the PLAN has clearly accelerated significantly since the 1990s. A 2020 report by the US Department of Defense noted that the PLAN is now the largest naval force in the world in total numbers, surpassing the US Navy. China's capacity to project maritime power has subsequently increased significantly.

Has the quality of China's naval forces grown in accordance with this quantitative growth? The framework developed by Jiang and his successors, including Xi, suggests that naval investment would be geared to improve the PLAN's qualitative capacities. Figure 6 also indicates that some vessel types are prioritized over others: frigates, for instance, which mostly

do not carry SAMs, rendering them practically “*defenseless against modern anti-ship cruise missiles*” (quoted in ChinaPower Project, 2018), have been largely decommissioned at the expense of corvettes and destroyers. Corvettes and destroyers, in turn, allow the PLAN to quickly project naval power in the East and South China Seas. Similarly, the prioritization of nuclear-powered submarines over diesel-fueled submarines allow for a greater degree of secrecy as nuclear-powered submarines can remain submerged for months on end, making them significantly harder to detect for foreign intelligence units (Federation of American Scientists, 2015). The strategic significance of enhanced subsurface capacities vis-à-vis superior naval forces (such as that of the US) is worth noting here:

“[s]ubmarines have been the weapon of choice for weaker naval powers that wish to contest a dominant power’s control of the seas or its ability to project power ashore from the sea. This is because submarines have been and are likely to remain the weapon system with the highest leverage in a battle for control of the ocean surface” (Coté, quoted in Lim, 2011, p. 113).

The tactical scope of China’s naval modernization program enhances China’s anti-access/area-denial operations (A2/AD) capacities in the face of the continued presence of the US and its allies along the first island chain. A2 operations “*attack aircraft, warships, and specialized ballistic and cruise missiles designed to strike key targets*” whereas AD operations “*employs more defensive means such as air and sea defense systems*” to limit the opponent’s freedom of action (Missile Defense Advocacy Alliance, 2018). Submarine investment adds a subsurface dimension to Beijing’s A2/AD capacities. The PLAN has furthermore equipped a growing number of ships with anti-ship, anti-air, and anti-submarine technology (O’Rourke, 2014). By modernizing the PLAN, China has developed a highly proficient A2/AD architecture in the near seas: although the PLA is presumably not yet capable of breaking the American dominance along the first island chain, for instance by invading and holding Taiwan, the expansion of A2/AD capacities strengthens the prospects of such an invasion by raising the military costs of an anti-China intervention by an outside power.

The investment in- and modernization of the PLAN’s submarine division and carrier fleet additionally expands China’s strategic reach beyond the near seas. China’s surface power has grown through the acquisition of aircraft carriers allowing Beijing to project symbolic and direct military power. In 1998, Beijing purchased the *Liaoning*, which became operable in 2012, as an unfinished vessel from Ukraine (O’Rourke, 2014). China’s second carrier, the *Shandong*, is China’s first indigenously built carrier (Westcott, 2019). In June 2022, China launched its third aircraft carrier, the *Fujian* (The Guardian, 2022). As a Type 003 carrier, the *Fujian* is the first Chinese vessel that can rival the size of the US Navy’s super carriers (Sutton, 2022). Aircraft carriers serve multi-purpose functions: they enable winning and controlling maritime spaces in times of conflict and provide air cover for continental operations, thus allowing a military to project power in spaces in which land-based air facilities are unavailable (International Institute for Strategic Studies, 1998). China’s acquisition of aircraft carriers is even more noteworthy considering that carriers would not necessarily be required to launch an invasion of Taiwan (O’Rourke, 2014). While A2/AD systems are not necessarily offensive, the PLAN’s carriers and submarine fleet serves distinctly offensive purposes and increasingly allows the PLAN to operate beyond the near seas.

