

**Testimony before the U.S.-China Economic and Security Review Commission  
Hearing on China's Military Modernization and its Implications for the United States  
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By any measure, China already has the world's second largest defense budget. Unlike the globally-distributed U.S. military, the People's Liberation Army (PLA) focuses its military capabilities primarily in its immediate region, while seeking only gradually to expand its operational reach. This dynamic works strongly in China's favor vis-à-vis its core strategic priorities, and conserves resources. Fundamentally different American and Chinese military approaches prevents simple comparison of their overall forces from explaining their relative capabilities regarding peacetime influence or operational scenarios where it matters most: the contested Yellow, East, and South China Seas and the airspace above them. The PLA has acquired growing numbers of increasingly-capable weapons with this geographically-proximate theater in mind, and is striving to strengthen its personnel's ability to wield them effectively to further its unresolved island and maritime claims there. Yet critical uncertainties remain concerning Beijing's capabilities and intentions, both today and in the future. This testimony will therefore address:

1. The nature and state of China's military finances
2. Sources of opportunity and competition among China's services and other national spending priorities
3. Factors affecting the trajectory of underlying economic growth, which funds PLA development
4. How Chinese military resources, spending, and results should be evaluated given Beijing's increasing but still-limited transparency

### **1. China's Military Finances**

Annual multibillion-dollar defense budget increases suggest strong Chinese interest in furthering core strategic objectives, with those closest geographically to China prioritized. Every March, China announces its official defense budget for the forthcoming fiscal year. Beijing's rapid rise in national power across the board, together with its limited willingness to release specifics concerning military spending, ensure that this event attracts considerable attention worldwide. This past March, China announced a 2013 defense budget of 720.2 billion yuan (roughly \$US114 billion). This continues a trend of double-digit spending increases in *nominal* terms since 1989 (2010 was the sole exception, perhaps because of priorities adjustment in the wake of the global financial crisis).

While China's official defense budget does not reflect all of China's defense-related spending, the same is true (albeit sometimes to a lesser degree) for all nations, including the United States. Typically sweeping in generality, official statements nevertheless reflect the basic reasons for increases in Chinese defense spending: to

- compensate for past austerity, including revenues lost when the PLA was largely removed from commercial business
- modernize China's military
- develop and deploy new platforms and weapons systems, particularly with anti-access/area denial (A2/AD) capabilities, all increasingly networked with information technologies
- support growing long-distance operations per "New Historical Missions"
- attract and retain qualified personnel, many of whom have more lucrative civil sector options

- afford increases in the price of goods and commodities
- improve management, accounting, and place more spending “on the books”

Even inflation-adjusted, however, the PLA budget’s growth rate far exceeds those of Western militaries, including many of Washington’s traditional allies. Their budgets are typically either stagnating (including that of the U.S., when war expenditures are factored out and recent spending limitations are factored in), or declining absolutely (as in most of Europe). The major exception is Japan, whose defense budget rose in 2013, for the first time in 11 years, at an extremely modest nominal growth rate of 0.8% compared to China’s 10.7%.

China’s rapid economic growth and technological development have also facilitated military spending far outpacing, and the acquisition of capabilities that are in most cases vastly superior to, those of China’s neighbors. Association of Southeast Asian Nations (ASEAN) member states’ defense spending is rising too, but from a far lower base. According to SIPRI, China’s official nominal 2011 defense spending was 4.28 times greater than that of the ten ASEAN states combined, even though expenditures as a percentage of GDP were virtually equal.<sup>2</sup>

There is no robust Chinese equivalent to America’s growing debate today as to whether maintaining current defense spending levels should be a national priority given the opportunity costs. Instead, many Chinese support spending even more of Beijing’s rising tax revenues on the PLA. They believe it can be augmented somewhat without harming China’s rapid economic growth. In fact, military development is widely regarded as essential to furthering the Chinese leadership’s nationalist objective of achieving the “great rejuvenation of the Chinese nation.”

