India's Counterforce Temptations

Strategic Dilemmas, Doctrine, and Capabilities

Christopher Clary and Vipin Narang

Is India shifting to a nuclear counterforce strategy? The conventional wisdom is that India only reluctantly acquired nuclear weapons and has been a restrained nuclear weapons power that adheres to a no-first-use (NFU) policy and rejects the possibility of nuclear warfighting. Although the empirical record largely bears out its reluctance to acquire nuclear weapons,[1] India's continued nuclear restraint is less certain. Specifically, India is developing a suite of capabilities and increasingly making statements about preemption and counterforce that appear inconsistent with its professed strategy of assured retaliation or minimum deterrence.

This article identifies, and attempts to explain, why India has devoted considerable resources since 2003 to develop and acquire capabilities that exceed what is required for a strictly retaliatory nuclear arsenal. Specifically, why has India sought to build a diverse and growing number of accurate and responsive nuclear delivery systems at higher states of readiness, an increasing array of surveillance platforms, and both indigenous and imported air and ballistic missile defenses? Moreover, these capability developments have emerged alongside an increasing number of public statements by serving and retired Indian national security officials arguing that preemptive counterforce options against Pakistan are permissible doctrinally and advantageous strategically.[2]

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1. See George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley: University of California Press, 1999); and Vipin Narang, "Strategies of Nuclear Proliferation: How States Pursue the Bomb," *International Security*, Vol. 41, No. 3 (Winter 2016/17), pp. 110–150, doi.org/10.1162/ISEC_a_00268.
2. Vipin Narang, "Plenary: Beyond the Nuclear Threshold: Causes and Consequences of First Use," remarks prepared for the Carnegie International Nuclear Policy Conference, Washington, D.C., March 20, 2017, https://fbfy83yid9j1dqsev3zq0w8n-wpengine.netdna-ssl.com/wp-content/uploads/2013/08/Vipin-Narang-Remarks-Carnegie-Nukefest-2017.pdf.

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We argue that these apparently discrepant capability developments are most likely the result of India's conscious pursuit of more flexible options beyond countervalue targeting—namely, counterforce options against Pakistan's longer-range nuclear systems—and are largely not the product of either technological drift or strategic confusion.

If our assessment is correct, then these developments are an early indication of India's exploration and development of options to target Pakistan's strategic nuclear systems in a conflict. Unlike India's nuclear strategy toward China, which appears to remain countervalue assured retaliation, available evidence suggests that India may be developing options toward Pakistan that would permit it to engage in hard nuclear counterforce targeting, providing India a limited ability to disarm Pakistan of strategic nuclear weapons.[3] Such a development would entail a decoupling of India's nuclear strategies toward its two neighbors.

A shift to incorporating nuclear counterforce options may be an attempt to escape India's strategic paralysis following Pakistan's development of tactical nuclear weapons, which Pakistan threatens to use against Indian conventional forces should they cross certain red lines. What can India do if Pakistan uses one or several tactical nuclear weapons against Indian forces? India's official nuclear doctrine explicitly threatens massive retaliation against any such use, which outside observers have widely interpreted as implying a major countervalue strike against Pakistani cities. Nevertheless, many have questioned the credibility of massive retaliation—whether any Indian leader would in fact order the killing of millions of innocent Pakistani civilians in response to nuclear use on Indian forces operating on Pakistani soil.[4] If India chose not to retaliate with massive force, it could attempt a proportional tit-for-tat response. Such a response, however, would cede the nuclear initiative back to Pakistan, which,

3. Hard counterforce implies attacks against hardened targets, such as nuclear weapons storage facilities or leadership bunkers, which are difficult to destroy. Soft counterforce implies attacks against area targets, such as military bases, where even one fission warhead would likely cause meaningful destruction. Given the difficulty of destroying mobile targets, such as missile transporters, we consider such attacks as part of "hard counterforce."

4. See P.R. Chari, "India's Nuclear Doctrine: Stirrings of Change" (Washington, D.C.: Carnegie Endowment for International Peace, June 4, 2014), https://carnegieendowment.org/2014/06/04/india-s-nuclear-doctrine-stirrings-of-change-pub-55789; Raja Menon, "A Mismatch of Nuclear Doctrines," *Hindu*, January 22, 2014; Rajesh Rajagopalan, "India's Nuclear Doctrine Debate" (Washington, D.C.: Carnegie Endowment for International Peace, June 30, 2016), https://carnegieendowment.org/2016/06/30/india-s-nuclear-doctrine-debate-pub-63950; Zorawar Daulet Singh, "Is India's Nuclear Doctrine Credible?" *Journal of Defence Studies*, Vol. 11, No. 1 (January–March 2017), pp. 111–118, https://idsa.in/jds/jds_11_1_2017_is-india-nuclear-doctrine-credible; and George Perkovich and Toby Dalton, *Not War, Not Peace? Motivating Pakistan to Prevent Cross-Border Terrorism* (New Delhi: Oxford University Press, 2016), pp. 190–193.

retaining its long-range strategic nuclear weapons, could respond by destroying one or several Indian cities. Further, pursuing such graduated options would place enormous pressure on India's command and control system.[5]