China's rapid naval expansion and modernization reflects the importance of civil-military fusion projects since the 1990s. Civil-military fusion in the shipbuilding industry has been prioritized by the CCP, with a 2013 State Council report suggesting that shipbuilders should "*breach military industry capacity-building bottlenecks in key products, materials, manufacturing equipment*" by "*rely[ing] on major civilian research projects*" (ChinaPower Project, 2018). Joint ventures with Japan, Singapore, and South Korea from the mid-1990s onwards allowed China to develop the infrastructure required for large-scale ship-building projects, including for aircraft carriers (Medeiros et al., 2005, p. 115). Civil-military fusion has consequently enabled the unusually quick growth of the PLAN. In 2018, China alone accounted for the construction of 40.1% of all ships globally built that year (ChinaPower Project, 2018). Childs and Waldwyn (2018) note that "*since 2014, China has launched more submarines, warships, principal amphibious vessels and auxiliaries than the total number of ships currently serving in the navies of Germany, India, Spain, Taiwan and the United Kingdom*". In line with the development of the domestic defense industry, civil-military fusion frameworks have consequently played a key role in enhancing China's naval capacities.

The PLAN's growing operational capacities are supported by an expanding geographical scope to the "*far seas*", which also include the Indian Ocean. During the 1997 Party Congress, the CCP had outlined that "*the seas are an important element of the national territory and resources that can be developed on an ongoing basis*" (quoted in Kondapalli, 2018, p. 112). Subsequent Congresses and defense white papers published since the late 1990s have reiterated this growing naval focus, increasingly shifting the PLAN's operational scope from mere coastal defense to offshore naval operations. Naval modernization is thus connected to an explicitly formulated ambition to increase Chinese naval power projection capacities beyond the near seas.

The PLAN's transition towards a more offensive and geographically expansive posturing is reflected in the strategic concept of 'frontier defense'. First mentioned in China's national defense strategy of 2004 and later updated in 2015, frontier defense,

"Does not refer merely to defense of China's geographic boundaries but also to protection of its new open-ended frontiers of national and economic security interests. It heavily factors in potential hostile scenarios against China's sea lines of communication (SLOC) through the Indian Ocean. Frontier defense entails efforts to both establish a forward naval presence and develop the long-range power-projection capabilities to sustain such a presence" (Ji, 2016, p. 12).

The 2015 defense strategy update furthermore defined China's maritime environment as a "*critical security domain*" (Upadhyaya, 2017, pp. 65-66) whilst calling on naval forces to include 'open seas protection' alongside 'offshore waters defense' (Kondapalli, 2018). Moreover, the 2015 update committed China to building a "*multifunctional marine combat force*" (Krupakar, 2017, p. 212) that would allow China to project power in the 'open seas'. Since the 1990s, China has framed its maritime ambitions in increasingly expansive terms.

The PLAN has significantly benefited from the PLA's broader modernization approach due to investments being channeled into the modernization and high-scale expansion of the naval service branch. Unlike the PLAGF, the PLAN is a key tool for power projection in times of (relative) peace, especially in the East and South China Seas. Reflecting developments in

the domestic defense industry, the PLAN's modernization is heavily linked to successful civil-military fusion projects. The PLAN has also witnessed a doctrinal shift, embodied by the concept of frontier defense and an expansion from the near seas to the far seas. These doctrinal and operational shifts have transformed the PLAN into an increasingly formidable naval force that can project power in areas long dominated by the US.

PLAAF

Alongside the PLAN, the PLAAF constitutes the key branch enabling potentially offensive operations throughout the Indo-Pacific. Like sea power, air power also plays an important symbolic role, for instance by signaling to Taiwanese authorities that the PLA is consistently capable of disrupting Taiwan's air defense zone. Air and naval power projection are also directly linked via the operation of PLAAF aircraft on aircraft carriers, making enhanced PLAN-PLAAF jointness particularly relevant for the improvement of China's offensive strike capacities. In a conflict with Taiwan, for instance, China would likely seek to quickly eliminate Taiwan's air force through targeted air strikes on Taiwanese air bases, thus paving the way for a PLA invasion force (Huang, 2022, p. 29). PLAN-PLAAF jointness also allows China to project air power in other maritime disputes.

