

# Applying Cost Imposition Strategies against China

*Col Kenneth P. Ekman, USAF*

## Abstract

Cost imposition strategies focus on eliciting an adversary response that creates a hardship differential favoring the initiating nation. There is new interest in cost-imposing strategies as the most beneficial element of the competitive spectrum. If applied against China, cost-imposing strategies can succeed when based on correct predictions of Chinese responses and accurate accounting for the monetary and other security costs involved. In the air domain, competition involving China's ballistic and cruise missiles, surface-to-air missiles (SAM), and fighters offers the United States different degrees of advantage and hardship. Defense decision makers will find that cost imposition is not a panacea. They should understand the concept beyond its current level of misuse both for the disproportionate advantage it offers and for the liability it poses when used against America. To institutionalize the practice, the Department of Defense (DOD) should revive the competitive strategies structure and methods developed in the 1980s. Implementation will require overcoming institutional resistance, short time horizons, and significant fiscal constraints.



Over the last year, the potential to foist disproportionate peacetime military investment burdens on rival countries has sparked the inter-

---

Col Kenneth P. Ekman is commander, 8th Fighter Wing, Kunsan Air Base, Republic of Korea. He served in a variety of operational and staff assignments, including air component strategist and fighter analyst in the Office of the Secretary of Defense/Office of Cost Assessment and Program Evaluation. Colonel Ekman graduated from the USAF Weapons School, the Air Command and Staff College, the School of Advanced Air and Space Studies, and was an executive fellow at The Brookings Institution.

This article is a condensed version of Colonel Ekman's Federal Executive Fellowship Policy Paper, first published by the Center for 21st Century Security and Intelligence at The Brookings Institution in May 2014.

## Report Documentation Page

*Form Approved*  
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE <b>2015</b>	2. REPORT TYPE	3. DATES COVERED <b>00-00-2015 to 00-00-2015</b>	
4. TITLE AND SUBTITLE <b>Applying Cost Imposition Strategies against China</b>		5a. CONTRACT NUMBER	
		5b. GRANT NUMBER	
		5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)		5d. PROJECT NUMBER	
		5e. TASK NUMBER	
		5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Air Force Research Institute (AFRI), Strategic Studies Quarterly (SSQ), 155 N. Twining Street, Maxwell AFB, AL, 36112</b>		8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)	
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>			
13. SUPPLEMENTARY NOTES			
14. ABSTRACT <b>Cost imposition strategies focus on eliciting an adversary response that creates a hardship differential favoring the initiating nation. There is new interest in cost-imposing strategies as the most beneficial element of the competitive spectrum. If applied against China, cost-imposing strategies can succeed when based on correct predictions of Chinese responses and accurate accounting for the monetary and other security costs involved. In the air domain, competition involving China's ballistic and cruise missiles, surface-to-air missiles (SAM), and fighters offers the United States different degrees of advantage and hardship. Defense decision makers will find that cost imposition is not a panacea. They should understand the concept beyond its current level of misuse both for the disproportionate advantage it offers and for the liability it poses when used against America. To institutionalize the practice, the Department of Defense (DOD) should revive the competitive strategies structure and methods developed in the 1980s. Implementation will require overcoming institutional resistance, short time horizons, and significant fiscal constraints.</b>			
15. SUBJECT TERMS			
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>	<b>Same as Report (SAR)</b>
			18. NUMBER OF PAGES <b>34</b>
			19a. NAME OF RESPONSIBLE PERSON

est of policy makers and defense practitioners alike. Think tanks like the Center for Strategic and Budgetary Assessments and the American Enterprise Institute have included cost imposition in their prescriptions for future US security strategies. Long-range planning efforts like the DOD *Quadrennial Defense Review* have also considered the approach.<sup>1</sup> Research and development agencies like Defense Advanced Research Projects Agency included the principle when considering new ways of achieving air superiority.<sup>2</sup> Senior military officers have used the term to characterize advantage and disadvantage relative to America's competitors.<sup>3</sup> Further, in his proposed amendment to House Resolution 4310, the National Defense Authorization Act for Fiscal Year 2013, Congressman Randy Forbes tasked the DOD "to conduct a study to identify cost-imposing/competitive strategies focused on countering potential challenges posed by foreign nations."<sup>4</sup> Hence, "cost imposition" is rapidly becoming today's strategic concept of choice, suggesting the possibility of attaining greater strategic advantage relative to US rivals.

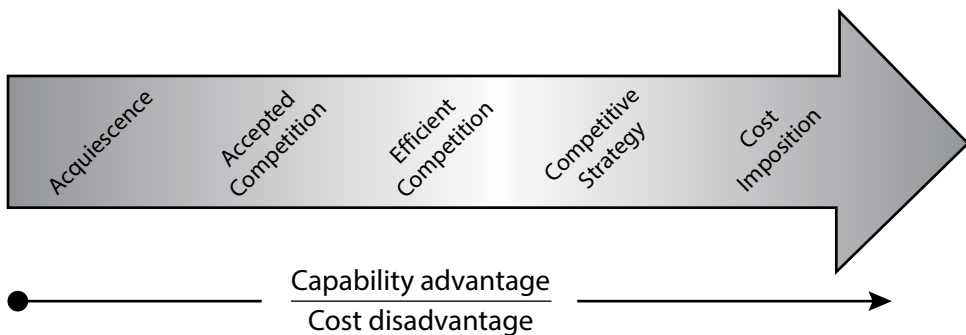
This article attempts to clarify cost-imposition methods for defense decision makers while applying them to a military competition with China. China's growing influence and aggressiveness appear threatening to US interests and allies in the Far East. Militarily, it has improved its capabilities to challenge US access and security guarantees, including general assurances in the Taiwan Relations Act. The military dimension of US-Sino relations is undeniably competitive, and opportunities for imposing costs upon China may exist as the competition unfolds. The argument begins by defining the concept of a cost-based competitive spectrum leading to cost imposition. It continues by accounting for the range of cost factors between security competitors and delves into *reacting opponent* responses, decisions, and choices linked to the *initiating competitor's* actions. Finally, it presents cost-imposition prospects inherent in key contests between US and Chinese air forces and suggests program, posture, and operating concept changes that could benefit America within each exchange.

## **Defining the Competitive Spectrum**

In a military sense, competition consists of a contest to create an advantageous differential in military capabilities, capacities, and perhaps options between rivals. Competitive strategy, as implemented by the

DOD in the 1980s, involved “aligning enduring American strengths against enduring Soviet weaknesses . . . to force the Soviets to perform less efficiently or effectively.”<sup>5</sup> Here cost imposition is defined as a more finely tailored competitive strategy whereby program, posture, and operational concept choices lead an adversary to incur greater hardship—fiscal or otherwise—through disadvantageous competition. These costs are incurred in peacetime though the relationship between prewar choices, and the ability to inflict or avoid damages in war should be considered, as the former sets conditions for the latter.

Yet, not every military competition is conducive to, or appropriate for, a cost-imposing approach. Identifying candidate areas for cost imposition involves less an either-or choice and more a correct assessment of where a capability standoff falls along the larger spectrum of military competition (*see* fig. 1). In this case, the competitor’s measure of effectiveness consists of the capability advantage created by the choice divided by the commensurate cost or hardship disadvantage. Contests where the competitor realizes less capability advantage or suffers more disproportionate costs fall further left on the spectrum. In some military strength comparisons, a competitor could *want* a rival to have greater strength.<sup>6</sup> These capability areas could include humanitarian assistance and disaster relief, nuclear weapons command and control, or internal security. Figure 1 depicts the resulting cost-based competitive spectrum, showing a trajectory leading to the best case though infrequent option whereby a nation can elicit an advantageous hardship differential from an adversary.



**Figure 1. Cost-based competitive spectrum**

From a direct investment perspective, *acquiescence* represents the cheapest and least capable cost-based competition. Here, the competitor chooses to allow an adversary's strength to go uncontested and saves resources in the process. Collective security agreements may permit the competitor to make this choice, as in the case of 25 nations that forego an indigenous nuclear capability while bandwagoning under the US nuclear umbrella.<sup>7</sup> In other cases, adherence to weapons-control regimes leads a nation to refrain from adopting certain capabilities like nerve agents, cluster munitions, and space weapons. Finally, the cost or adaptation required to field a competing or countering capability might simply be too much. The Soviets appear to have acquiesced when faced with the prospect of the US Strategic Defense Initiative. Unlike some of its extremist adversaries, the United States has chosen not to field a weapons system comprised of suicide bombers, though the DOD has taken other steps to mitigate this strategy. While acquiescence may appear to offer savings, the collateral costs required to compensate in other areas hardly make acquiescence a free option or an enduring choice. These include the autonomy ceded to join collective security agreements and the potential vulnerability of a competitor's vital interests in the event of conflict.

In a more active though costly approach, a nation could *accept competition* with a rival in a certain capability. Opting to compete creates further choices dealing with sufficiency. Reconciling an element of their military means with their security ends, competitors can compete to win, compete to achieve parity, or compete to create a lesser disadvantage. In setting this balance, a nation can elect to develop either a competing or a countering capability—or a combination of both.