Thus, some Indian policymakers appear to be attracted to a third option: a hard counterforce strike against Pakistan's relatively small number—perhaps several dozen—strategic nuclear assets on land (and eventually at sea) to eliminate its ability to destroy Indian strategic targets and cities. Such a strategy would be consistent with India's doctrine of massive retaliation—massive retaliation strategies need not be countervalue—while avoiding the credibility issues associated with a countervalue targeting strategy following Pakistan's use of nuclear weapons on the battlefield. One problem with a counterforce option, however, is that, seized with the fear of a disarming strike, Pakistan would have an incentive to unleash its entire arsenal first before losing it, which in turn would encourage India to attempt a counterforce strike preemptively—a problem given India's NFU commitment, which most commentators have assumed would oblige India or its forces to suffer a nuclear detonation before retaliating. We argue that these preemptive pressures associated with counterforce targeting may explain why a number of influential Indian officials have made a persistent and otherwise puzzling argument either that India should revise its NFU policy to permit preemption or that preemptive use upon warning of imminent Pakistani launch is consistent with its existing NFU policy.

India's adoption of potentially preemptive counterforce options—even as a choice on a menu that otherwise consists of countervalue retaliation options—would mark a seismic shift in Indian nuclear strategy and the death knell of so-called credible minimum deterrence. Furthermore, if India construes preemption as consistent with its NFU policy and therefore preemptive counterforce as a form of massive retaliation, it may decide that no overt changes to its declaratory doctrine are necessary. As India's former National Security Adviser Shivshankar Menon recently stated, "India's nuclear doctrine has far greater flexibility than it gets credit for."[6] In short, India's national security officials may have already quietly concluded that preemptive counterforce options—and associated increases in strategic force capabilities—are consis-

5. Balraj Nagal, "India's Nuclear Strategy to Deter: Massive Retaliation to Cause Unacceptable Damage," *CLAWS Journal*, Winter 2015, p. 13, http://www.claws.in/images/journals_doc/440323975_balrajnagal.pdf.

6. Quoted in Ajai Shukla, "After a Pakistani TNW Strike, India Can Go for Pakistan's Nuclear Arsenal: Former NSA Shivshankar Menon," *Business Standard*, March 18, 2017, http://ajaishukla.blogspot.com/2017/03/after-pakistani-tnw-strike-india-will.html.

tent with India's existing nuclear doctrine. Therefore, there may be no explicit acknowledgment or indicators of this shift, which may force Pakistan to adjust its nuclear posture and strategy on the fear that it has already occurred.

Eliminating Pakistan's strategic nuclear weapons would be tempting for India. Rather than current military plans that aim to punish Pakistan for future provocations while avoiding Pakistan's nuclear red lines, plans for a counterforce-capable India would be able to wage whatever conventional war it prefers by eliminating the nuclear threat altogether. India might be able to reestablish deterrence against Pakistani terrorist attacks on Indian territory in ways that aborted adjustments to its conventional doctrine have failed to do.

Nevertheless, India's flirtation with nuclear counterforce carries significant risks. First, the prospects for counterforce success even against Pakistan's current force are questionable. Second, India's adoption of nuclear counterforce—or even Pakistan's fear of its adoption—could generate not just an arms race, but dangerous "first-strike instability" where neither side could afford to go second. Absent an explicit denial of Indian interest in counterforce options, Pakistan must react to the mere possibility of their existence, given that the survivability of its strategic nuclear weapons could be at stake. Consequently, Pakistan may decide that it needs to build more nuclear forces and to adopt riskier deployment patterns to enhance survivability, heightening the danger of nuclear escalation in any future military crisis.

The article proceeds as follows. First, we situate India's nuclear developments in the context of broader strategic developments in the India-Pakistan relationship. Second, we document a growing number of statements by recent Indian officials offered in a private capacity while serving or shortly after retirement that call into question India's NFU commitment and demonstrate interest in being able to execute disarming attacks. Third, we discuss Indian nuclear force developments over the last two decades, which have substantially improved India's ability to conduct hard-target counterforce strikes despite continuity in India's official nuclear doctrine. Fourth, we assess Pakistan's likely responses to these developments and conclude that India's prospects for counterforce success are dubious and the adoption of a counterforce strategy—or Pakistan's fear of its adoption—could have significant deleterious consequences. This conclusion implies that just as conventional military options have failed to resolve India's Pakistan dilemma, adjustments to its nuclear strategy are similarly unlikely to yield positive results—and may increase the risk of catastrophic outcomes. Finally, we consider the implications of these findings for scholars' understanding of theories of nuclear strategy and the prospect of a broader era of counterforce in the emerging nuclear landscape.