As with the other branches, the PLA has invested significantly in the PLAAF's acquisition and development of new military hardware. The technological complexity of fighter aircraft, including the integration of AI, makes the acquisition and development of technologically superior systems particularly key for this service branch. China continues to use Russia-produced aircrafts and partially depends on Russia-supplied parts for indigenously built aircrafts such as the J-20 stealth fighter (Bommakanti & Shivamurthy, 2021). The J-20 is sophisticated enough to reach Japan and Taiwan from mainland China without requiring refueling, providing a main strategic asset to the PLAAF if conflict in the East China Sea was to erupt (Osborn, 2021). The PLAAF has also built and acquired a growing number of bombers with long-range anti-ship missiles (Huang, 2022, p. 30). The growth in China's fighter and bomber portfolio directly expands China's offensive capacities beyond its direct continental geography. As with other defense technologies, the origins of China-built aerospace technologies are partially the result of corporate espionage: the PLAAF *"has acquired advanced equipment, some thought to be copied from stolen U.S. designs, including airborne warning and control systems, bombers, and unmanned aerial vehicles"* (Maizland, 2020). The development and use of modern weapon technologies has helped to significantly modernize the PLAAF while increasingly enabling it to project air power beyond the mainland.

The PLAAF has also undergone doctrinal changes on the back of the shifts in equipment. The 2006 national defense strategy stipulated that the PLAAF,

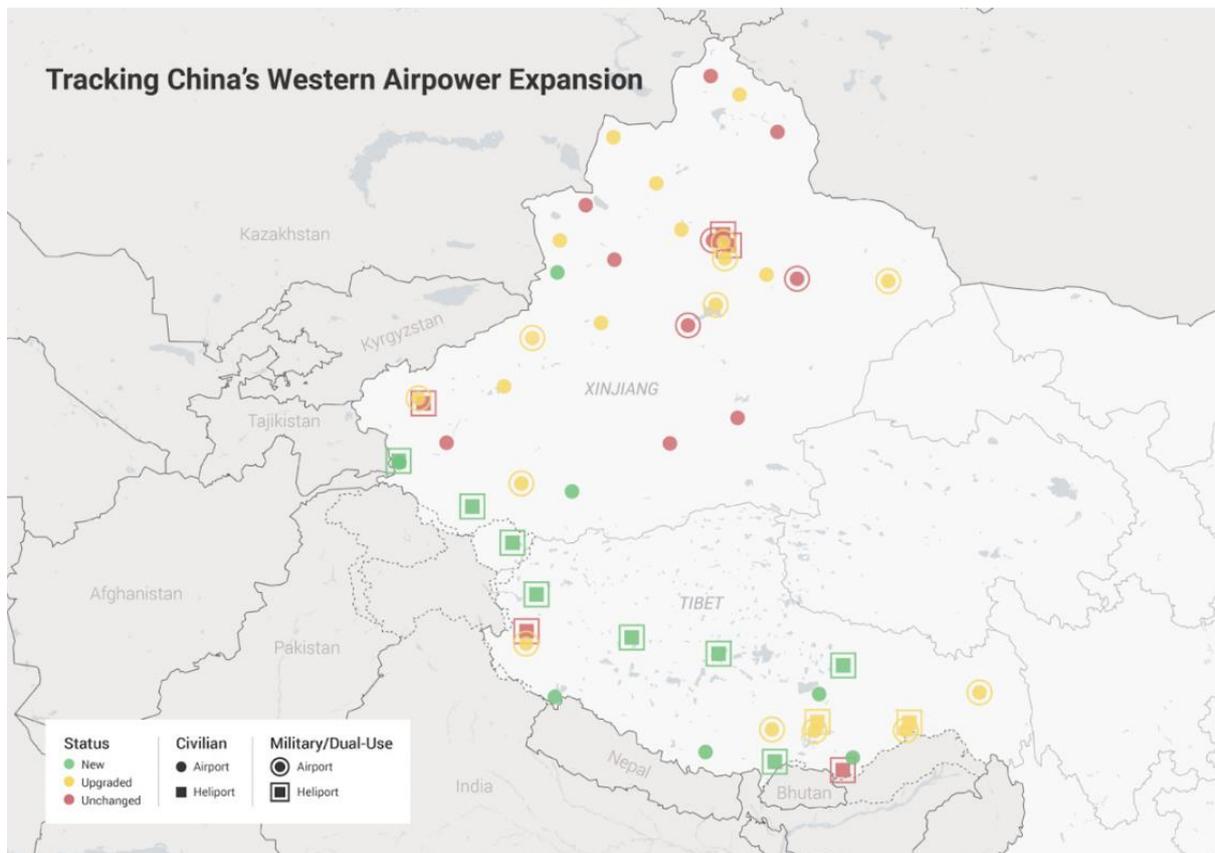
"Aims to speed up its transition from territorial air defense to simultaneous offensive and defensive operations. It also aims to increase its capabilities in the areas of air strike, air and missile defense, early warning and reconnaissance, and strategic projection" (Lanzit & Allen, 2007, p. 439).