Tradeoffs between quality and quantity and the Soviet conception of “correlation of forces” speak to the pursuit of *efficient competition*. The competitor could develop and operate a weapons system less expensively, as China's People's Liberation Army Air Force (PLAAF) was able to do by purchasing discounted fighter aircraft from the former Soviet Union in the mid-1990s.<sup>8</sup> Alternatively, a nation could enhance the system's effectiveness by employing superior operating concepts, such as the “initiative, innovation, and self-reliance” practiced by Western aircrews, providing them an advantage over their more numerous Soviet rivals.<sup>9</sup> The competitor could also develop and integrate new technologies, potentially delivering more capability for every dollar spent, as occurred in

the transition to precision-guided munitions. By partnering with other countries possessing complementary weapons systems, the nation can leverage additional capability and capacity. Furthermore, the competitor can shoulder reduced deterrent clout and additional risk should conflict occur by accepting disadvantage in the capability contest. Within the cost-based competitive spectrum, the majority of military rivalries appear to involve either accepting competition or competing efficiently.

The *competitive strategy* approach imparts a new level of effectiveness and efficiency, where a nation possesses an advantage while its rival is disadvantaged. In 1972, Andrew W. Marshall penned *Long Term Competition with the Soviets: A Framework for Strategic Analysis*, proposing that the United States was in a protracted contest with the Soviet Union for military strength, economic growth, and international influence. This realization prompted the national security establishment to focus on cultivating areas of military capability where America already possessed a distinct advantage over the Soviets through the method of competitive strategies.<sup>10</sup> The Reagan administration institutionalized the US-Soviet competition by creating the Competitive Strategies Office as an element of the Office of the Secretary of Defense and charged the organization with devising competitive initiatives vis-à-vis the Soviet Union. It functioned until 1991.<sup>11</sup> As a champion of the concept, Secretary of Defense Casper Weinberger claimed several American competitive strategy successes.<sup>12</sup> For example, he identified competitive success in antisubmarine warfare capabilities, made possible by US technological advantages in manufacturing, signals processing and acoustics, forward basing of these capabilities on the Soviet periphery, and submarine employment doctrine.<sup>13</sup> By choosing further investment in these advantages, the DOD elicited from the Soviets “disproportionate expenditures” to reduce the US threat to their submarine force.<sup>14</sup> As part of this response, Soviet conventional fleet design focused on defending areas close to the Soviet mainland, rather than projecting these forces long distances to threaten American assets in the US littoral.<sup>15</sup>

Within the spectrum, *cost imposition* represents the holy grail of military competition. Necessary preconditions include the requirement and will to compete, the impetus to do so efficiently, and the potential to do so from a position of capability advantage with ability and intent to elicit a disadvantageous response from an adversary. For the DOD, cost imposition should be waged within a larger framework of military

competition as an extension of competitive strategies. Successful cost-imposing strategies yield benefits offered by the range of competition types further left on the spectrum, while allowing the initiating competitor to endure less hardship than an adversary does.

In January 1966, Secretary of Defense Robert McNamara cited cost imposition against the Soviet Union as partial justification for acquiring bombers.<sup>16</sup> America leveraged its superior manufacturing, exterior lines offered by bomber bases both at home and abroad, higher quality aircrews, and lead in technologies including radar, navigation aids, communications, and—more recently—stealth.<sup>17</sup> The offensive, low-altitude, and low-observable threat these capabilities posed exploited Soviet paranoia. In response, the Soviet Union fielded over 10,000 SAM systems, numerous early warning and fire-control radar systems, tens of thousands of air-defense artillery systems, and at least 15 different major aircraft systems—many of which were single purpose interceptors.<sup>18</sup> One appraisal listed Soviet expenditures on SAMs alone at \$120 billion to protect the nation's 12,000-mile border.<sup>19</sup> The same group of authors asserted, "American investments in stealth and bomber aircraft in the 1970s compelled the Soviet Union to pay a substantially higher price to continue guarding its airspace from any intruder."<sup>20</sup> In the decade prior to the formal advent of the competitive strategies initiative, the Soviet Union's military expenditures exceeded those of the United States by 50 percent.<sup>21</sup> Through these investments, the Soviets attained substantial numerical superiority in a wide array of capabilities and were reducing their qualitative disadvantages as well. However, the successful US competitive strategy amounted to closing the military gap in effective and efficient ways that avoided "matching the Soviets tank for tank, ship for ship, or aircraft for aircraft."<sup>22</sup>

### **Accounting for Costs**

Cost imposition denotes a balance or calculus for gauging a differential in hardship between an initiating competitor and a reacting opponent. These costs can be monetary or less tangible, vary temporally from obsolescence to forward-looking, and create a range of consequences based on the economic strength and composition of each competitor. Clear accounting of costs becomes more important when predicting or assessing the relative advantage represented by hardship differentials.

The most obvious category includes direct investment costs associated with competing weapons systems. Such expenses would include development, procurement, operating, and modernization costs, as well as costs of associated armament. Using a fighter aircraft example, the imposition calculus would weigh direct investments in each competitor's fighter aircraft arsenal and associated weapons but would include only the portion of those fighter inventories most likely to be engaged in a direct confrontation between the competitors. While immediate program costs only capture a portion of the fiscal burden associated with specific weapons systems, a more comprehensive balance would include personnel costs, leading to consideration of individual service member productivity, unit manpower compositions and associated pay scales, and the broader array of military member entitlements and benefits.<sup>23</sup> Furthermore, a weapons system only comprises one ingredient of an operational capability. Better accounting would include program costs for enabling weapon systems. Going back to the fighter aircraft example, comparisons would include the personnel costs associated with operations and maintenance. Such accounting would also include costs of base support structures and maintenance depots, along with the expenses associated with the mobility, air refueling, and command and control platforms and networks necessary to organize, to train, and to equip the fighter force and to employ it in the security competitor's theater.

When facing a military capability threat, a rival nation can choose to field countering or asymmetric capabilities rather than directly competing technologies.<sup>24</sup> Oftentimes, this is not an either-or choice but rather a mix of competing and countering capabilities. Using the fighter force example, a rival nation could choose to compete via a modest investment in its fighter force, while favoring instead greater investment in SAMs and anti-aircraft artillery. From a cost imposition perspective, countering capabilities can induce steep gradients in investment playing fields for all players. A countering capability fielded by a reacting opponent can change the entire calculus. The tendency would be for the counter, in lieu of the directly competing alternative, to be cheaper and thus more advantageous for the reacting opponent. A better measure of cost imposition might include costs of previously fielded systems made obsolete by new capabilities. Loss of utility for sunk costs may constitute an economic and security disadvantage to a competitor. When considering these costs, an imposition calculus will have to include some criteria



to discern between modicums of capability advantage associated with a typical arms competition spiral and fundamentally game-changing capabilities that truly marginalize the preceding capabilities they counter.

Recognizing areas where the United States is a target of an adversary's cost imposition efforts may provide new ways of thinking about how to reduce hardships through more efficient competition. Changes in how America develops, procures, and sustains weapon systems can improve the balance. Personnel and installation costs offer significant potential—as does divestiture of weapons systems—having little impact on already disadvantaged competitor choices. Sustaining long-standing postures benefitting previous competitions entails foregone present and future opportunities. Operational concepts that proved advantageous when confronting lesser competitors may elicit no beneficial response from a peer competitor and thus merit revision. For example, projecting land-based fighters from invulnerable bases and enabling them with tankers; command and control platforms; and intelligence, surveillance, and reconnaissance assets operating close to contested areas spurs few responses from China that benefit the United States. Indeed, insights provided by a cost imposition framework can be as useful in the losing exchanges they illuminate as in the opportunities they identify.<sup>25</sup>

Ultimately, monetary costs become relevant in a strategic sense only when placed in context of the national economies bearing them. Here, the scale and composition of each nation's economy becomes central. At one extreme, the United States can operate at a cost imposition disadvantage indefinitely against countries with small economies, simply because of its capacity to outspend them. These situations merely involve accepted competition where, at most, the United States could aspire to greater efficiency. With near-peer competitors like China, absolute investment costs must be placed in context and may be less relevant than percentages of gross domestic product (GDP) spent. In 2012, the United States spent \$646 billion on defense, equating to 4.2 percent of GDP.<sup>26</sup> At the same time, China spent approximately \$180 billion on defense, equating to approximately 2 percent of GDP.<sup>27</sup> Differences in total sums and percentages of GDP spent only approximate the hardship differential created by cost imposition. In the case of a global power like the United States, only a portion of the nation's spending involves competition with a particular opponent. One estimate attributes 35 percent of the DOD budget, or \$226 billion and 1.5 percent GDP, to Far

East force structure that could be used in a conflict with China, placing the United States and China much closer to spending parity in East Asia.<sup>28</sup> Where a security standoff ultimately leverages the will of each competitor's respective population, fiscal burdens at the national level comprise useful quantitative insights.

However, monetary costs only tell part of the story as they account for relative advantage. Cost-imposing strategies rely on fundamentally sound competition, waged efficiently, in a competitive strategies channel where the competitor enjoys an advantage. In the Soviet competitive calculus, quality and quantity of a particular force element were factored into a "correlation of forces" appraisal.<sup>29</sup> Capability and capacity have inherent value, as they constitute "hard power" strength before and during conflict. Better capabilities only loosely translate to military advantage, affected as they are by a nation's ability to adopt and wield them effectively.<sup>30</sup> The manner by which each competitor employs groups of weapons systems via operational concepts imparts relative advantage and inherent flexibility that cannot be valued in strictly monetary terms, nor can these factors be accurately assessed. Likewise, the countering or competing operational concepts an adversary develops in response bestow some degree of value to the other side of the balance.