This already gives China sufficient funding to develop formidable military capabilities for use on its immediate periphery and in its general region, but not to develop a top-caliber globally-deployed force like that of the U.S. For navies in particular, attack is generally cheaper than defense. By largely, if decreasingly, focusing on potential conflicts in and over China’s borders and immediate terrestrial and maritime periphery, the PLA has rapidly exploited its geographical proximity and the vulnerabilities of its potential adversaries’ military technologies and force structures, potentially placing them on the costly end of a capabilities competition. This approach affords China asymmetric capabilities that are disproportionately efficient in asserting its interests, even though its overall defense spending still remains a distant second to America’s. For instance, while it is difficult to determine the cost of a DF-21D anti-ship ballistic missile (ASBM), even many such missiles would likely be far cheaper than the U.S. aircraft carrier they are designed to disable. One Chinese source estimates the cost of the DF-21D and its launcher at \$5-10.5 million per unit.<sup>3</sup> Based on this figure, Capt. Henry Hendrix, USN, emphasizes that even at an upper estimate of \$11 million, China could produce 1,227 DF-21Ds for the cost of a U.S. *Ford*-class carrier. Hendrix adds that only one ASBM would have to penetrate U.S. defenses to produce a mission kill, a prospect that could impose significant risk.<sup>4</sup>

By contrast, developing the capabilities necessary to project significant power and wage high- or even medium-intensity warfare further from China would require greatly-increased spending on new platforms, weapons, and supporting infrastructure; as well as enhanced training, operations, and maintenance. Such investments are likely to be increasingly inefficient, providing significantly less “bang” for a significantly larger “buck.” Political capital would be vital to achieve and maintain overseas access. China currently lacks useful military allies (North Korea being the technical but burdensome exception), and its defense industry must produce the entire range of weapons and equipment that the PLA uses.

For the next few years, China's military spending appears likely to be economically-proportionate and hence sustainable. Even during particularly-rapid defense spending increases over the last ten years, official defense spending has remained relatively constant and low as a percentage of the overall economy, accounting for just 1.3-1.5 percent of GDP. Even calculating off high-end foreign estimates of China's actual military budgets yields estimates of only 2-3 percent of GDP. This is not only lower than U.S. defense spending as a percentage of GDP, it is also lower by several-fold than even the low-end estimates of the Soviet Union's unsustainable, consumer-sector-stifling defense spending in terms of GDP at the height of the Cold War. China's rate of official defense spending growth has been roughly on a par with GDP growth, remaining largely in single-digits when inflation is factored in. These parameters suggest that while core national defense objectives are secondary only to regime continuity and domestic stability in Beijing's priorities, marginal military developments beyond these foundational imperatives take a back seat to economic development. China's leaders have internalized Soviet lessons on the dangers of military over-prioritization and strategic overextension, and appear determined not to repeat them. Particularly since the 1980s, they have coordinated military spending with economic trends.

## **2. Prospects for Inter-Service Budget Competition**

Unfortunately, no data concerning the actual breakdown of China's military budget by-service or within-service are presently available. But general prioritization and trends may be seen inductively from new Chinese hardware. What this all means in practice can be seen readily in Beijing's actual military developments since the late 1990s. China is developing a formidable set of military capabilities to ensure stability on its borders, and to attempt to shape territorial and maritime claims in its favor immediately beyond. It is pursuing an A2/AD-heavy approach by developing weapons systems and employment patterns designed to threaten foreign forces should they intervene in sensitive disputes on China's periphery. The goal is to deter such intervention in the first place and convince China's neighbors that they must settle disputes on Beijing's terms.

China is also developing power projection platforms such as aircraft carriers, and sending destroyers and frigates on naval diplomacy and non-traditional security missions, but these longer-range developments are happening gradually and do not represent high-end combat capabilities against another great power. Beijing can afford these efforts without making them the centerpiece of its investment.