This shift mirrors the reformulation of the PLAN's operational mandate from maintaining positions geared at territorial defense to a mandate that also includes an increasingly offensive posturing. As with the PLAGF, the PLAAF has also decreased in total

personnel size, allowing for the recapitalization of funds and the formation of a slimmer but more professional force. The doctrinal shift in both the PLAN and the PLAAF, in line with personnel reduction and professionalization, indicates how China has sought to gradually implement its modernization program in practice.

The PLA has also invested significantly in the domestic air infrastructure in western China, bearing direct strategic ramifications for India. Different parts of the Indian-Sino border have become renewed flashpoints in recent years, most notably during the 2017 Doklam standoff and the skirmishes between Chinese and Indian troops along the Line of Actual Control (LAC) throughout 2020. Since Doklam, China has significantly ramped up its investment in dual-use infrastructure along the LAC in Tibet and Xinjiang (see Figure 7). If China and India engaged in a (limited) war along the LAC, the respective air forces would arguably be the largest force multiplier for either side, with the general inhospitality of the Himalayas making the deployment of ground troops a severe logistical challenge.

Figure 2: Chinese airports and heliports in Tibet and Xinjiang



Source: ChinaPower Project (2022).

Alongside building new airports and heliports that can be used by the PLAAF, China has also ramped up its investment in road and rail infrastructure in Tibet, seemingly to accelerate the transport of personnel and equipment to the LAC in case of a conflict (Reuters, 2020). The general expansion of dual-use infrastructure in Tibet in particular indicates that

China remains increasingly prepared for a potential conflict with India and treats air power as a key asset in a potential conflict.

In line with the deployment of PLAGF personnel in both regions, the concentration of a growing number of dual-use infrastructure in Tibet and Xinjiang simultaneously serves domestic security interests. Fears of ethnic unrest in Tibet and Xinjiang have intensified under Xi and if unrest was to break out (or the CCP would perceive there to be unrest), heliports could be used to quickly transport PAP/PLAGF units into the remote and inhospitable areas that characterize most of Tibet and Xinjiang. The expansion of military infrastructure in these areas thus serves both internal and external power projection capacities.

Especially when compared to the PLAN, the immediate effects of PLAAF modernization are not as apparent given that aircraft such as the J-20 remain effectively unproven in modern air combat. That said, the aerospace modernization drive has expanded the geographical reach of the PLAAF's strike force, including in China's maritime environment in the near seas. The expansion in air power projection capacities would also be key for a potential invasion of Taiwan. The PLAAF has thus developed into one of the PLA's key strategic assets.

PLARF

The PLARF, known until 2015 as the Second Artillery Corps, is another force multiplier in China's A2/AD capacities. The Corps was founded two years after China had successfully tested its first nuclear warhead in 1966 and was initially tasked with overseeing China's nuclear umbrella. Since then, the Corps/the PLARF has also assumed responsibility *"for the PLA's land-based ballistic and cruise missiles and serves as the cornerstone of the Chinese military's strategic deterrence and conventional precision strike capabilities"* (Chase, 2018, p. 1). As such, the PLARF has occupied an increasingly central role in China's deterrence system, including non-nuclear options.