Nobel-winning American economist Thomas C. Schelling acknowledged the challenge of bounding a cost-imposition calculus, observing that relative advantage is more easily determined when focusing on the narrow set of costs directly related to a specific capability contest.<sup>31</sup> He further noted that while accounting within a "suboptimization" was easy, the main thrust of cost imposition involves impacting investment choices occurring outside the area of competition.<sup>32</sup> Nevertheless, when one expands the scope of consideration, the more indeterminate the advantage becomes. Taken to the extreme, when the cost imposition balance grows to consider the entirety of international competition involved, "the best overall strategy, worked out in all its detail, is just the best strategy, all things considered; and any relevant costs have already been implicitly taken into account."<sup>33</sup> In the end, if the calculus is too narrow, it misses accounting for the hardships sought by the strategy. If the calculus is too wide, the accounting becomes indeterminate and of secondary importance to an overall appraisal of the competitors' relative security advantage.

The focus on monetary and other costs has a decidedly military bias. Broadly, security competitions and, more narrowly, cost imposition efforts necessarily employ all the instruments of national power. Diplomatic, economic, and information domains each provide their own opportunities for exacting hardships from a security competitor. Each domain possesses its own currencies that lend themselves to accounting and advantage determination to varying degrees. As with any security confrontation, the competitor most likely to win will be the one that effectively harmonizes all these instruments, in part through understanding the real exchange ratios of the various types of currencies involved. Command economies and artificially set exchange rates make this determination even more difficult.

The challenge for defense decision makers involves determining which costs will and will not be considered in an imposition calculus. A collective understanding of a competitor's national economy, defense spending, and methods of employing military capabilities will influence the choices. Selections made to create cost imposition advantage should include clear identification of the expected costs associated with the primary and alternative responses elicited. Practical limitations of insight and time will drive boundaries drawn for considered costs, which will involve some artificiality. Strategists and planners should elevate the discussion beyond comparisons of the cost of one antiship cruise missile to the cost of an aircraft carrier, moving instead to a comparison of the systemic costs of those opposing capabilities. Certainly, in defense circles no straightforward answer attends the question, "How much does it cost?" Valuation of cost imposition balances will be no easier.

Finally, the DOD should carefully consider both the reliability and vulnerability of the collective security partners affected by a cost-imposing strategy.<sup>34</sup> When a strategy relies on the capability contributions of one or more allies, the United States should proceed only with the reasonable assurance that partners will make good on their future contributions—lest the desired hardship differential be diminished. When designing a cost-imposing strategy excluding partner contributions, the DOD should still gauge the potential for collateral damage resulting from the ensuing bilateral capability contest. While collective security arrangements can significantly exacerbate the hardship differential in America's favor, the intricacies of each partner's decision calculus should

be understood to prevent costs being placed back on the alliance leader and to preclude fracturing the alliance itself.

### Gauging Adversary Response

Prospects for cost-imposing strategies depend on defense decision makers' success in anticipating an adversary's response to a DOD program, posture, or operating concept choice. Absent understanding of a nation's intentions behind a competitive choice, it is difficult to make judgments regarding which choices were failed strategies and which choices were further left on the competitive spectrum. A variety of cause and effect relationships informs international security relations and how they could enable cost-imposition attempts into potential points of leverage. Even when the opportunity exists, going forward with a cost imposition strategy may not yield benefits and may actually do more harm than good. Certain arms race tendencies or crisis stability concerns could restrain cost-imposition attempts. Unfavorable differences in adoption capacity between the initiating competitor and the reacting opponent could also prompt inaction. In situations where the competitive choice is less likely to elicit the desired reaction and alternative reactions carry greater disadvantage, the competition should end. Furthermore, if a cost-imposition strategy is to sharpen rather than diminish a nation's competitive edge, decision makers should consider several contextual variables.

The initiating competitor should have reasonable confidence that the reacting opponent perceives itself in competition in the selected capability area. In absence of an opponent's commitment to compete, the initiating competitor's choices are unlikely to elicit the desired reaction. This situation leaves the initiating nation incurring all the additional costs and likely results in a hardship differential that favors the reacting opponent. Particularly at the outset of a cost-imposing strategy, the initiating competitor should gauge the likelihood that the increased competition will prompt the opponent to react in overt conflict. A new, surprising, or highly disadvantageous hardship differential could fan the embers of a latent *casus belli* between the two competitors. Arms race theory warns that conflict is most likely at the outset of the race.<sup>35</sup> In their book, *Strategic Reassurance and Resolve*, authors James Steinberg and Michael O'Hanlon repeatedly caution against the destabilizing effects an arms race between the United States and China could have.<sup>36</sup> While carefully

managed arms races may actually contribute to crisis stability and conflict avoidance, they likely derive their stability from clear mutual understanding between competitors reinforced by control regimes. When an arms control agreement limits each competitor's maximum defense investment or fixes their respective investments by prescribing a ratio, the monetary context becomes zero-sum. When an adversary reacts by spending to shore up a weakness, other capability areas must suffer because the adversary cannot increase the quantity of resources available for defense. Steinberg and O'Hanlon propose instituting a two-to-one military spending ratio for the United States and China, respectively.<sup>37</sup> While their main intent is to limit an overall arms race between the countries, such an agreement could increase the likelihood that cost-imposing strategies would exact greater hardship differentials and yield more competitive advantage. Thus, the existence of and mutual adherence to arms control agreements can increase cost-imposition efficacy. Because of the conflict risks they pose, when the relationship between two competitors appears precarious, cost-imposing strategies are better left unwaged, regardless of the hardship differential returns they offer.

Another dangerous opponent reaction would witness an unforeseen technological breakthrough coupled with the financial intensity and organizational capital to adopt it. This breakout alternative reaction could change the competition, placing the initiating nation at a disadvantage. A sound assessment of the opponent's research and development enterprise can help mitigate this outcome, as would pursuit of similar innovation by the initiating competitor. Opaque societies make this appraisal more difficult. As an example, the commander of US Pacific Command stated in October 2009, "In the past decade or so, China has exceeded most of our intelligence estimates of their military capability and capacity, every year."<sup>38</sup>

## **Decision Theories and Competitor Choices**

While multiple theories like rational decision, deterrence, spiral, and arms control cast each competitor as monolithic and perfectly perceptive of the external environment, Robert Jervis disaggregates competitors and injects more potential for fallibility. He posits that decisions are made by inherently flawed people, that competitors should be disaggregated to allow multileveled analysis, and that decisions occur in

the “fog of foreign policy making” due to varying degrees of perception and misperception.<sup>39</sup> Therefore, competitor choices become products of complementing or competing interests at decision-maker, bureaucratic, domestic political, and international environmental levels.<sup>40</sup> Furthermore, competitors make choices based not only on their perceptions of the security environment but also on the “evoked set” of concerns and information dominating one or more of these factions’ cognizance at the time of the decision.<sup>41</sup> Theories like Jervis’s help spur defense decision makers to better understand a security competitor’s intentions, predispositions, and decision-making processes before selecting cost-imposing strategies. Recognition that even the deepest of understandings can still yield suboptimum choices is inherent to this degree of insight.

Alternatively, some capability challenges go unanswered. One riddle of US-Sino competition queries why, despite America’s significant submarine capability advantage and the impact this force would have in any conflict between the two nations, China has refrained from developing a significant antisubmarine warfare (ASW) capability vis-à-vis the United States.<sup>42</sup> China employs its diesel attack submarines (SS) for coastal defense, offensive mine warfare, and as local sources of intelligence.<sup>43</sup> Chinese SS capabilities are appropriate to counter diesel submarines operated by potential regional adversaries but have limited to no capability against American nuclear attack and ballistic missile submarines, the most difficult ASW targets.<sup>44</sup> Furthermore, the littoral focus of very limited Chinese ASW capabilities involves operating in poor acoustic conditions present in the Yellow, East China, and northern South China Seas; whereas, US submarines have the ability to maneuver at will in Chinese coastal waters.<sup>45</sup> Moreover, China does not appear to be making any major investments to improve its ASW force.<sup>46</sup>

Following the advent of a significant military innovation, competitors may or may not choose to exploit it. Political scientist Michael Horowitz characterized competitors’ ability to respond as adoption-capacity theory, stating that “once states have the necessary exposure to an innovation, the diffusion of military power is mostly governed by . . . level of financial intensity required to adopt . . . and the amount of organizational capital required to adopt.”<sup>47</sup> Adoption-capacity theory explained otherwise anomalous responses to military innovations and provided insights supporting better imposition choices. For example, the theory explained why—despite the 70-year existence of nuclear weapons—only

13 states adopted the technology, highlighting the financial intensity involved in developing and sustaining a nuclear weapons program.<sup>48</sup> Rather than compete or counter, competitors may elect instead to harness the capabilities of a third-party nation, deferring substantial costs. When financial intensity or organizational capital precludes adoption, bandwagoning is an alternative response to the emergence of a military innovation.<sup>49</sup> For example, by bandwagoning under the US nuclear umbrella, 25 North Atlantic Treaty Organization (NATO) nations have foregone the financial intensity of developing indigenous nuclear weapon capabilities. The same recourse occurs in the case of mature, conventional capabilities. Collective defense alliances like NATO allow member nations to forego or share significant financial burdens, benefiting the cost-imposition balance relative to the alliance's security competitors. Foreseeable competitor responses to US cost-imposition attempts should include the bandwagoning option and address the counterreactions the United States would apply in response.