India's Enduring Strategic Dilemma

Since the late 1980s, India's leaders have struggled to develop a strategy for deterring Pakistan-sponsored terrorism in the wake of Pakistan's acquisition of a nuclear weapons capability. Despite its conventional military superiority over Pakistan and its possession of nuclear weapons, India has been unable to deter Pakistan-backed attacks.[7] India has lost more than 30,000 civilians and security force personnel to terrorist or militant violence in the last thirty years, an outcome New Delhi attributes largely to Pakistani state sponsorship of anti-India militants.[8] "The challenge is," one former Indian diplomat explained, "how can you change the thinking of the other side—raise the cost, but not then have to face a dilemma that is existential?"[9]

Indian leaders had initially expected that India's nuclear weapons would help deter sub-conventional and conventional aggression. When India conducted nuclear explosive tests in May 1998, Prime Minister Atal Bihari Vajpayee argued they were necessary because two bordering nuclear weapons states—China and Pakistan—had attacked India four times. He explained that Pakistan, a "bitter neighbor," had sponsored "unremitting terrorism and militancy" in India.[10] Within a week of India's 1998 tests, India's deputy prime minister announced that India's new nuclear status "brought about a qualitatively new stage in Indo-Pak[istani] relations." He demanded that Pakistan "roll back its anti-India policy," and stated that cross-border strikes on militant camps in Pakistan-administered Kashmir should be "looked into."[11] Pakistan tested its own nuclear weapons later that same month.

A much publicized visit by Prime Minister Vajpayee to Pakistan in February

7. S. Paul Kapur, *Dangerous Deterrent: Nuclear Weapons Proliferation and Conflict in South Asia* (Stanford, Calif.: Stanford University Press, 2007), pp. 14–31; C. Christine Fair, *Fighting to the End: The Pakistan Army's Way of War* (New York: Oxford University Press, 2014), pp. 202–225; and Vipin Narang, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict* (Princeton, N.J.: Princeton University Press, 2014), pp. 222–252.
8. South Asia Terrorism Portal, "India Data Sheets" (New Delhi: Institute for Conflict Management, n.d.), accessed November 15, 2018, http://www.satp.org/satporgtp/countries/india/database/index.html; Praveen Swami, *India, Pakistan, and the Secret Jihad: The Covert War in Kashmir, 1947–2004* (New York: Routledge, 2007); and Ahsan Butt, *Secession and Security: Explaining State Strategy against Separatists* (Ithaca, N.Y.: Cornell University Press, 2017), pp. 83–124.
9. Quoted in Perkovich and Dalton, *Not War, Not Peace*? p. 8.
10. "Nuclear Anxiety; Indian's Letter to Clinton on the Nuclear Testing," *New York Times*, May 13, 1998, https://www.nytimes.com/1998/05/13/world/nuclear-anxiety-indian-s-letter-to-clinton-on-the-nuclear-testing.html.
11. Quoted in Waheguru Pal Singh Sidhu, "India's Nuclear Use Doctrine and Command and Control," in Peter R. Lavoy, Scott D. Sagan, and James J. Wirtz, eds., *Planning the Unthinkable: How New Powers Will Use Nuclear, Biological, and Chemical Weapons* (Ithaca, N.Y.: Cornell University Press, 2000), p. 126; and "Advani Tells Pak to Roll Back Anti-India Policy, Or Else . . ." *Rediff*, May 18, 1998, http://m.rediff.com/news/1998/may/18advani.htm.

1999 led some Indian officials to conclude that the two countries' overt nuclear capabilities had "eliminated the threat of another war, making a settlement possible."[12] Instead, in early summer of that year, Indian troops in Kashmir discovered a massive incursion of Pakistani forces near the town of Kargil, triggering what would become the fourth Indo-Pakistani war. In the aftermath of that conflict, which terminated with Pakistan's withdrawal, Indian policymakers abandoned the optimism that had emerged following the May 1998 tests and concluded that Pakistan's possession of nuclear weapons had enabled continued Pakistani revisionism. A postwar Indian government commission examining the causes and conduct of the Kargil War highlighted an earlier strand of more pessimistic and previously classified Indian intelligence analysis from the early 1990s, even prior to Pakistan's overt nuclear testing in 1998. These analysts had concluded that Pakistan sought to use its nuclear capability to "allow Pakistan to continue" waging sub-conventional conflict in Kashmir, because "the cover of a nuclear threat . . . would limit India's retaliatory options of threatening escalation to a conventional war."[13] To deter Pakistan, India would need to develop the ability to conduct limited war that stopped short of triggering Pakistan's use of nuclear weapons.

Despite public proclamations by India's leadership that India was ready and willing to fight such a limited war, Pakistan continued to support anti-India terrorist groups—increasingly beyond Kashmir, into India's heartland. In December 2001, a group of terrorists attacked India's Parliament while it was in session. The terrorists bungled the attack, but had they succeeded, the consequences would have been calamitous for India and its government. In response to the attack, India ordered the full mobilization of its army—the first time it had done so since the 1971 Indo-Pakistani War—and demanded that Pakistan take action against terrorist groups operating from its soil.[14]

The unfolding crisis tested, and eventually reaffirmed, the Pakistan military's belief in the importance of its nuclear deterrent—a conclusion Pakistan's President Pervez Musharraf did not hesitate to publicize. As early as mid-June 2002, before India had even demobilized its army, Musharraf stated publicly that "the hesitation, frustration and inability of India to attack Pakistan or con-

12. Kenneth J. Cooper, "India, Pakistan Kindle Hope for Peace," *Washington Post*, February 21, 1999, https://www.washingtonpost.com/archive/politics/1999/02/21/india-pakistan-kindle-hope-for-peace/a0b3a8d7-3fda-4168-aa48-f66b5e741564.
13. Kargil Review Committee, *From Surprise to Reckoning: The Kargil Review Committee Report* (New Delhi: Sage, 2000), p. 197.
14. Sumit Ganguly and Devin T. Hagerty, *Fearful Symmetry: India-Pakistan Crises in the Shadow of Nuclear Weapons* (New York: Oxford University Press, 2005), p. 182.