China is thereby increasing emphasis on the roles, missions, and capabilities of the PLA Navy (PLAN), PLA Air Force (PLAAF), and Second Artillery Force (SAF), enhancing potential for inter-service rivalry. Growing Chinese external interests appear to be eroding the ground forces' still-preeminent power. Possible restructuring of the Military Regions—including reorientation in favor of a more outward-looking posture—appears to be under consideration, but doubtless faces considerable organizational complexity and resistance. The PLA has thus far declined to make a definitive announcement.<sup>5</sup>

As the ground forces gradually diminish in relative power, competition among the “three services and one branch”—a time-honored tradition in all militaries—will likely intensify. If defense spending increases slow down, or reverse, this will be even more severe. Each strives to develop in new domains, and can claim vital capabilities. With the most external geopolitical orientation and operations, the PLAN would seem—at least in theory—to have a strong claim to a growing piece of the budget pie. Moving from its current Near Seas-specific three-fleet structure, as some Chinese analysts have suggested, toward a two-ocean Pacific and Indian Ocean navy would demand more and better vessels.

Yet the PLAAF is also striving to control China's burgeoning military space assets, a circum-global capability vital to supporting information-age warfare. The SAF, since 1993, has assumed responsibility for both nuclear and conventional ballistic missiles and long-range, ground-launched land attack cruise missiles. Seven times more numerous than their nuclear counterparts, SAF conventional missiles represent one of China's most potent A2/AD capabilities. The SAF likewise seeks space responsibilities. Fielding a substantial operational nuclear ballistic missile submarine (SSBN) force might also generate friction between the PLAN and SAF.

### 3. Factors Affecting China's Economic and Military Funding Trajectories

One of the greatest challenges facing Xi Jinping and the economic reforms he envisions is that even as comprehensive implementation remains challenging over the next few years, larger structural factors are already beginning to slow China's economic growth overall. China's national power growth trajectory may be facing slowdown and dissipation. Beijing's leaders know *what* economic reforms are needed, but it remains unclear *how*, *when*, and *to what degree* they can actually *implement* them without assuming unacceptable political risks. This fundamental question remains unanswered.

The economic model that propelled China through three decades of meteoric growth appears unsustainable. China already suffers from acute domestic problems, including resource (water) constraints, environmental degradation, corruption, urban-rural division, and ethnic and religious unrest; these may grow further and be combined with looming demographic and gender imbalances to strain both China's economic development and internal stability. An additional risk factor is the global economy's potential to change (e.g., move away from concentrated, labor-intensive manufacturing) faster than China can adjust. These problems could combine with rising nationalism to motivate Chinese leaders to adopt more confrontational military approaches, particularly concerning unresolved claims in the Yellow, East, and South China Seas. Rather than portending an impending "collapse," however, these factors may herald China's version of the same slowdown in national trajectory that has afflicted great powers throughout history. This has direct implications for PLA development.

History suggests that great powers tend to follow an "S-curved" trajectory in which the very process of growth and development sows the seeds for its eventual abatement. Initial territorial and institutional consolidation and infrastructure development underwrites rapid growth, fueled by cheap labor and resources. Particularly impressive results may be achieved if the government promulgates and enforces effective policies in the right areas, and stays out of the way in other areas. Eventually, however, a wealthier society demands increases in wages and social spending. Improved living conditions and urbanization change social mores and individual priorities, thereby reducing birth rates while life spans lengthen and the elderly and infirm enjoy increasingly sophisticated, expensive healthcare. However morally desirable any of these trends may be, they all reduce economic and national power growth rates. Meanwhile, commitments abroad become unprofitable because of allied free-riding and collective action problems in public goods provision. GDP rarely falls in absolute terms, but growth levels out or at least slows.

While Beijing may have limited its foreign commitments for now—and even abandoned forms of foreign aid that were burdensome to an impoverished China during the Cold War—it may be headed for rapid changes domestically. In fact, the unleashing of Chinese society in 1978 followed a century of foreign predation and internal turmoil, and three subsequent decades of abnormally constricted individual and economic possibilities. This terrible past may have disguised China's post-1978 economic boom—facilitated though it was by pragmatic policies and globalization—as a "new normal."