As a corollary, the United States has opportunities to leverage the investments and capabilities of its allies in a way that tilts the cost-imposition balance to its advantage. Direct military aid to allied nations provides a net capability increase while reducing US expenditures on costs such as manpower, installations, and enabling capabilities. Relatively inexpensive theater security cooperation bolsters both the capability and interoperability of allied militaries—thus, imparting a new slope to the balance of forces. Foreign military sales improve interoperability. They also provide an economic boost to US companies, while denying sales, economies of scale, and associated interoperability benefits to a competitor. However, third-party consideration can also constrain otherwise advantageous cost-imposing strategies. Fielding an improved weapons system or posturing a capability in a particular location may prompt an opponent's response, placing allies at further disadvantage. This predicament would effectively constitute cost-imposition collateral damage. Because of a competitor's choice, allies bear increased hardship in their attempts to reset the balance. Thus, the primary and alternate responses of allied nations, particularly those proximate to a competitor, become essential considerations when developing cost-imposing strategies. At best, complimentary allied responses can further tip the cost-imposition balance against the opponent. At worst, allies could abdicate for finan-

cial intensity or organizational capital reasons and either adopt a neutral stance or bandwagon with a US rival.

Theorists acknowledge to a varying degree uncertainty in eliciting a desired reaction from a competitor. Specifically on the subject of cost imposition, Schelling argued that small differences in a reacting opponent's demand for a capability can create large differences in the actual response.<sup>50</sup> The presence of "demand elasticity" creates the situation where a competitor's action cannot reliably elicit the intended reaction, which in turn decreases the likelihood of creating a favorable hardship differential.<sup>51</sup> Unpredictability makes the loop of assessment, feedback, and adjustment a critical element of successful cost-imposing strategies. An additional consideration driving cost imposition deals with the degree to which program, posture, or operational concepts affect crisis stability between competitors. The history of nuclear arms competition includes several cases where a new capability introduction, change in force posture, or revised operating concept bolstered deterrence but made the path to conflict more likely and more difficult to arrest.<sup>52</sup> As an example, in the mid-1960s Secretary of Defense McNamara chose to field multiple independently-targetable reentry vehicles (MIRV) on US submarine- and land-based missiles as a competitive counter to predicted Soviet antiballistic missile capabilities.<sup>53</sup> This choice produced a first-strike incentive and reduced crisis stability between the two nations, an unintended effect that took over 30 years to remedy.<sup>54</sup> In a conventional sense, long-range, highly destructive, one-time use systems lack the ability to perform proximate, graduated, tit-for-tat escalating operations. While America tends to favor the offensive as a power-projecting nation, defensive systems can stall an opponent's initial attack and provide intermediate options between peace and full-scale conventional conflict.<sup>55</sup> Ultimately, decision makers must consider cost-imposing choices yielding prewar opportunities in light of the degree to which these options help or hurt US flexibility to respond in an advantaged but graduated manner should hostilities commence.<sup>56</sup> Therefore, when focused by clear understanding of how the interaction between the competitors may unfold, a cost-imposing strategy has greater probability for success. Sun Tzu famously counseled strategists to know their enemies and to know themselves.<sup>57</sup> By understanding the complexities of cost-imposition interactions, decision makers may refine the discussion and make more successful choices.



## **Cost Imposition and China**

Over the last two decades, China's defense spending has increased by an annual average of 11 percent in real terms and at a rate slightly more than China's GDP growth.<sup>58</sup> By 2020 China's defense spending will likely approach \$300 billion, while US defense spending will likely remain close to \$550 billion.<sup>59</sup> By 2030, China's budget could reach \$500 billion, based on GDP projections.<sup>60</sup> Within these timeframes, the United States and China will come much closer to military spending parity than the current balance suggests. China's rapid economic and military rise, investments in capabilities that thwart US regional security guarantees, and aggressive sovereignty claims signify ongoing competition with the United States. Since the 1990 Gulf War, and particularly after a successful US deterrent response in support of Taiwan in 1995–1996, China has aggressively sought to nullify US military advantages in the Far East.<sup>61</sup> However, the United States is late even to acknowledge the competition exists, partially due to preoccupation with campaigns in Iraq and Afghanistan.<sup>62</sup> Not until 2012 did the Obama administration identify the need to rebalance toward the Asia-Pacific, and only in November 2013 did National Security Advisor Susan E. Rice describe “managing [the] inevitable competition” with China.<sup>63</sup> Especially in the case of China, the US defense establishment clearly recognizes the potential value of cost-imposing strategies. When opportunities exist to impose costs, the DOD should impose them via program, posture, and operational concept choices offering the most lucrative hardship differentials.

## **A Framework for Competing with China**

In their article, “U.S.-China Balance in a Three Game Framework,” David Frelinger and Jessica Hart suggest the military balance between the two nations, and particularly the implications of the PLAAF's modernization, can be assessed within three different game frameworks: influence, third parties, and power.<sup>64</sup>

Each of these frameworks involves a different scope, which in turn invokes different strategic ends along with alternate competitive ways and means to achieve them. The game of influence involves largely political competition—with the military in a supporting role—for influence and primacy in a variety of regions. For the United States, this region may

be global, while for China, the focus may be narrow and consist of the Taiwan Strait and the South and East China Seas.<sup>65</sup> Secondly, the battle over a third-party game largely emphasizes the military power balance, as it would affect conflict over a third nation or over that nation's key interests. Stakes in this game can be highly asymmetric, with one competitor ascribing greater importance to control of the third party. This asymmetry of stakes and interests also makes armed conflict over disputes unrelated to the third party highly unlikely.<sup>66</sup> Thirdly, the great power game has the broadest scope and highest stakes, leading to valuing every interaction between two competitors within a zero-sum calculus.<sup>67</sup> Regardless of which game ultimately best typifies US-Sino relations, cost imposition offers potential benefits if well played.

The entire concept of competitive strategy inverts the more traditional approach to building military power. The strategy focuses more on the reacting opponent than on the United States. Rather than countering opponent strengths, the strategy exacerbates opponents' weaknesses. In the three-move process, the goal is to elicit a specific adversary reaction. The action taken by the United States is secondary and may require adjustment. When the adversary displays an unexpected reaction, increased investment in previous choices would further entrench an obsolete action while foregoing a more appropriate counterreaction.

A measured competitive framework in the military domain against China could be one that emphasizes Frelinger's and Hart's battle over a third party. This approach acknowledges the asymmetries of national interest and constrains the military balance to proximate forces and those likely brought to bear in the event of conflict. It would localize the contest in the areas bounded by the South and East China Seas, Taiwan and the Taiwan Strait, plus eastern portions of mainland China. The competition would remain largely beyond reach of US territories and compel China to make further investments in primarily defensive programs, postures, and operating concepts. The conditions are largely set for an air component arms race specifically focused on fighter aircraft and armaments, where the United States need only preserve its advantage while emphasizing quality over quantity. A lesser game of influence can be played in other regions of the world, where US capabilities and experience can eclipse China's peacekeeping, humanitarian assistance, and disaster response initiatives. Other activities, such as dealing with piracy off the Horn of Africa, will offer opportunities for US-Sino coop-

eration, decreasing the likelihood that the battle over a third party will result in conflict.

While opacity characterizes many aspects of Chinese foreign policy decision making, several insights clearly offer competitive strategy leverage to the United States. China's evoked set of concerns deals with defense of the homeland, a constant in the country's expansion of comprehensive national power within its twenty-first century "strategic window of opportunity."<sup>68</sup> China's leaders "view a modern military as a critical deterrent to prevent actions by outside powers that could damage Chinese interests, or to allow China to defend itself against such actions should deterrence fail."<sup>69</sup> The ability to prevail in a conflict over Taiwan—largely a conflict wherein China defends its territorial and governance claims—has dominated the People's Liberation Army's (PLA) force modernization agenda for the last 15 years.<sup>70</sup> While the 2008 defense white paper commends a shift towards active defense and a better balance of offensive and defensive capabilities, these efforts largely amount to holding would-be aggressors at greater distances.<sup>71</sup>

Multiple factors suggest that first and foremost, the United States could leverage competitive and cost-imposing strategies against China in the air domain. Air capabilities have increasingly become the military foreign policy tool of choice. In fact, in the last six years China has even developed a "ladder of intensity levels" for deterrence using conventional air and space forces, including ballistic and cruise missiles, SAMs, and fighter aircraft.<sup>72</sup> Foreseeable conflicts with China would largely occur in the air and sea domains encompassing the Taiwan Strait, the South China Sea, and the East China Sea.<sup>73</sup> The United States and its close allies have no contiguous borders with China supporting large-scale employment of land forces. Furthermore, the limited US aims supporting peace and stability for people on Taiwan and reluctance to conduct large-scale land operations make land force investments a less lucrative choice.

### **Interacting with China and the PLAAF**

Competition in the air with China involves a contest with the PLAAF. The better strategies will be those that account for the PLAAF's stature as a component of the PLA, its history and perceptions, and the people the PLAAF employs. Several attributes distinguish the PLAAF as a particularly attractive target for competitive and cost-imposing strate-

gies within the larger US-Sino competition. As with greater China, the PLAAF nurtures an evoked set of sovereignty concerns borne out of its long-standing defensive orientation. PLAAF leaders and initiatives have limited influence within the larger PLA, making the air force less able to react effectively due to bureaucratic constraints.<sup>74</sup> Furthermore, defense analyst Kenneth Allen contends that the enduring pattern of army domination within the PLA will continue through the next decade.<sup>75</sup> Cultural and force-structure factors further exacerbate the PLAAF's disadvantage relative to the US Air Force (USAF). The PLAAF has had no significant combat experience since the 1958 Taiwan Strait crisis, placing the service over half a century behind US air forces.<sup>76</sup> Subsequent limited engagements of US forces during the Vietnam War provided grounds for a flawed service tradition wherein the PLAAF esteems itself as the only air force ever to have defeated the USAF.<sup>77</sup> By its own admission, the PLAAF needs to improve considerably its capabilities, doctrine, and training to challenge US power-projection capabilities.<sup>78</sup> While initiatives prompting these needed changes are ongoing, the PLAAF will continue to compete from a position of disadvantage relative to the USAF in the interim. Key Chinese air capabilities warranting deliberate competition include ballistic and cruise missiles, SAMs, and fighter aircraft.