China's missile umbrella fulfills defensive and offensive purposes. Missiles provide deterrence against foreign intervention in China and Chinese (or China-claimed) waters, especially through GLCMs (ground-launched cruise missiles) and SRBMs (short-range ballistic missiles). SRBMs can strike targets as far as 1000km away from base while more advanced weapon systems, such as IRBMs (intermediate-range ballistic missile), can strike targets within up to 5000km from deployment. As such, this missile shield is key not just for territorial defense but also the execution of a successful invasion of Taiwan and the repellency and delay of a potential American intervention in support of Taipei. The importance of Taiwan-related contingencies is exemplified by the concentration of PLARF brigades in Fujian, Guangdong, Jiangxi, and Zhejiang, the provinces in closest proximity to Taiwan. The SRBM systems stationed in these provinces (including the DF-15B and the DF-11A) could reach Taiwan within six to eight minutes (ChinaPower Project, 2020). Over the course of the 21st century China has also begun adding more MRBMs (medium-range ballistic missiles) and IRBMs to its missile portfolio (see Figure 9 below), enhancing its distant-strike missile capacities.

Table 7: Number of PLARF Brigades, 2013-2020

	IRBM	MRBM	GLCM	SRBM	Other
2013	0	3	2	8	18
2014	0	4	2	8	17
2015	0	4	2	8	18
2016	1	5	2	8	15
2017	1	5	2	8	15
2018	1	4	2	8	19
2019	2	4	2	8	18
2020	4	6	2	5	19

Source: ChinaPower Project (2020).

The specific investment in IRBM and MRBM (which can strike targets as far as 300km away) indicates that China's missile defense priorities have focused on expanding the geographical scope of the missile umbrella. Technological change and innovation in missile defense technology has also improved the survivability and accuracy of PLARF-used missiles (Bommakanti & Shivamurthy, 2021, p. 17). In practice, this allows the PLARF's conventional missile shield to project power over an ever-expanding area in the Western Pacific. The strategic implications, especially for Taiwan, are momentous: if war broke out in the East and South China Seas, China could inflict severe damages on its adversary while limiting area access to foreign navies. The deployment of MRBMs and IRBMs from non-coastal areas would also place PLARF brigades out of reach for air defense systems (Huang, 2022, p. 28). While this would not guarantee a Chinese victory, it makes foreign intervention an extremely (and increasingly) costly strategic decision.

The drive to expand China's missile umbrella is also reflected in China's military build-up in disputed maritime areas in the South China Sea. China has constructed runways and military infrastructure on Woody Island, Fiery Cross Reef, Mischief Reef, and Subi Reef (Asia Maritime Transparency Initiative, 2021). The infrastructure on these surface formations is key for air, naval and missile power projection as they include hangars that can store fighter aircraft as well as HQ-9 SAMs and YJ-12B anti-ship cruise missiles. Having access to offshore intelligence and data posts furthermore allows PLAAF aircraft to remain in communication with the base, enhancing their safety when executing operations. Besides enabling the PLA to enhance its power projection capacities surrounding vital SLOCs in the South China Sea via

the PLAN and the PLAAF, the build-up of Chinese military infrastructure also allows the PLARF to project its increasingly sophisticated missile shield over an expanding geographical area in the South China Sea and Southeast Asia.

In sum, the development and restructuring of the PLARF's strike capacities mirrors the restructuring of the PLAN into a force that is increasingly capable of projecting military power beyond China's immediate continental environment. Historically focused on overseeing China's nuclear strike potential, the PLARF has been refocused to strengthen China's conventional strike capacities, including through the acquisition of increasingly sophisticated medium and intermediate-range missiles. The PLARF also presents an additional protective layer for the activities of the PLAN and PLAAF.

Conclusion: Prospects and issues

How does China's rapid drive towards military modernization ultimately impact its military potential and posturing vis-à-vis other regional powers? All four branches above witnessed a thinning and professionalization of personnel, the attempt to enhance jointness between branches, and the acquisition of increasingly modern and up-to-date technologies that can rival that of other regional powers. The capacity to launch and sustain this form of modernization is inherently linked to the structure of the domestic defense industry and the degree to which the CCP can guide and direct this industry through civil-military fusion projects. Via joint ventures and partially through outright corporate espionage, China has been able to acquire and develop technologies that have significantly boosted its military capabilities, indicating the importance of civil-military fusion in China's broader military modernization approach.