In fact, it is more likely an exceptionally-well-managed but unsustainable catch up period. Beijing's one-time opportunity to funnel this pent-up national potential has produced the seeds of impending slowdown: urbanization of unprecedented scale and rapidity, coupled with the world's greatest artificial demographic restriction (the "one child" policy) and dramatic internal disparities. These factors may now be sending China along the "S-curve" faster than any other major power has gone before. Any relaxation of the one child policy is probably too little, too late for averting demographic slowdown. A new Chinese Academy of Social Sciences report projects that by 2030, China will have world's highest proportion of people over 65, higher than even Japan.<sup>6</sup> China is already approaching a labor shortage economy. A 2012 OECD report even forecasts that India and Indonesia will surpass China's growth rate by 2020.<sup>7</sup> China may thus be further along the S-curve than many realize.

Can China achieve an economic rebalance to avoid the "middle-income trap" that typically plagues developing economies before S-curve factors develop overwhelming momentum of their own? It seems unlikely that the leadership's goal of transitioning to a domestic consumption-based economy sufficient to support a new growth model can be achieved. A true transition from government investment and manufacturing toward an innovative service economy would require reforms that vested interests—unusually potent given rapid resource-intensive development within a closed political system—are likely to block. Leaders are likely to view breaking this policy logjam as too politically risky, too close to home. The heart of the problem is that China's leaders know what they need to do from an economic standpoint, but cannot do it fully because this would undermine their authority. Faced with this dilemma, short-term stability to preserve existing power structures seems poised to prevail. Even the vigorous Xi Jinping is likely to muddle through some of the most difficult areas, leaving insufficient progress before S-curve slowdown factors become increasingly limiting.

Moreover, even if implemented with the greatest success conceivable, some of the key reforms that Xi is proposing—and many of those most likely to garner popular support sufficient for their successful implementation—can themselves strengthen potent S-curve headwinds, and will even accelerate and deepen their impact. Some challenges stem from societal patterns that the U.S. and other Western nations are already suffering from, and which even China cannot escape—and may well narrow the gap quickly, before China is well-prepared. An aging society with rising expectations, burdened with rates of chronic diseases exacerbated by sedentary lifestyles, will probably divert spending from both military development and the economic growth that sustains it. Expanding China's welfare state, in particular, will crowd out other forms of spending, yet the floodgates appear already to be opening.

One of China's greatest strengths in recent years has been its ability to allocate tremendous resources rapidly to programs for security, infrastructure, and technology development. Many of these programs are seen as extremely inefficient. As competition for resources intensifies, the leadership's ability to allocate increasingly scarce funds effectively will face unprecedented tests.

Domestic challenges may place increasing demands on, and funding claims by, China's internal security forces, whose official budget already exceeds the PLA's<sup>8</sup> if funding for the paramilitary People's Armed Police is counted as internal (in keeping with China's own budget structure). Potential drivers include unrest in ethno-religiously-restive borderlands such as Xinjiang and Tibet as well as disaster relief, exacerbated by environmental degradation and climate change. Rising living costs and societal expectations may greatly increase the expense of current security approaches, which rely in part on large numbers of relatively low-paid individuals to provide physical security, surveillance, and monitoring of data from security cameras and other sources.

This has a special significance for China's ability to continue developing its external military capabilities. Beijing has judged that it can sustain multiple overlapping advanced programs simultaneously. China's shipbuilding industry—which, aside from its missile and electronics industries, produces China's most advanced indigenous defense products—has already proven able to do this with its simultaneous construction of multiple modern submarine and warship classes. Now China's military aviation industry, which has traditionally lagged, also appears to be making this important strategic breakthrough. In many key areas, China's number of multiple simultaneous programs is rivaled only by the U.S. But how long such dynamic investment can be sustained is unclear.

Within this larger context, manifold factors will likely increase costs and technological requirements and hence reduce the purchasing power of each yuan allocated to defense spending and restrain further budget growth and focus. These include:

- weapons systems and associated infrastructure, which are more expensive to build, operate, and maintain than their less-advanced predecessors
- investments in structural and organizational reform and associated demobilization costs
- rising salaries and benefits to attract, educate, train, and retain technologically-capable professionals
- growing entitlements, particularly as increasing numbers of retirees draw benefits

The closer the PLA approaches leading-edge capabilities, the more expensive and difficult it will be for it to advance further, or even to keep up with the general increase in global capabilities. China's cost advantages decrease as military equipment becomes less labor-intensive and more technology- and materials-intensive. The more sophisticated and technology-intensive PLA systems become, the less relative benefit China can derive from acquiring and indigenizing foreign technologies, and the less cost advantage it will have in producing and maintaining them.