duct a so-called limited war . . . bear ample testimony to the fact that [a] strategic balance exists in South Asia" that deters Indian "aggression."[15] In December, Musharraf returned to this theme, asserting that he had told Indian leaders "they should not expect a conventional war from Pakistan" if India attacked. As a consequence, he boasted, "We defeated our enemy without going to war."[16] It was this statement that convinced India that it needed to release a public nuclear doctrine that emphasized the certainty of massive nuclear retaliation in the event of Pakistan's first use of nuclear weapons against India or its forces.[17]

For its part, the Indian Army attributed the failure of the military standoff with Pakistan to the slow mobilization of India's ground forces, which permitted international pressures to dissuade its political leaders from launching a reprisal and gave Pakistan time to countermobilize, increasing the likelihood of a full-scale conflict in the event of a limited Indian attack. In response, the army developed what it called "proactive strategy options," colloquially known as Cold Start, which in a future crisis would allow India to initiate limited attacks from a "cold start," without needing weeks to mobilize in advance of the onset of conventional hostilities.[18] The idea was to develop calibrated and quick conventional retaliatory options that the army could employ to punish Pakistan without provoking nuclear escalation.

A multiday terrorist rampage in the Indian city of Mumbai in 2008, which left 166 dead and more than 300 injured, provided India an opportunity to put the army's conventional retaliatory options to the test. New Delhi's resulting inaction, however, showed that these options were too risky for civilian leaders to authorize.[19] Indian leaders struggled with the fundamental paradox of

15. Quoted in Sami Zubeiri, "Nuclear Deterrent Gave India Second Thought: Musharraf," Agence France-Presse, June 18, 2002.
16. Quoted in Farhan Bokhari and Edward Luce, "Pakistan's Leader Highlights Atomic Dangers," *Financial Times*, December 31, 2002.
17. Prime Minister's Office (PMO) of India, "Cabinet Committee on Security Reviews Progress in Operationalizing India's Nuclear Doctrine," January 4, 2003, https://web.archive.org/web/20171213002811/http://pib.nic.in/archieve/lreleng/lyr2003/rjan2003/04012003/r040120033.html; and Rahul Roy-Chaudhury, "Nuclear Doctrine, Declaratory Policy, and Escalation Control," in Michael Krepon, Rodney Jones, and Ziad Haider, eds., *Escalation Control and the Nuclear Option in South Asia* (Washington, D.C.: Stimson Center, 2004), p. 114.
18. Walter C. Ladwig III, "A Cold Start for Hot Wars? The Indian Army's New Limited War Doctrine," *International Security*, Vol. 32, No. 3 (Winter 2007/08), pp. 158–190, doi.org/10.1162/isec.2008.32.3.158; and Shashank Joshi, "India's Military Instrument: A Doctrine Stillborn," *Journal of Strategic Studies*, Vol. 36, No. 4 (August 2013), pp. 512–540, doi.org/10.1080/01402390.2013.766598.
19. Sandeep Unnithan, "Why India Didn't Strike Pakistan after 26/11," *India Today*, October 14, 2015, https://www.indiatoday.in/magazine/the-big-story/story/20151026-why-india-didnt-strike-pakistan-after-26-11-820634-2015-10-14; and Pranab Dhal Samanta, "26/11: How India

Cold Start: any level of retaliation punitive enough to deter Pakistan and its army would risk a nuclear response from Pakistan. It was this concern that stayed Prime Minister Manmohan Singh's hand after the Mumbai attack.[20] Presented with an attack that justified the employment of the Cold Start strategy, India froze instead, and Pakistan took note.

Three years later, in 2011, Pakistan announced that it had tested a very short-range, nuclear-capable ballistic missile, the Nasr, designed to be deployed close to the battlefield—an explicit answer to any remaining temptation to ever execute a Cold Start strategy. Pakistan's manipulation of the threat of low-level nuclear use, something that it had hinted at since 1998, now included a dedicated battlefield capability. Satellite imagery strongly suggests that Nasr batteries are kept in garrisons near the border, implying that the short-range missile is in fact a fielded system.[21]

With respect to nuclear strategy, two approaches emerged in India to address Pakistan's continued sponsorship of terrorist violence, now further enabled by its introduction of battlefield nuclear weapons. The first approach suggested shifting from a policy of massive retaliation against Pakistani cities in the event of Pakistan's first use of battlefield nuclear weapons to proportional or calibrated retaliation against more credible targets, such as a Pakistan military base.[22] In theory, India could retaliate with conventional forces and use the threat of proportional nuclear retaliation to deter Pakistani battlefield nuclear use. The problem with this strategy is that it could trigger a cycle of tit-for-tat escalation—and put enormous pressure on India's command and control

Debated a War with Pakistan that November," *Indian Express*, November 26, 2010, http://archive.indianexpress.com/news/2611-how-india-debated-a-war-with-pakistan-that-november/716240.

20. Unnithan, "Why India Didn't Strike Pakistan after 26/11"; and Samanta, "26/11: How India Debated a War with Pakistan that November."