### **Chinese Ballistic and Cruise Missiles versus US Air Defenses**

One capability contest that bears examining for its current location on the cost-based competitive spectrum and its poor potential for offering cost-imposing opportunities involves Chinese ballistic and cruise missiles and US defensive measures. From an American perspective, the contest currently amounts to accepted competition in pursuit of reduced disadvantage. As of December 2012, China had deployed more than 1,100 short-range ballistic missiles opposite Taiwan.<sup>79</sup> While Taiwan possesses 22 SAM sites, with a mix of long- and medium-range systems, only three Patriot PAC-2 batteries have any counter-ballistic missile capability.<sup>80</sup> One RAND study estimated that about 60 to 200 Chinese short-range ballistic missiles could neutralize most of Taiwan's fighter bases, and additional missiles could effectively suppress Taiwanese air defense operations, allowing employment of PLAAF strike aircraft.<sup>81</sup> Land-attack cruise missiles launched by H-6 bombers and longer-range ballistic missiles like the DF-21/CSS-5 can extend the reach of PLAAF

missile attacks far beyond Taiwan to Okinawa, other bases in southern Japan, aircraft carriers at suitable employment distances from the Strait of Taiwan, and even Guam.<sup>82</sup> The range, numbers, and destructive effectiveness characterizing China's relatively inexpensive missile force denies the United States and its allies the ability to stage fighter operations from sanctuary in support of a Taiwan crisis.

Successful active defense against Chinese missiles is difficult and costly. While relatively effective against individual missile attacks, Terminal High Altitude Air Defense (THAAD) and Aegis Ballistic Missile Defense units protect small areas and could be overwhelmed by mass attacks. These systems are expensive. For example, each THAAD battery costs approximately \$800 million.<sup>83</sup> Each Aegis Ballistic Missile Defense Ashore battery, a land-based variant, also costs approximately \$800 million.<sup>84</sup> Fielding sufficient systems to protect key military and strategic locations vulnerable to Chinese attack is simply cost prohibitive. As an alternative, measures improving resilience provide protection and enable continued operations despite even large-scale, coordinated attacks.<sup>85</sup> They also can invoke a spiraling competition involving adversary missile numbers, accuracy, and munitions effects. Dispersal complicates Chinese missile targeting and may reduce attack densities per location, but limited sites support dispersed US fighter operations due to the runway length and composition, munitions, and fuel access. Increasing US air forces' standoff distances can render obsolete many Chinese missile types, but the locations of Taiwan and other US allies remain interminably fixed and close. Camouflage, concealment, and deception, along with hardening aircraft, personnel shelters, and key infrastructure can improve survivability. Furthermore, programs and operating concepts allowing better indications and warning and enabling faster and more robust military installation recovery mitigate ballistic and cruise missile attacks.<sup>86</sup> Nevertheless, the United States and its allies cannot defend everywhere against everything, cannot fully recover from every attack, and cannot endure the financial intensity of trying to do so.

While America's prospects of fully protecting its air forces and its allies against Chinese missile capabilities are poor, competitive improvements remain possible and may reduce US capability disadvantage and hardship. This competition may amount to foiling a Chinese competitive strategy that threatens to impose excessive costs on the United States. An appropriate American counter should consist of efficiently competing

from disadvantage while searching for alternative approaches to undermine China's capabilities, postures, and operating concepts. The following choices support these ends:

- **Programs**—Harden threatened US installations sufficiently to make some conventional missile munitions and submunitions obsolete, creating a spiral of US hardening and Chinese obsolescence. Develop dispersed operating locations. At main operating bases, construct redundant runways and taxiways. Field robust airfield repair equipment and backup systems delivering essentials like fuel and electricity.
- **Postures**—Field ballistic missile defense systems at key US bases. Balance forces postured inside and outside PLAAF intermediate missile ranges. Encourage allies to acquire more ballistic missile defense systems, preferably by buying or coproducing US models.
- **Operating concepts**—Reduce Chinese missile targeting effectiveness. Improve ability to counter air-launched cruise missiles, both before and after launch. Assess US capability to destroy or suppress ballistic missiles prior to launch. Improve attack recovery practices.

### **Chinese SAMs versus US Strategic Attack**

An improved understanding of the PLAAF illuminates both the opportunities and limitations associated with the competition between Chinese SAM systems and American strategic attack capabilities. The PLAAF's commitment to defensive systems suggests that it will respond aggressively to future US offensive capability enhancements. The nature of this particular military competition makes pursuit of US advantage both expensive and tenuous. Where this competition falls along the competitive spectrum in the future is not predetermined and will be heavily influenced by future US choices.

True to its defensive heritage, the PLAAF has invested heavily in advanced SAMs, rendering its perimeter much less penetrable by US aircraft and munitions. These defenses hold American air assets at greater distances, placing US strategic attack assets at a competitive disadvantage in any conflict in the Chinese littoral. "US bombers carrying cruise missiles might be compelled to launch farther from the Chinese coast," limiting their missiles' reach.<sup>87</sup> Chinese SAMs would also constrain non-

stealth US fighters, which “would be greatly at risk if called upon to fly within the S-300/400’s envelope.”<sup>88</sup> The range and capabilities of these systems would further constrain efforts to suppress or destroy them using munitions delivered from the air.

While the current balance of forces may amount to an American competitive disadvantage, that balance may retrospectively constitute a competitive and even cost-imposition victory. These defensive systems pose no direct threat to the United States, though they significantly affect the battle over a third party. SAM systems are expensive, with one source citing the cost of an unspecified S-300 variant battery at \$115 million, plus \$1 million per missile.<sup>89</sup> Meanwhile, the United States has made few investments directly serving this competitive facet vis-à-vis China. America’s small bomber fleet—consisting of 74 B-52s, 62 B-1s, and 20 B-2s—has multiple nuclear and conventional purposes.<sup>90</sup> Within its foreseeable uses, a US-Sino conflict is but a subset. The stealthy B-2 has inherently greater capability in the face of Chinese defenses, as do stealth fighters like the F-22 and F-35—though these fighters’ range limitations necessitate closer proximity and air refueling. Fighters are also less able to penetrate deep into China’s interior. On the whole, China has spent heavily over the last two decades to counter US strategic attack systems that were primarily focused elsewhere.

Looking forward, the DOD may not have the opportunity to impose a similar degree of costs within this contest. Accepted competition for parity or advantage will require the United States to make additional investments to modernize its strategic attack capabilities, while the long-range strike bomber capable of performing some or all of these functions may improve the US competitive edge. However, with a program cost exceeding \$100 billion to achieve a planned force structure of 80 to 100 aircraft, the Long-Range Strike Bomber (LRS-B) may not enable the United States to impose an advantageous hardship differential regardless of the response the program elicits from the Chinese.<sup>91</sup>

Opportunities may exist to compete more efficiently. Some trade space may exist between the F-35, LRS-B, and standoff munitions programs to achieve a more competitive and efficient balance tailored to the battle over a third party. Alternative conventional strike approaches, such as improved air-launched munitions or sea-launched munitions like those from the US Navy’s *Virginia*-class Payload Module can also improve efficiency but will have to be traded against the flexibility, range, and

persistence that may be inherent to the LRS-B. Where practicable, the United States should encourage third parties to field and sustain organic strategic attack capabilities.

Optimistically, the DOD might be able to leverage a competitive strategy in this contest while improving its forces' abilities to defeat Chinese SAMs and operate in areas protected by these systems to conduct conventional attacks deep in China's interior. PLAAF SAM investments show China's penchant for defense. In fact, a long-time China observer noted, "the Chinese armed forces are obsessed with defending China from long-range precision air strikes" and, therefore, invested heavily in passive defense capabilities provided by hardened and deeply buried facilities.<sup>92</sup> Chinese writers have expressed concerns about space planes' "global reach, information sharing, and precision strike capabilities."<sup>93</sup> Like stealth technology, the speed of such craft effectively reduces the engagement envelope of Chinese SAMs. Furthermore, while Chinese SAMs ostensibly could operate in defensive concert with PLAAF fighters, a dearth of information currently exists as to how the PLAAF operates these defensive forces together.<sup>94</sup> With some technological and financial intensity preconditions, opportunities may still exist for the DOD to elicit disadvantageous, defensive Chinese responses to future competition in the realm of US strategic attack. These considerations lead to the following choices as potential ways to shift the contest further right on the competitive spectrum:

- **Programs**—Balance F-35, LRS-B, and standoff munitions resources to more efficiently serve conflict scenarios with China. Develop and field survivable, long-range munitions capable of striking Chinese target sets at less cost. Encourage partners and allies to field their own capabilities. Improve US abilities to suppress and defeat Chinese SAMs.
- **Postures**—Pursue a frontier basing strategy, making a portion of available Asia-Pacific airfields suitable for supporting bomber operations close enough to China to enhance deterrence and responsiveness but outside the range of most Chinese conventional offensive capabilities.<sup>95</sup>
- **Operating concepts**—Assess and exploit PLAAF weaknesses in conducting integrated SAM and fighter engagement zones. Train



with allied air forces to improve their capabilities and interoperability with US forces in defeating Chinese SAMs.