Here China is on a demanding treadmill that has long bedeviled others developing advanced militaries. Maintaining a leading navy or air force, for instance, is increasingly expensive. Military shipbuilding cost escalation approximates that of other weapons systems, such as military aircraft, making this a revealing example.<sup>9</sup> Cost control is complicated by relatively small production numbers in the best of cases and rising standards—today's ships and the conditions under which they are produced and operated are far more sophisticated than their predecessors. In his classic treatise, Philip Pugh marshals considerable historical data to suggest that while countries tend to spend a constant percentage of their economy on defense over time, the cost of ships and weapons increases faster than inflation—typically at 9%. At 2% inflation, this would compound to costs doubling each decade. Pugh finds that even 2% per annum naval budget growth—excessively optimistic for most developed Western nations—would tend to require an annual average 3.5% reduction in fleet numbers. In practice, navies find ways to save costs and innovate (e.g., by shifting given missions to smaller platforms).<sup>10</sup> In an example of its emphasis on civil-military integration, China is accomplishing just such a mission shift by strengthening its coast guard (consolidating its structure and increasing its size) and assigning it missions that PLAN forces had previously. Eventually, however, navies typically find that the cost growth challenge is constant and forces major numbers reductions over time.

A RAND study similarly concludes that the cost growth rate for U.S. Navy vessels over the past half century is 7-11%, with economy-related factors approximating inflation and customer-driven demands accounting for the remaining majority. Of these, ship weight, power density, and sophistication are the largest cost drivers.<sup>11</sup> In Pugh's analysis, such dynamics make it essential to avoid the "Everest

syndrome”—constant selection of the most advanced ship possible over a more conservative approach based on competition with actual adversary capabilities.<sup>12</sup> Mass production of the Type 056 *Jiangdao* corvette and Type 022 *Houbei* fast attack craft suggests Chinese avoidance of the “Everest syndrome” in pursuing proximate priorities thus far. A Chinese buildup of aircraft carriers and other large vessels, by contrast, could change that dynamic to Beijing’s detriment.

A combination of rapid GDP growth and shipbuilding prowess puts a country in an enviable sweet spot. Between the world wars, for instance, Japan’s rapid economic growth enabled it to bear ever-increasing ship development costs at a constant defense burden.<sup>13</sup> World naval powers, including Holland, the UK, and the U.S., have likewise enjoyed such conditions in their years of rapid growth. Today China enjoys a similar combination of factors, but this is unlikely to last.

By developing and deploying advanced technologies, China is raising the bar for regional capabilities competition. An action-reaction cycle forces it to spend ever-more on more-advanced systems to narrow the gap with the U.S. and Japan and stay ahead of other regional rivals. Political scientist Minxin Pei warns that by pursuing gradualist, incomplete reforms, Beijing risks a “trapped transition” instead of transformation into a full market economy. An analogous “trap” may also emerge for the PLA as it strives to transition from a homeland and periphery-focused, people-intensive, mechanized force into a broader-ranging, technology-intensive, information-enabled force. A slowdown in the PLA’s recently-rapid progress looms as fewer easy improvements remain available and the costs of advancement rise even as objectives grow more ambitious than ever.

In particular, by wielding asymmetric weapons, China suggests their efficacy and writes potential adversaries a potent playbook. This portends a new era in A2/AD systems, which Chinese forces themselves may face from other nations. Japan and Vietnam in particular may attempt to deploy missiles, naval mines, and torpedoes to complicate Chinese forces’ ability to prevail in conflict.<sup>14</sup> While China can already exploit its geographical proximity to nearby conflict zones by deploying many overlapping forces to attempt to defeat and overwhelm such approaches, it is far from being able to defend its forces effectively if they face such challenges from a capable power further afield, e.g., India. The likelihood that the PLA will get “trapped” in its region with respect to high-end warfighting capabilities will increase still further if China’s growing military power and assertiveness leads its neighbors to accelerate nascent balancing against it.