21. Hans M. Kristensen, "Pakistan's Evolving Nuclear Weapons Infrastructure" (Washington, D.C.: Federation of American Scientists blog, November 16, 2016), https://fas.org/blogs/security/2016/11/pakistan-nuclear-infrastructure/; and Col. Vinayak Bhat (ret.), "Rare Images Show Pakistan's Tactical Nuclear Weapons May Be Used against Indian Troops," *ThePrint*, March 29, 2018, https://theprint.in/security/rare-images-show-pakistans-tactical-nuclear-weapons-that-may-fail-to-stop-indian-troops/45703/.

22. Raja Menon, "Boxed In by Pakistan," *Indian Express*, September 6, 2014, https://indianexpress.com/article/opinion/columns/boxed-in-by-pakistan/; Gurmeet Kanwal, "India's Nuclear Doctrine: Need for a Review" (Washington, D.C.: Center for Strategic and International Studies, December 5, 2014), https://www.csis.org/analysis/india%E2%80%99s-nuclear-doctrine-need-review; and Verghese Koithara, *Managing India's Nuclear Forces* (Washington, D.C.: Brookings Institution Press, 2012), pp. 245–246.

systems—because Pakistan would still retain longer-range strategic nuclear missiles that it could use against the Indian homeland.

The second possible approach—one that outside observers overlooked given its difficulty and perceived inconsistency with India's nuclear doctrine—centered on developing counterforce options, whereby India could launch a disarming strike against Pakistan's nuclear arsenal and then overwhelm Pakistan's remaining forces with its conventional superiority. After all, U.S. scholars had concluded that the United States' attempts to maintain "limited" nuclear options during the Cold War had provided "a strong incentive for Soviet military planners to retain preemptive [counterforce] options."[23] If India could convince Pakistan that its ability to launch a disarming strike were credible, this might nullify Pakistani nuclear threats, permitting punitive conventional attacks that could restore Indian deterrence of Pakistani subconventional attacks. At a minimum, such a capability might diminish Pakistani confidence that Pakistan could contain a nuclear exchange to the battlefield. A counterforce strategy might restore credibility to India's massive retaliation doctrine, because it would allow India to retain the nuclear initiative and would justify a massive strike to achieve disarming effect.[24]

Although the Indian military would likely try to destroy as many of Pakistan's battlefield nuclear systems as it could, the battlefield systems do not pose a threat to Indian population centers.[25] The primary concern for India would be to disarm Pakistan's longer-range strategic nuclear systems, which number in the tens, not the tens of thousands, and which India has been mapping for years. The logic is seductive: Pakistan's strategic nuclear force is currently small enough that India might believe it could be disarmed or neutralized with combined strikes on Pakistan's launchers and its command and control system, and that any remaining Pakistani nuclear weapons could be intercepted with missile defenses. Although this may sound like wishful thinking, especially after the aborted flirtation with Cold Start, India has been developing the components necessary for such a strategy. In addition, India's national security leaders have recently—and intriguingly—made statements that suggest they believe such a strategy may offer a way out of their country's current strategic paralysis.

23. Scott D. Sagan, *Moving Targets: Nuclear Strategy and National Security* (Princeton, N.J.: Princeton University Press, 1989), p. 64.
24. Nagal, "India's Nuclear Strategy to Deter," pp. 13–14.
25. See Feroz Hassan Khan, *South Asian Stability Workshop 2.0: A Crisis Simulation Report* (Monterey, Calif.: Naval Postgraduate School, February 2016), p. 26.

Public Statements, Private Views, and a Changing Strategy?

According to the conventional wisdom,[26] India's nuclear posture has three pillars: (1) India seeks to "[build] and [maintain] a credible minimum deterrent";[27] (2) India keeps its forces in a disassembled state to maximize safety and civilian control;[28] and (3) India has an unequivocal no-first-use policy, declaring that "nuclear weapons will only be used in retaliation against a nuclear attack on Indian territory or on Indian forces anywhere,"[29] and "consciously rule[s] out" any "preemptive use" of nuclear weapons.[30] Together, these three pillars constitute India's doctrine and strategy of assured countervalue retaliation: India would not be the first to use nuclear weapons, but it would retaliate with certainty following a nuclear attack on it (or its forces) with strategic nuclear countervalue strikes on an adversary's cities. The narrow aim of this strategy was to deter the use of weapons of mass destruction against India, not to deter Pakistani sub-conventional or conventional attacks. To achieve this objective, India would rely on a relatively small number of survivable land, air, and eventually sea-based nuclear weapons, maintained with highly centralized control at a very low level of peacetime readiness.[31]

Although some of these features—such as a declared NFU policy—may remain official doctrine, they are no longer unassailable pillars of Indian nuclear strategy. Given Pakistan's threat of first use of tactical nuclear weapons against Indian forces, India's nuclear strategy may be evolving. Recent acquisitions and readiness enhancements to its nuclear arsenal suggest a widening gap between India's capabilities and its declared nuclear deterrence goals. Additionally, in recent years, serving and retired Indian officials have begun arguing for greater flexibility in India's existing nuclear doctrine—