### **Fighter Aircraft Competition**

The ongoing US-Sino competition in fighter aircraft bears examining for several reasons. First, depending on the timeframe considered, the United States can claim or achieve varying degrees of hardship advantage or disadvantage. Next, fighter aircraft capabilities are expensive and complicated. The F-35 is the most costly and ambitious acquisition program ever, with total acquisition costs approaching \$400 billion.<sup>96</sup> Finally, this competition can be susceptible to countering capabilities—both within and outside fighter technologies—that may induce large shifts in relative competitive and hardship advantage.

China's fighter aircraft modernization effort from 1995 to 2010 may represent a competitive and cost-imposition success for the United States that will be more difficult to continue in the upcoming period of USAF modernization. In this period, the PLAAF divested 3,500 aircraft, while procuring 399 fourth-generation fighters and at least 250 modernized third-generation fighters.<sup>97</sup> Meanwhile, the USAF divested approximately 970—most with capabilities rivaling newer Chinese aircraft—and procured only 266 fighters during a period colloquially called a “procurement holiday.”<sup>98</sup> While the USAF's divestiture was not influenced by competition with China and procurement only partially so, the Chinese bore tremendous direct procurement and obsolescence costs in the PLAAF's attempts to modernize primarily vis-à-vis the USAF. From a cost-imposition perspective, China's introduction of the J-20 and J-31 prototypes bodes well, as they represent early milestones in a long, costly road to developing and fielding fifth-generation fighters. Meanwhile, the USAF's F-22 fleet has matured since initial operational capability in 2005, and the one hundredth F-35 was produced, though at no small cost.<sup>99</sup>

China has attempted to mitigate America's qualitative advantage by countering with “informationization” or electronic countermeasures (ECM).<sup>100</sup> It “gained immense benefit from its extensive access to Russia's EW [electronic warfare] designers and manufacturers, whose business was sustained by Chinese orders over the long period.”<sup>101</sup> China acquired Russian Sukhoi Su-27SK and Su-30MKK fighters, with their associated state-of-the-art jammers and countermeasures pods.<sup>102</sup> The

Chinese domestically produced J-11B carries an ECM pod resembling Russian designs, and the J-10B will likely feature an advanced radar, capable of functioning as a more powerful jammer.<sup>103</sup> These countermeasures could reduce the capability of and even neutralize current US fighters' radars and radar-guided missiles.

Several factors make US-Sino fighter-aircraft competition ripe for American competitive strategy. Few weapon systems require successful integration of as many diverse high-end technologies as do fighters, and the Chinese are currently 15 to 20 years behind the United States.<sup>104</sup> Though in the past the PLAAF acquired its aircraft by either purchasing or coproducing them, China's violation of the terms of its indigenous production agreements with Russia involving the SU-27 led to a 2006 Russian refusal of further military aviation sales, leaving China short of aircraft suppliers.<sup>105</sup> China now has to produce its own airplanes and, in doing so, is likely to incur more costs associated with development and manufacturing than China bore when purchasing Russian hardware in the mid-1990s. Since its inception, the PLAAF has been a fighter-centric force and shows no signs of willingness to accept a balance of forces deficit relative to the United States in East Asia. Thus, for the PLAAF, the apparent imperative will be to spend heavily to match the United States.

Though China has willingly borne the financial intensity associated with adopting modern fighter technologies, it remains to be seen whether the PLAAF can expend the organizational capital. Operationally, the PLAAF has yet to make the transition to a centralized control and decentralized execution method of employment that has garnered such success for Western air forces.<sup>106</sup> The ongoing transitions from purely defensive to the full spectrum of offensive to defensive tactics and from a purely air-to-air to multirole mission will heavily tax the PLAAF's organizational capital.<sup>107</sup> Autonomy exploited in US fourth-generation tactics has not been infused in PLAAF employment. Furthermore, stealth aircraft diffusion via the J-20 and J-31 will require significant PLAAF employment and sustainment adaptations.

The United States is winning the fighter-aircraft competition with China. Retrospectively, the DOD elicited a Chinese response likely representing a hardship differential advantageous to the United States over the period of 1995 to 2010. Looking forward, the United States has the opportunity to wage a successful competitive strategy, though

the financial intensity associated with air force fighter recapitalization may inhibit favorable cost imposition. At the same time, the predominately fifth-generation US fighter force represented by the F-35 may make Chinese fighter investments to date merely obsolescent costs. The United States may preserve much of its advantage through the following choices:

- **Programs**—Field the F-35 in sufficient numbers and sustain the F-22 to prompt continued Chinese fifth-generation fighter development and fielding. Looking forward, the United States should continue developing a follow-on to these aircraft to make obsolete an even greater portion of the Chinese fleet. The DOD should procure fighters more efficiently. Inadvertent technology hemorrhage to China should be minimized. The size of the DOD fighter force should support bringing to bear a stressing number of US fighters in any crisis with China. Explore disruptive technologies in air-to-air missiles.
- **Postures**—Maintain adequate fighter presence in the Far East to provide immediate support to a broad range of response options during any US-Sino crisis. Prioritize Far East bases for F-35 or F-22 bed down as the US fifth-generation fleet grows. Encourage allies to acquire competitive fighters, preferably by buying or coproducing US models capable of networking with US systems.
- **Operating concepts**—Improve US effectiveness in countering Chinese fighters, particularly in an informationized environment. Research and test alternative ways to neutralize Chinese fighters—both when airborne and prior to launch. Train with allied fighter forces to improve their capabilities and interoperability with US forces.

### **Bounding Challenges in US-Sino Competitions**

The three specific US-Sino competitions for the air domain bear revisiting. In each case, drawing boundaries to clarify competing or countering capabilities and weapons system-specific contests involves some artificiality. When a larger boundary is drawn to encompass all three US-Sino air-centric contests addressed in this study, different competitive standings may emerge. For instance, Chinese ballistic and cruise

missiles counter far more than just the US air defenses opposing them. Rather, they thwart US and allied attempts to stage air operations from locations near China.<sup>108</sup> Therefore, Chinese missiles represent part of the nation's competitive reaction to US fighters. As a corresponding counteraction, the DOD can choose to improve active and passive defenses of close fighter bases, to stage fighters from more distant locations enabled by greater numbers of tankers, or to employ some combination of these two actions. Even more indirectly, Chinese missiles may mitigate the US advantage in the fighter contest.

From a cost-imposition perspective, redrawing the cost boundary changes the accounting from just Chinese and US fighter costs to include Chinese ballistic and cruise missiles, US fighter base air defenses and US tanker and command-and-control costs required to project and coordinate fighters from sanctuary. Within this larger balance, the United States may have even less ability to create an advantageous hardship differential. When the contest considers these disparate but related capabilities, the DOD may find itself pushed further left on the competitive spectrum. In the end, this effect was part of Schelling's point. The more a cost-imposition calculus expands beyond suboptimization of a specific contest, the more hardship differential becomes less relevant than which nation has the best overall strategy.<sup>109</sup>

## **Conclusion**

While cost imposition retains its appeal, successful application of the strategy starts with recognizing what the approach is and what it is not. Cost imposition occupies one extreme of the cost-based competitive spectrum and offers advantageous hardship differential between an initiating competitor and a reacting opponent in a limited number of instances. Currently, these instances may be even more limited, given disproportionately high US defense investment relative to all competitors, including China. Cost imposition is not a stand-alone remedy for the DOD's fiscal constraints, but it has potential as a multiplier effect on the balances attained by expenditures within those constraints. The strategy will not bankrupt China, and it loses utility when used to lament or to justify the expense of defending US security interests. The DOD should develop some new organizational structures or adapt existing ones to implement long-term competition with rivals. The Competitive Strate-

gies Office approach of the 1980s was sufficient to the task then, and it most likely would be now.<sup>110</sup> The Joint Staff, service staffs, and combatant command staffs should accommodate the change, as each will play its part in conceiving, tailoring, executing, and adjusting the approach.

Successful cost-imposing strategies will require net assessments of the United States and each prospective rival and will place specific demands on US intelligence resources. To realize an advantageous hardship differential, the DOD will need an in-depth understanding of the Chinese economy, including all facets of the nation's military spending. Even then, the cost-imposition calculus will be somewhat artificial—bounded to be as inclusive as possible while still meaningful—and reliant on some type of exchange rate to better compare very different economies. Before making program, posture, and operating concept choices promising cost-imposing advantage, defense decision makers should ask hard questions about theories of interaction, reactions and counterreactions, and quantitative accounting. Theories of interaction only gain predictive utility when based on sufficient insights defining the adversary's decision calculus leading to primary and alternative reactions.

Managed competition between the United States and China in the military domain will require a mix of restraint and aggressiveness. The interdependencies of the two nations and potential collateral effects on third parties commend thoughtful, deliberate action. China's large competitive steps, begun in the mid-1990s to counter US capabilities, suggest that competitive and cost-imposing strategies have a high likelihood of eliciting significant reactions. The DOD should take a very long-term, calculated, and adaptive approach to the threats posed by Chinese ballistic and cruise missiles, SAM systems, and fighter aircraft. The ability to contest each of these Chinese capabilities falls at a different place on the competitive spectrum. For the security of the United States and to meet US responsibilities in other regions of the world, defense decision makers must do much better to optimize US performance within and among these competitions. The DOD should embark on cost-imposing initiatives fully cognizant of the expected and alternative outcomes, as informed by their underlying interaction theories and net assessment insights. By sharing the insights and assumptions informing a choice, defense decision makers can improve the likelihood that individual service supporting actions are coherent. The Office of Net Assessment, or a similar group, will have to conduct the deep and holistic understanding

of prospective competitors along with an inclusive appreciation of US attributes. Were the Office of the Secretary of Defense's program review process to include a cost-imposition facet, potential changes might be minor adjustments rather than major course corrections. However, cost-imposing strategies will frustrate the collective attention span of the DOD and may not survive the more self-interested, less spendthrift, Congressional review process.