To be sure, there are several important caveats to this larger analysis. First, there is a lag effect. Ships purchased on favorable terms today can benefit Beijing for years to come. China currently lacks the unstable business and vendor base of its Western shipbuilding counterparts, factors that increase costs. No other major shipbuilder appears poised to overtake it as the world’s foremost civil shipbuilder by volume, and it is working up the value chain in both military and civil domains. Yet history suggests that China will face difficult choices in the future, particularly as its economic growth slows. Throughout history, lower economic growth rates have tightened shipbuilding budgets, confronting navies with more difficult choices. Straight-line projections only last so long.

Second, slowdown could stimulate innovation. Today’s massive R&D coupled with tomorrow’s slowdown could generate revolutionary Chinese military capabilities that both surprise and challenge the U.S. China is presently investing in military R&D supported by an economy that grows fast enough to support the faster-than-inflation growth of military technology. S-curve factors are likely to render this unsustainable, eventually leaving China with an increased sense of its own capabilities, perhaps some form of overseas commitments (protecting citizens, property, and access to critical resources), and all of

the problems maintaining forward military progress that presently plague the European and American militaries. At that point, China, seeking relief from the cost-compounding treadmill, may seek to field a radical, disruptive new capability to achieve its goals more efficiently. Such an approach already emerged at a lower level of Chinese capacity, when the 1999 Belgrade Embassy Bombing persuaded China's leadership to fund "assassin's mace" megaprojects to develop weapons of disproportionate effect like the ASBM. In addition to cost-curve dynamics, another similarity to 1930s Japan and today's China is the extreme opacity of military-technological development. Pugh maintains that Japan's Long Lance oxygen-driven torpedo was the single example of a major leapfrog innovation that was kept confidential for a long time, possibly the only such example in all of naval history. But the U.S. government would be unwise to assume that it could never be surprised again.

#### **4. Analytical Approaches to Limited Transparency**

China has rightly been criticized for military opacity. Beijing maintains that transparency concerning strategic intentions is more important than transparency concerning specific capabilities at the operational and tactical levels. In that spirit, it does indeed make general statements that largely describe the trajectory and objectives of its military development. China's 2004 Defense White Paper offers an example: "The PLA will promote coordinated development of firepower, mobility and information capability, enhance the development of its operational strength with priority given to the Navy, Air Force and Second Artillery Force, and strengthen its comprehensive deterrence and warfighting capabilities."<sup>15</sup> At the same time, however, Beijing makes categorical statements that may not remain true in the future ("China lacks overseas military bases") or are so vague ("China will never seek hegemony") as to avoid addressing other nations' concrete concerns.

Chinese media reports tend to summarily dismiss reasonable foreign (and some domestic) concerns about Beijing's limited defense spending transparency and rapid military development, failing to recognize both the potential threat that China's increasingly capable military poses to its neighbors and the fact that these neighbors have legitimate rights and interests of their own. Especially in the case of China's official mouthpieces, there is very little room for alternative views or expressions of concern about Beijing's actions and their external consequences; criticisms are routinely rejected as machinations of "anti-China" elements aimed at hyping a "China military threat theory" for craven motives.

As Chinese spokespeople correctly point out, there is no universal standard for military budget categorization or transparency. No nation's official defense budget contains all defense-related spending. Indeed, while China's falls far below typical standards of Western industrial democracies, there are many developing nations with similar lack of disclosure. At the margins, Beijing has increased transparency slightly over time concerning defense budget reporting. As in so many other areas of Chinese development, this progress is from a very low baseline.