26. Ashley J. Tellis, *India's Emerging Nuclear Posture: Between Recessed Deterrent and Ready Arsenal* (Santa Monica, Calif.: RAND Corporation, 2001); Perkovich, *India's Nuclear Bomb*; Rajesh M. Basrur, *Minimum Deterrence and India's Nuclear Security* (Stanford, Calif.: Stanford University Press, 2006); and Bharat Karnad, *India's Nuclear Policy* (Westport, Conn.: Praeger Security International, 2008).
27. PMO, "Cabinet Committee on Security Reviews Progress in Operationalizing India's Nuclear Doctrine."
28. See, for example, Tellis, *India's Emerging Nuclear Posture*, p. 367.
29. PMO, "Cabinet Committee on Security Reviews Progress in Operationalizing India's Nuclear Doctrine." The policy is more accurately described as no first use of weapons of mass destruction, because India "retain[ed] the option of retaliating with nuclear weapons" to adversary use of chemical and biological weapons.
30. Jasjit Singh, "A Nuclear Strategy for India," in Singh, ed. *Nuclear India* (New Delhi: Knowledge World, 1998), p. 314.
31. Narang, *Nuclear Strategy in the Modern Era*, pp. 94–120.

or asserting that its existing doctrine is already more flexible than commonly assumed.

Such claims by serving Indian military and political officials complicate the ability of analysts to assess India's current nuclear posture and doctrine. India has produced only one official nuclear doctrine, and chose to publicly issue merely a summary of it in 2003. Since then, India's officials have made very few declaratory remarks regarding nuclear strategy or doctrine, and have pointedly avoided revising its official public doctrine. Instead, India seems to prefer pursuing any strategic shifts by creatively reinterpreting the current doctrine. Indeed, India's national security managers have repeatedly noted the flexibility of the existing doctrine. The challenge for analysts, therefore, is to infer their thinking from the few statements that they do make.

Shivshankar Menon, India's national security adviser and the point person on India's nuclear arsenal and strategy from 2011 to 2014, is the highest-level former government official to write on India's nuclear strategy since the release of the 2003 doctrine. In his book, *Choices*, Menon laid out what one can only infer might be India's operational nuclear strategy, and what he thinks it perhaps should be. His thinking is starkly different from the conventional wisdom of a minimum deterrence countervalue retaliatory strategy.[32]

First, Menon hints at possible preemptive elements in Indian nuclear strategy, which is puzzling for a state that professes an explicit NFU policy. Although he ultimately concludes that declaring no first use is in India's strategic interests, he challenges and erodes its operational absoluteness in the following scenario: "There is a potential gray area as to when India would use nuclear weapons first against another NWS [nuclear weapons state]. Circumstances are conceivable in which India might find it useful to strike first, for instance, against an NWS that had declared it would certainly use its weapons, and if India were certain that adversary's launch was imminent. But India's present public nuclear doctrine is silent on this scenario."[33] This suggestion of doctrinal silence hints at the notion that India's nuclear doctrine contains enough ambiguity to permit preemptive nuclear use if Indian leaders believed that nuclear use against it was imminent.

This was not the first time Menon cast doubt on India's commitment to an absolute NFU policy. In 2010, he gave a speech at India's National Defence

32. Shivshankar Menon, *Choices: Inside the Making of India's Foreign Policy* (Washington, D.C.: Brookings Institution Press, 2016), pp. 105–123.
33. Ibid., p. 110.

College where he used a peculiar formulation that deviated from the official doctrine to describe India's policy: "no first use against non-nuclear weapons states."[34] This formulation suggests that India's NFU policy may not apply to nuclear-armed Pakistan or China. Although some observers believed that Menon's phrasing was inadvertent,[35] the speech remains on India's official Ministry of External Affairs website without any correction. Dhruva Jaishankar, a knowledgeable Delhi-based analyst declared that this eroded formulation "wasn't a mistake,"[36] that "it was deliberate,"[37] and it was intentional "signaling . . . [to c]orrespond with other activities around that time."[38]

Menon was not working in a vacuum. There have long been skeptics within India's government and military about the advisability of a declared and absolute NFU policy—that India would accept first use, especially on its homeland.[39] Hints of preemptive elements in Indian strategy date back to at least 2000, when Prime Minister Vajpayee declared: "We are being threatened [by Pakistan] with a nuclear attack. Do they understand what it means? If they think we would wait for them to drop a bomb and face destruction, they are mistaken."[40] Although Vajpayee's government would subsequently affirm India's NFU policy in its 2003 official nuclear doctrine, his national security team had already presided over the creation and public release of a "draft" nuclear doctrine in 1999, which declared that "India will not be the first to initiate a nuclear strike." This declaration left open the possibility of using nuclear weapons first if India detected adversary preparations for nuclear attack.[41] Although the 1999 draft was described by the government as illustrative rather than authoritative, Vajpayee's statement above only a year later suggests that at least some of India's leaders had, from the beginning, been uncomfortable