The concept of cost imposition can yield new clarity when examining security alternatives for the services, the DOD, and the nation. It provides another attribute that, when considered in evaluating alternatives, can lead to better decisions that maximize competitive advantage. DOD-wide, cost-imposition principles can recast investment trade space, re-focus regional presence and posture goals in a manner that rebalances near-term conflict preparedness with long-term competitive shaping, and provide new impetus for component interactions and the operating concepts they become. For the nation, cost imposition can provide a new framework for evaluating America's security challenges, which may suggest new options and priorities over current approaches. ■■■

## Notes

1. Maj Gen Steven L. Kwast (director, US Air Force *Quadrennial Defense Review*), discussion with author, Washington, DC, 21 November 2013.
2. Stephen Waller, Col Case Cunningham, and Capt Keith Wheeler (Defense Advanced Research Projects Agency), interview by the author, 6 February 2014.
3. Gen Herbert J. Carlisle, "Viewing the Asia-Pacific Rebalance through the Lens of PACAF's Strategy" (address, Air Force Association Convention, Washington, DC, 18 September 2013).
4. Congressman Randy Forbes' official web site, "Amendment Offered by Mr. Forbes of Virginia: H. R. 4310 – National Defense Authorization Act for Fiscal Year 2013. Competitive Strategies Study," [http://forbes.house.gov/uploadedfiles/forbes\\_competitivestrategies.pdf](http://forbes.house.gov/uploadedfiles/forbes_competitivestrategies.pdf).
5. Caspar W. Weinberger, *Annual Report to the Congress: Fiscal Year 1988* (Washington, DC: Government Printing Office, 12 January 1987), 88.
6. Thomas C. Schelling, "The Strategy of Inflicting Costs," in *Issues in Defense Economics*, ed. Roland N. McKean (Cambridge, MA: National Bureau of Economic Research, 1967), 118–20.
7. International Law and Policy Institute Nuclear Weapons Project, "The Nuclear Umbrella States," Nutshell Paper No. 5 (Oslo, Norway: International Law and Policy Institute, 2012), 1–2.
8. Phillip C. Saunders and Joshua K. Wiseman, "China's Quest for Advanced Aviation Technologies," in *The Chinese Air Force: Evolving Concepts, Roles, and Capabilities*, ed. Richard

## *Applying Cost Imposition Strategies against China*

P. Hallion, Roger Cliff, and Phillip C. Saunders (Washington, DC: National Defense University [NDU] Press, 2012), 300–02.

9. Weinberger, *Annual Report to Congress*, 66.

10. Andrew W. Marshall, *Long-Term Competition with the Soviets: A Framework for Strategic Analysis* (U) (Santa Monica, CA: RAND Report R-862-PR, April 1972), iii.

11. David J. Andre, *Review of the Department of Defense (DOD) Competitive Strategies Initiative, 1986–1990*, vol. 1 (McLean, VA: SAIC Report SAIC 90/1506, 30 November 1990), 11–14.

12. *Ibid.*, 66–69.

13. *Ibid.*, 66.

14. *Ibid.*

15. *Ibid.*

16. Randall A. Greenwalt, David J. Andre, et al., *Historical Examples of Competitive Strategies* (Greenwood Village, CO: SAIC Report SAIC-91/ 6004&FSRC-E, 23 March 1991), 2.24.

17. Weinberger, *Annual Report to Congress*, 66. However, cost advantages attributed to the United States in this case may be overstated. The intensity of US investment required to develop, field, and sustain its bomber fleet does not draw much mention. To establish a true hardship differential in this area, more rigorous accounting is necessary. For example, initial procurement costs for the B-47, B-52, FB-111, B-1A and 1B, KC-135, KC-10, and B-2 were approximately \$128 billion in 1987 dollars. This sum excluded modernization investments plus substantial costs associated with personnel, installations, and operations. US Naval War College economist and former Deputy Assistant Secretary of Defense for Policy Planning Thomas Mahnken noted, “there has been no detailed case study of this interaction, particularly one incorporating Russian resources.” Thomas G. Mahnken, ed., *Competitive Strategies for the 21st Century: Theory, History, and Practice* (Stanford, CA: Stanford University Press, 2012), 302. Pending further substantiation, it may be correct to say that US cost imposition against the Soviets in the contest between penetrating bombers and air defenses was a qualified success. I derived the \$128 billion figure from initial procurement costs listed in *Selected Acquisition Reports*, or best available unit cost data for each aircraft applied to the inventory, inflated or deflated using consumer price index values to achieve 1987 values for comparison with Weinberger’s Soviet cost data.

18. Greenwalt, et al., *Historical Examples of Competitive Strategies*, 2.28. Advanced cruise missiles are mentioned more explicitly in Weinberger’s 1988 report to Congress.

19. Weinberger, *Annual Report to Congress*, 66. The 12,000-mile figure comes from Andrew F. Krepinevich, Simon Chin, and Todd Harrison, *Strategy in Austerity* (Washington, DC: Center for Strategic and Budgetary Assessments, 2012), xx.

20. Krepinevich, et al., *Strategy in Austerity*, xix.

21. Weinberger, *Annual Report to Congress*, 85.

22. *Ibid.*, 69.

23. Dr. Thomas P. Ehrhard (Office of the Undersecretary of Defense for Policy), discussion with the author, 26 September 2013.

24. Michael Horowitz, *The Diffusion of Military Power Causes and Consequences for International Politics* (Princeton, NJ: Princeton University Press, 2010), 28.

25. Some weapons systems elude accounting by virtue of their classification. Special access programs vary in their degrees of acknowledgement and disclosure. “Black program” expenditures require separate accounting, making them more difficult to include in any cost-imposition calculus, despite the sizeable monetary investments some of these programs

represent. It is reasonable to assume that America's security competitors have weapon-systems programs shrouded in similar levels of secrecy. However, no accurate cost balance, much less capability comparison, can occur without factoring in classified programs for both sides. Temporal boundaries also affect the calculus. The obvious approach involves comparing investments in competing or countering systems and their associated enablers from the same point in time. However, nations do not necessarily field competing weapon systems concurrently. In the capability-improvement spiral associated with an arms race, one nation's investment in a system in time begets a rival's investment in a system of equal or greater capability. Using a fighter aircraft example, the greater capabilities and numbers of the Soviet MiG-23 and MiG-27 fielded in 1970 and 1975 prompted the United States to field the F-15 and F-16 in 1976 and 1978 respectively, which in turn led the Soviets to field the MiG-29 and Su-27 in 1983 and 1985 respectively. To determine the victor in this cost-imposition contest, which dates or weapons system introductions should be used in bounding the comparison?

26. The World Bank, "Military Expenditure (% of GDP)," Stockholm International Peace Research Institute, n.d., <http://data.worldbank.org/indicator/MS.MIL.XPND.GD.ZS>. The total expenditure of \$646 billion includes wartime costs and is cited in a variety of source to include, for consistency, James Steinberg and Michael E. O'Hanlon, *Strategic Reassurance and Resolve: U.S.-China Relations in the Twenty-First Century* (Princeton, NJ: Princeton University Press, 2014), 85.

27. Ibid. Steinberg and O'Hanlon address the wide variation of Chinese military expenditure estimates. I have used theirs for consistency. These authors (page 92) and the World Bank estimate Chinese defense spending at approximately 2 percent of GDP.

28. Steinberg and O'Hanlon, *Strategic Reassurance and Resolve*, 98.

29. Daniel I. Gouré, "Overview of Competitive Strategies Initiative," in *Competitive Strategies for the 21st Century: Theory, History, and Practice*, ed. Thomas G. Mahnken (Stanford, CA: Stanford University Press, 2012), 93.

30. Horowitz, *Diffusion of Military Power*, 1–5.

31. Schelling, "Strategy of Inflicting Costs," 109.

32. Ibid.

33. Ibid.

34. Ian Wallace (Brookings Institution), interview by the author, Washington, DC, 2 October 2013. While these were not his primary concerns, Wallace was the first person to highlight (to me) third-party considerations in a competitive interaction.

35. Samuel P. Huntington, "Arms Races: Prerequisites and Results," *Public Policy* 8, no. 41 (1958): 41–86.

36. Steinberg and O'Hanlon, *Strategic Reassurance and Resolve*, 4, 168, 173, 176, and more.

37. Ibid., 100–01.

38. Thomas G. Mahnken, Dan Blumenthal, Thomas Donnelly, Michael Mazza, Gary J. Schmitt, and Andrew Shearer, *Asia in the Balance: Transforming U.S. Military Strategy in Asia* (Washington, DC: American Enterprise Institute, June 2012), 9.

39. Robert Jervis, *Perception and Misperception in International Politics* (Princeton, NJ: Princeton University Press, 1976), 113.

40. Ibid., 15.

41. Ibid., 203–16.

42. Owen R. Cote Jr., "Assessing the Undersea Balance between the United States and China," in *Competitive Strategies for the 21st Century: Theory, History, and Practice*, ed. Thomas G. Mahnken (Stanford, CA: Stanford Security Studies, 2012), 184–203.