However, observers increasingly state that, having the world's second largest defense budget, China is already in a very different category from the vast majority of nations—developing *and* developed—and should therefore be more forthcoming about its capabilities to address others' concerns. A good next step, in keeping with Beijing's emphasis on the UN's paramount importance, would be to move from submitting merely a Simplified Reporting Form to submitting a Standardized Reporting Form, as the U.S. and most other industrialized democracies already do.

Under such conditions, significant limitations remain concerning details about China's military spending and capabilities. It remains difficult to assess:

- how much exactly China spends on its military, particularly in specific areas
- how far that money goes given China's lower cost structure
- what is the quality and performance of the resulting products

It is nevertheless possible to draw meaningful inferences from macro level data and strategic trends. Multiple factors suggest that China's official figures increasingly reflect its military spending. Numerous reforms in PLA professionalism and accounting have put an increasing portion of revenues and expenditures on the books. Yet the dearth of specific data disclosed by China's government leaves obtaining internal information by other means or inductive estimation as the only alternatives for determining the precise extent and nature of Chinese defense spending. Both these approaches are beyond the capacity of individual civilian researchers.

When China buys export weapons, associated literature usually offers some details, but especially as China invests in its own systems it is often difficult to understand what even China's well-known, obvious platforms are capable of doing at a meaningful level of specificity—a possible source of an American “Everest syndrome” in response. Numerous practical problems with using military equipment in the field are difficult to quantify for the military of any nation, including China's. Measuring the ability of a country to employ sophisticated equipment in a realistic, challenging environment necessitates estimation of effective capability—likewise difficult. Determining net capability by factoring in opposing systems is often impracticable using open sources, even with significant simplifying assumptions.

These limitations in available detail about both capabilities and funding make meaningful comparisons difficult. On the capabilities side, for instance, open sources indicate that the Type 093 nuclear-powered attack submarine (SSN) was launched in 2002, but still do not reveal how quiet it is or how well its sonar works—leaving little basis to compare it against advanced opposing systems.<sup>16</sup>

The best evidence of the tremendous challenges in this regard is the paucity of published studies in this field. Truly detailed, reliable inductive estimation has not even been achieved by research organizations capable of devoting multiple specialists to making relevant calculations. Even some of the most comprehensive, sophisticated efforts, by IISS and SIPRI, have yielded only general estimates.

A prime example of the barriers to inductive calculation that even capable organizations face can be found in the challenges of one of its most conceptually straightforward subcomponents: calculating the cost to China of producing a given platform or weapons system. Simply extrapolating from known rough equivalents in one's own country may not yield reliable results given China's very different, poorly understood, and possibly still-unsystematic input pricing. Then there is the question of whether, to what extent, and how to factor in purchasing power parity. As a result, truly intensive, systematic efforts may yield general cost estimates of some platforms with commercial analogues (e.g., simpler surface ships), but not those with few commercial connections (e.g., missiles). Moreover, even achievement of a few rough estimates leaves vast areas uncovered, and the task of overall estimation unmanageable.

Specialists who have attempted such investigations suggest that one of the few reliable conclusions of their herculean efforts was that China enjoys great cost advantages in certain defense industrial areas

(e.g., electronics, missiles, space, and shipbuilding; perhaps less so with aircraft), especially for capital costs like tooling. It may thus be able to afford tremendous armaments development even at its announced budgetary levels, though productivity and quality remain uncertain in many respects. For instance, AMI International estimates the “total acquisition cost” for a *Yuan*-class (041/039A) conventionally-powered submarine at US\$200 million and a *Jin*-class (094) SSBN at US\$1.3 billion. Yet it acknowledges that “a core assumption behind our estimate” is “that the Chinese are able to build their submarines at lower acquisition cost than comparable products from Europe (much less the United States). ... the Chinese have not stated or published their spending on submarines or any other naval platforms.” Specific factors include “lower cost of labor and materials in China, construction in state-owned shipyards, and use of systems and weapons developed ‘in house’ rather than more expensive sourcing from (foreign) commercial subcontractors....”<sup>17</sup> Similarly uncertain estimates suggest that China’s J-10 fighter may cost roughly \$28 million per aircraft and the J-20 \$100 million per unit. If true, this would make them cheaper than more advanced American counterparts, but approaching similar Russian systems.<sup>18</sup>

As for other possible capabilities, China also has the potential to use autonomous underwater vehicles (AUVs) to conduct underwater wartime missions (cutting seabed cables, laying mines, and hunting submarines). Civilian AUVs rely on similar underlying technologies, and China is engaging in considerable research in this area.<sup>19</sup> Even this discrete capability still defies accounting, however, as open sources offer insufficient details to permit an accurate cost assessment.