Military modernization per se and the rate of military modernization since the 1990s should not detract from prevailing challenges in China's defense sector and concerns surrounding the capacity of the personnel. Aerospace development, for instance, has lagged behind R&D in other sectors (ChinaPower Project, 2021). Despite the drive towards modernization, the PLA has also had no active combat experience since 1979. This raises doubts as to whether upgraded equipment necessary translates into improved military performance on the ground (Heath, 2018; Kaufman & Mackenzie, 2009). Meia Nouwens (2020) notes that,

“Building a fully modern military will mean more than just building and deploying the “heavy metal” – ships, aircraft, modern artillery, and missiles. It has just as much to do with “heartware”, which in some ways can be much more complicated: recruiting and retaining talented personnel, educating them in new doctrine and modern warfare, and training troops in realistic conditions to achieve combat-readiness”.

Although it must be assumed that the PLA's growing military budget and enhanced sophistication has expanded its offensive and defensive capabilities, it remains to be seen how effectively the PLA could implement these advances in practice. As the war in Ukraine has shown, political commentators and intelligence communities may overestimate the military capacities of supposedly superior military powers. This is even more pronounced in the case of China given that China has no modern military performance to analyze. As such, significant ambiguity surrounding China's actual military capacities will remain as long as the PLA has not fought a war under modern conditions.

To some degree, the PLA also remains impaired by organizational issues. Chinese military analysts continue to criticize ineffective operational commanders and a fierce interservice rivalry that has persisted despite efforts to enhance jointness (Noon & Bassler, 2021). Despite decentralization efforts, the PLA continues to be a military force that prioritizes structure and hierarchy over ad-hoc decision-making by lower-ranking officers. Noon and Bassler (2021) highlight that “*Chinese commentators believe that mid-level operational commanders are not properly equipped for modern warfare*”, and express concerns “*that officer cadres cannot correctly judge battle situations, do not understand central leadership intentions, are unable to make operational decisions, cannot deploy troops, and are unable to deal with emergencies*”. These anxieties reflect the issues associated with the aforementioned lack of combat experience. The war in Ukraine has reaffirmed the importance of flexible set-ups, with post-2014 reforms in the Ukrainian Army supporting the relative strategic autonomy of units in the field by empowering lower-ranking officials to make ad hoc decisions (Abdalla et al., 2022). This prioritization of flexibility has made Ukrainian troops more situationally apt than their Russian counterparts. Given the organizational overlap between the PLA and the Russian military, the PLA may face similar issues when confronted with a smaller, well-armed military.

Despite the advances made by China since the 1990s, structural issues in both operational and organizational terms conclusively prevail, creating uncertainty as to how formidable a force the PLA has grown to be. Nouwens (2020) observes that although,

“The PLA has come a long way from its humble origins as a foot-soldier heavy and rudimentarily equipped military in the 1940s [...] the challenges the PLA faces to achieving full modernisation by 2035, while not insurmountable, are certainly not negligible”.

Analyses of the PLA’s trajectory must consequently seek to be neither naive nor overly alarmist. Although the PLA has improved its military capacity and has closed the gap to Western militaries, military gaps remain. These gaps, however, are in the process of becoming more insignificant. This is a development that must worry officials throughout the Indo-Pacific.

To counter China’s growing military clout in the Indo-Pacific, regional actors (such as Australia, India, Japan, and the US) must focus on developing more comprehensive security ties with other actors, including through collaboration with non-democratic and non-traditional partners, especially in Southeast Asia. Closer defense ties could be developed through the expansion of regional military initiatives, such as multilateral training, patrols, etc. A ramping up of Western, Indian, and Israeli arms sales to States throughout the region could enhance troop interoperability while fostering closer defense ties. Defense cooperation must simultaneously not be viewed as the largest front in anti-China policy: the threat posed by China, as well as the means through which China has projected power thus far, are more of economic than of military nature. While this can change as China’s military capacities grow, China-skeptical parties must invest in the deepening of trade relations with one another and the strengthening of global supply chains, especially regarding semiconductors. Any military program must ultimately be supplemented with economic and technological policies that directly benefit the effects of military deterrence.

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