34. Shivshankar Menon, "Speech by NSA Shri Shivshankar Menon at NDC on 'The Role of Force in Strategic Affairs'" (New Delhi: Ministry of External Affairs, Government of India, October 21, 2010), https://www.mea.gov.in/Speeches-Statements.htm?dtl/798/Speech+by+NSA+Shri+Shivshankar+Menon+at+NDC+on+The+Role+of+Force+in+Strategic+Affairs.
35. Vipin Narang, "Did India Change its Nuclear Doctrine? Much Ado about Nothing," IDSA Comment (New Delhi: Institute for Defence Studies and Analysis, March 1, 2011), https://idsa.in/idsacomments/DidIndiaChangeitsNuclearDoctrine_vnarang_010311.
36. Dhruva Jaishankar (@d_jaishankar), Twitter, July 1, 2016, 3:07 p.m., https://twitter.com/d_jaishankar/status/748941060727005184.
37. Ibid., 3:13pm, https://twitter.com/d_jaishankar/status/748942581074198528.
38. Ibid., 3:15pm, https://twitter.com/d_jaishankar/status/748943209510924289.
39. Kumar Sundaram and M.V. Ramana, "India and the Policy of No First Use of Nuclear Weapons," *Journal for Peace and Nuclear Disarmament*, Vol. 1, No. 1 (February 2018), pp. 152–168 doi.org/10.1080/25751654.2018.1438737.
40. Quoted in Sarabjit Pandher, "Talks Only on Return of PoK, Says Vajpayee," *Hindu*, February 7, 2000, https://www.thehindu.com/2000/02/07/stories/01070001.htm.
41. National Security Advisory Board, "India's Draft Nuclear Doctrine" (Washington, D.C.: Arms Control Association, August 17, 1999), https://www.armscontrol.org/act/1999_07-08/ffja99.

with an absolute NFU policy. His statement led to little public debate, and there was no attempt to reconcile it with India's reaffirmed NFU commitment in 2003. With his 2016 book, Menon became the most authoritative figure to argue that preemption may be consistent with India's official 2003 NFU declaration since its formal adoption.

Unlike Menon, who construed preemption as consistent with India's declared doctrine, other Indian officials have discussed explicitly revising or jettisoning NFU altogether. In 2012, for example, a group of retired Indian national security officials engaged in a public effort to convince the Indian government to explicitly permit India to use nuclear weapons in the event of an imminent nuclear attack—by definition, preemption. P.R. Chari, a former senior Indian defense official, chaired a nongovernmental task force that included a former Indian strategic forces commander (the senior-most military official in the Indian system responsible for nuclear weapons), which argued that NFU should mean that India would not "initiate" nuclear use. The task force stressed that "initiation" included "the process leading up to the actual use of a nuclear weapon by an adversary. This would include mating component systems and deploying warheads with the intent of using them."[42] In making the argument for preemption, Chari and colleagues were reverting to language from the 1999 "draft" doctrine that merely proscribed no first "initiation" of nuclear use.

A growing number of India's highest-serving defense officials have similarly argued for formally revising NFU.[43] Menon's thinking above on a "gray area" in NFU dovetails with writings by Lt. Gen. B.S. Nagal (ret.), a former strategic forces commander who subsequently served as an adviser on nuclear issues in the prime minister's office during Menon's tenure as national security adviser. Nagal advocated that India should explicitly abandon NFU in favor of a doctrine of "ambiguity," which encompasses potential first uses in preemption scenarios, launch on warning, or launch on launch (which requires detailed real-time surveillance and intelligence that India presumably currently lacks).[44] Nagal goes further than Menon and questions the morality of NFU, particularly in a democratic state such as India—asking how the Indian leader-

42. IPCS Task Force on India's Nuclear Doctrine, *India's Nuclear Doctrine: An Alternative Blueprint* (New Delhi: Institute of Peace and Conflict Studies, 2012).
43. Recently, career Indian intelligence official and former Deputy National Security Adviser S.D. Pradhan also expressed doubts about no first use. Pradhan, "Growing Chinese Nuclear Arsenal: Is China Changing Its Doctrine?" *Times of India*, July 31, 2018, https://blogs.timesofindia.indiatimes.com/ChanakyaCode/growing-chinese-nuclear-arsenal-is-china-changing-its-doctrine/.
44. Lt. Gen. B.S. Nagal, "Checks and Balances," *Force*, June 2014.

ship could accept significant casualties if it knew that Pakistan was making preparations for the imminent use of nuclear weapons.

Then, in November 2016, after Nagal's writings had caused a stir in India's strategic community and following the release of Menon's memoirs, Defense Minister Manohar Parrikar stated in his "personal capacity" that India should not declare whether or not it has a no-first-use policy. At a public book event, Parrikar used the opportunity of a question unrelated to Indian nuclear doctrine to offer his opinion on NFU, declaring: "A lot of people say India has a no-first-use nuclear policy, but why should I bind myself? I should say I'm a responsible nuclear power, and I will not use it irresponsibly."[45] He went on to refer to the "written strategy" in the doctrine as only a "guideline," and suggested that unpredictability had to be part of any strategy.[46] This public questioning of the sanctity of the NFU declaration by a sitting defense minister—without a formal rebuke from the government—is, to date, the most high-profile example of the erosion of India's NFU policy.

In sum, unlike his colleagues who have called for explicit revision to India's nuclear doctrine, Menon has interpreted preemption as consistent with India's current NFU declaration, obviating the need for any adjustment to the declaratory doctrine or policy—since publicly rolling back NFU would likely be more costly than creative reinterpretation. The question then becomes: What standard of evidence of enemy preparation would be required for the strictures of NFU to dissolve? Would Indian leaders presume imminent use in the face of verbal threats and clear evidence of tactical nuclear weapons batteries moving into the theater of battle? Menon's writings suggest that India's nuclear strategy may already include an exception for Indian first use in an easily imagined crisis scenario.