Yet it will also be important to examine the progression of China’s many simultaneous development programs through the end of their research, development, and acquisition cycles. China has many systems simultaneously in development (including the J-20 and J-31), but—particularly in the case of fighter aircraft—the rapidity with which they can transition to deployment with full operational capabilities remains to be seen.

Given these challenges faced by specialists, it is instructive to consider the foreign organization that combines the greatest capability to estimate the PLA’s budget with some ability to publish its findings: the U.S. Department of Defense. DoD’s estimate of China’s “total actual military-related spending” in relation to Beijing’s official figure fell from ~3.25 fold in 2002 to 1.43-2.14 fold in 2008 to 1.13-1.70 fold in 2011. While this ratio climbed back to 1.27-2.02 for 2012 (\$135-215 billion vice the official \$106.7 billion), DoD acknowledges that “it is difficult to estimate actual PLA military expenses due to China’s poor accounting transparency and incomplete transition from a command economy.”<sup>20</sup>

While DoD does not disclose its methodology or any related details, its estimates give strong reason to believe that China’s official budget does increasingly reflect defense-related spending. Together with adjusting for inflation, this suggests that China’s defense spending is:

- among the world’s highest, in both absolute and growth-rate terms
- increasingly “on the books”
- affording the PLA significant capabilities
- sustainable
- capable of being raised substantially in the near future if Beijing saw fit to do so

More specific information and evidence concerning categories of spending included in China’s official military budget would help better determine what proportion of spending it actually reflects. This could help reduce uncertainty about whether Beijing was effectively hiding a significant proportion of military

spending. Budget breakdowns by-service and within-service would yield valuable indicators regarding PLA development priorities and capabilities.

Meanwhile, larger data points and dynamics concerning China's hardware deployments, personnel structure, and national health and wealth offer useful indications concerning medium- and long-term trends. Here are the larger questions that must be answered accordingly:

- How long can China's rapid growth last?
- During this time, how can the U.S. prevent China from using force, or the threat of force, to harm the regional status quo or the norms that sustain it?
- What capabilities and partnerships does the U.S. need to do so?
- How can Washington implement the most time-sensitive of these measures promptly?
- How can the U.S. demonstrate required presence credibly?
- How can the U.S. sustain necessary investment?

<sup>1</sup> The ideas expressed here are those of the author alone, and do not represent the policies or estimates of the U.S. Navy or any other U.S. government organization. They draw on Adam Liff and Andrew Erickson, "Demystifying China's Defence Spending: Less Mysterious in the Aggregate," *The China Quarterly* 216 (December 2013): 805-30; Erickson and Liff, "China's Military Development, Beyond the Numbers," *The Diplomat*, 12 March 2013; Erickson and Liff, "A Player, but No Superpower," *Foreign Policy*, 7 March 2013. The author thanks several reviewers for helpful suggestions.

<sup>2</sup> Ron Matthews and Alma Lozano, "Evaluating Motivation and Performance in ASEAN Naval Acquisition Strategy," in Geoffrey Till and Jane Chan, eds., *Naval Modernisation in South-East Asia: Nature, Causes and Consequences* (New York: Routledge, 2014), 57.

<sup>3</sup> Qiu Zhenwei and Long Haiyan, op. cit. "China's Anti-Ship Ballistic Missile Program: Checkmate for Taiwan?" *The Taiwan Link*, 17 June 2009, [http://thetaiwanlink.blogspot.com/2009/06/chinas-anti-ship-ballistic-missile\\_17.html](http://thetaiwanlink.blogspot.com/2009/06/chinas-anti-ship-ballistic-missile_17.html).

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