43. Ibid., 184.
44. Ibid., 185–87.
45. Ibid., 185–86.
46. Ibid.
47. Horowitz, *Diffusion of Military Power*, 9.
48. Ibid., 98–133.
49. Ibid., 26–27.
50. Schelling, “Strategy of Inflicting Costs,” 114–18.
51. Ibid.
52. Thomas F. Lynch, III, *Crisis Stability and Nuclear Exchange Risks on the Subcontinent: Major Trends and the Iran Factor* (Washington, DC: NDU Press, 2013), 2–3. While not focused on the whole of conflict stability, this narrow discussion provided me with a better sense of the principles involved.
53. Glenn A. Kent, David A. Ochmanek, Michael Spirtas, and Bruce Pirnie, *Thinking about America’s Defense: An Analytical Memoir* (Santa Monica, CA: RAND, 2008), 141–43.
54. Nuclear Threat Initiative, “Treaty between the United States of America and the Union of Soviet Socialist Republics on Strategic Offensive Reductions (START II),” 3 January 1993, <http://www.nti.org/treaties-and-regimes/treaty-between-united-states-america-and-union-soviet-socialist-republics-strategic-offensive-reductions-start-ii>.
55. Michael O’Hanlon (Brookings Institution), interview by author, Washington, DC, 18 December 2013.
56. Ibid.
57. Sun Tzu, *Art of War*, trans. Ralph D. Sawyer (Boulder, CO: Westview Press, Inc., 1994), 215.
58. Steinberg and O’Hanlon, *Strategic Reassurance and Resolve*, 89.
59. Ibid., 93.
60. Ibid., 91.
61. James R. Holmes, “The State of the U.S.-China Competition,” in *Competitive Strategies for the 21st Century: Theory, History, and Practice*, ed. Thomas G. Mahnken (Stanford, CA: Stanford Security Studies, 2012), 135–36.
62. Mahnken, ed., *Competitive Strategies for the 21st Century*, 302.
63. US DOD, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense* (Washington, DC: DOD, January 2012), 2; and Susan E. Rice, “America’s Future in Asia” (speech, Georgetown University, Washington, DC, 20 November 2013).
64. David Frelinger and Jessica Hart, “The U.S.-China Military Balance Seen in a Three-Game Framework,” in *The Chinese Air Force: Evolving Concepts, Roles, and Capabilities*, ed. Richard P. Hallion, Roger Cliff, and Phillip C. Saunders (Washington, DC: NDU Press, 2012), 347.
65. Ibid., 349.
66. Ibid., 351.
67. Ibid., 353.
68. Office of the Secretary of Defense (OSD), *Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China 2013* (Washington, DC: OSD, 2013), 15.
69. Ibid.
70. Ibid., 29.

71. Xiaoming Zhang, "The PLAAF's Evolving Influence within the PLA and upon National Policy," in *Chinese Air Force: Evolving Concepts, Roles, and Capabilities*, ed. Richard P. Hallion, Roger Cliff, and Phillip C. Saunders (Washington, DC: NDU Press, 2012), 78–79.
72. Murray Scot Tanner, "The Missions of the People's Liberation Army Air Force," in *Chinese Air Force: Evolving Concepts, Roles, and Capabilities*, ed. Richard P. Hallion, Roger Cliff, and Phillip C. Saunders (Washington, DC: NDU Press, 2012), 136.
73. OSD, *Annual Report to Congress*, 15.
74. Zhang, "PLAAF's Evolving Influence," 72.
75. Kenneth W. Allen, "The Organizational Structure of the PLAAF," in *Chinese Air Force: Evolving Concepts, Roles, and Capabilities*, ed. Richard P. Hallion, Roger Cliff, and Phillip C. Saunders (Washington, DC: NDU Press, 2012), 95.
76. National Air & Space Intelligence Center, *People's Liberation Army Air Force 2010* (Wright-Patterson AFB, OH: NASIC Public Affairs, 2010), 16.
77. Zhang, "PLAAF's Evolving Influence," 74.
78. Kenneth Allen, *The Ten Pillars of the People's Liberation Army Air Force: An Assessment* (Washington, DC: Jamestown Foundation, April 2011), 6.
79. OSD, *Annual Report to Congress*, 5.
80. Hsi-hua Cheng, "The Employment of Airpower in the Taiwan Strait," in *The Chinese Air Force: Evolving Concepts, Roles, and Capabilities*, ed. Richard P. Hallion, Roger Cliff, and Phillip C. Saunders (Washington, DC: NDU Press, 2012), 330.
81. *Ibid.*, 339.
82. OSD, *Annual Report to Congress*, 5–6.
83. Joakim Kasper Oestergaard Balle, "About the THAAD System," *Aeroweb* (web site), 22 October 2014, <http://www.bga-aeroweb.com/Defense/THAAD.html>.
84. US Government Accountability Office, *Missile Defense: Opportunity to Refocus on Strengthening Acquisition Management*, GAO 13-432 (Washington, DC: Government Printing Office, April 2013), 33.
85. US DOD, *Quadrennial Defense Review* (Washington, DC: DOD, March 2014), 38.
86. Christopher J. Bowie, "The Lessons of Salty Demo," *Air Force Magazine*, March 2009, 55–57.
87. David Shlapak, "Equipping the PLAAF: The Long March to Modernity," in *The Chinese Air Force: Evolving Concepts, Roles, and Capabilities*, ed. Richard P. Hallion, Roger Cliff, and Phillip C. Saunders (Washington, DC: NDU Press, 2012), 206.
88. *Ibid.*
89. Alexey Eremenko, "5 Questions on Russian S-300 Missile System Sales to Syria," *RIA Novosti*, 14 May 2013, <http://en.ria.ru/analysis/20130514/181146715.html>.
90. William M. Ibinson, (analyst, Office of the Secretary of Defense, Cost Assessment, and Program Evaluation), discussion with the author, 9 January 2014.
91. Bill Sweetman, "Boeing, Lockheed Martin Form New Bomber Team," *Aviation Week and Space Technology*, 4 November 2013, [http://www.aviationweek.com/Article.aspx?id=/article-xml/AW\\_11\\_04\\_2013\\_p22-631732.xml](http://www.aviationweek.com/Article.aspx?id=/article-xml/AW_11_04_2013_p22-631732.xml).
92. Mark A. Stokes, "China's Quest for Joint Aerospace Power: Concepts and Future Aspirations," in *The Chinese Air Force: Evolving Concepts, Roles, and Capabilities*, ed. Richard P.

## *Applying Cost Imposition Strategies against China*

Hallion, Roger Cliff, and Phillip C. Saunders (Washington, DC: NDU Press, 2012), 34; and OSD, *Annual Report to Congress*, 31.

93. Kevin Pollpeter, “The PLAAF and the Integration of Air and Space Power,” in *The Chinese Air Force: Evolving Concepts, Roles, and Capabilities*, ed. Richard P. Hallion, Roger Cliff, and Phillip C. Saunders (Washington, DC: NDU Press, 2012), 174.

94. Roger Cliff, “The Development of the PLAAF’s Doctrine,” in *The Chinese Air Force: Evolving Concepts, Roles, and Capabilities*, ed. Richard P. Hallion, Roger Cliff, and Phillip C. Saunders (Washington, DC: NDU Press, 2012), 159.

95. Michael W. Pietrucha, “Frontier Basing: Making ‘Places, Not Bases’ A Reality,” unpublished paper, version 2.0, 2013.

96. US Government Accountability Office, *F-35 Joint Strike Fighter: Restructuring Has Improved the Program, But Affordability Challenges and Other Risks Remain*, GAO 13-690T (Washington, DC: Government Printing Office, June 2013), 1.

97. Shlapak, “Equipping the PLAAF,” 192.

98. Col Ralph J. Waite (analyst, Office of the Secretary of Defense, Cost Assessment, and Program Evaluation), discussions with the author, 18–20 February 2014. Based on *Selected Acquisition Reports*, 266 USAF fighter aircraft procured during this period consisted of 30 F-16s, 27 F-15Es, 184 F-22s, and 25 F-35As.

99. Lockheed Martin, “Lockheed Martin Celebrates 100th F-35 Lightning,” 13 December 2013, [http://www.lockheedmartin.com/us/news/press-releases/2013/december/131213ae\\_lockheed-martin-celebrates-100th-f-35.html](http://www.lockheedmartin.com/us/news/press-releases/2013/december/131213ae_lockheed-martin-celebrates-100th-f-35.html).

100. James R. Fitzsimonds, “Cultural Barriers to Implementing a Competitive Strategy,” in *Competitive Strategies for the 21st Century: Theory, History, and Practice*, ed. Thomas G. Mahnken (Stanford, CA: Stanford Security Studies, 2012), 290; and Allen, *Ten Pillars of PLAAF*, 5.

101. Robert Hewson, “Electric Dragons—Airborne Electronic Warfare Capabilities in China,” *RUSI Defense Systems*, Spring 2012, 80.

102. Ibid.

103. Ibid., 81.

104. Saunders and Wiseman, “China’s Quest for Advanced Technologies,” 312.

105. Ibid., 302–03.

106. Allen, *Ten Pillars of PLAAF*, 37.

107. National Air & Space Intelligence Center, *People’s Liberation Army Air Force 2010*, 15.

108. OSD, *Annual Report to Congress*, 32–33.

109. Schelling, “Strategy of Inflicting Costs,” 109.

110. Andre, *Review of Competitive Strategies*, 117–20.

### **Disclaimer**

The views and opinions expressed or implied in SSQ are those of the authors and are not officially sanctioned by any agency or department of the US government. We encourage you to send comments to: [strategicstudiesquarterly@us.af.mil](mailto:strategicstudiesquarterly@us.af.mil).