The puzzle for analysts of India's nuclear strategy has always been: Why inject ambiguity into India's NFU commitment, and specifically narrowly for preemptive use options? With its survivable nuclear force and a purported countervalue targeting strategy, India could absorb a Pakistani first use of nuclear weapons and still have sufficient forces to inflict unacceptable damage on high-value Pakistani targets. There is one potential logical reason to qualify NFU: if India does not have a countervalue targeting strategy, but rather is

45. "India Should Not Bind Itself to a 'No First Use Nuclear Policy,' says Manohar Parrikar," *Scroll*, November 10, 2016, https://scroll.in/latest/821251/india-should-not-bind-itself-to-a-no-first-use-nuclear-policy-says-manohar-parrikar. The use of the phrase "a lot of people say India has a no-first-use nuclear policy" is particularly notable. It is not the same as saying, "India has a no-first-use nuclear policy . . ."
46. Ibid.

considering counterforce options, where it cannot be as relaxed about accepting first use and the potential attrition of forces that would be required to destroy Pakistan's own nuclear forces. Any consideration of counterforce options must leave open the possibility of preemptive nuclear use.

Does private interest in counterforce options explain the seemingly persistent effort to carve out an exception to NFU for specifically preemptive use?[47] Menon suggests an answer in his book. First, he uses the past tense when discussing countervalue targeting, which many observers believe is India's targeting strategy. He writes, "Instead, the logical posture at first was countervalue targeting, or targeting an opponent's assets, rather than counterforce targeting, which concentrates on the enemy's military and command structures."[48] Is Menon implying that India has shifted away from countervalue to counterforce targeting? Although it is unclear here, his subsequent analysis reveals his explicit thinking about developing and shifting to a counterforce targeting strategy—if not now, maybe in the future—with the intention of fully disarming Pakistan of at least its strategic nuclear forces. Menon writes:

> What would be credible would be the message India conveyed by how it configures its forces. If Pakistan were to use tactical nuclear weapons against India, even against Indian forces in Pakistan, it would effectively be opening the door to a massive Indian first strike, having crossed India's declared red lines. There would be little incentive, once Pakistan had taken hostilities to the nuclear level, for India to limit its response, since that would only invite further escalation by Pakistan. India would hardly risk giving Pakistan the chance to carry out a massive nuclear strike after the Indian response to Pakistan using tactical nuclear weapons. In other words, Pakistani tactical nuclear weapons use would effectively free India to undertake a comprehensive first strike against Pakistan.[49]

Significantly, Menon includes the phrase "comprehensive first strike," evoking the Herman Kahn notion of a "splendid first strike."[50] Kahn's term of art is one with which Menon would be eminently familiar, and it means strategic nuclear counterforce.[51] Despite calls from India's strategic analysts to expunge "massive" retaliation from the doctrine given its perceived credibility prob-

47. It is also possible that growing discomfort with an absolute NFU policy first led to consideration of preemptive nuclear use, which then led to consideration of counterforce options; the end result is the same, however.
48. Menon, *Choices*, p. 108.
49. Ibid., p. 117.
50. Herman Kahn, *On Thermonuclear War* (Princeton, N.J.: Princeton University Press, 1961), pp. 36–37.
51. Elsewhere, Vice Adm. Verghese Koithara (ret.) advocates using the phrase "first strike" for circumstances in which an attack seeks "to eliminate or reduce the adversary's capability to carry out

lems, Menon instead reinterprets it to mean comprehensive counterforce rather than countervalue targeting. Recall, India's official nuclear doctrine does not prescribe countervalue targeting. A comprehensive first strike—counterforce—would by necessity be massive. And if one interprets preemption as something other than first use, then it would conceivably be consistent with India's existing nuclear doctrine.

Who would go first in a counterforce scenario is necessarily ambiguous. In Menon's example, India executes the counterforce strike following Pakistan's use of battlefield nuclear weapons. India may accept Pakistani first use if it were just on the battlefield, but as Vajpayee stated and Menon implies, Pakistan may be gravely mistaken if it believes that India will wait to allow it to destroy Indian cities or India's own nuclear forces. If, however, Pakistan anticipated such a disarming attempt after using battlefield nuclear weapons and is seized by use-them-or-lose-them fears, it would have an incentive to launch all of its nuclear weapons first, and would not restrict its first use just to the battlefield. For this reason, Menon recognizes that India may have no choice but to go first in such a scenario, to at least preemptively attack Pakistan's long-range nuclear systems. Indian counterforce options must thus retain the flexibility to be fully executed preemptively, imminently before Pakistan has even used nuclear weapons on the battlefield—precisely the gray area that Menon discusses. Indeed, nuclear counterforce options—those envisioned in extreme circumstances rather than a bolt-out-of-the-blue attack—must inherently have some elements of preemption baked in, in order to maximize the chance of success. As much as India might prefer a second-strike counterforce option, Pakistan's reaction to that possibility forces India to consider going first and preemptively itself.

Again, Menon is not alone in discussing or suggesting counterforce options. As Lieutenant General Nagal (ret.) wrote in 2015:

> Once the adversary has decided to initiate nuclear attacks on India or Indian forces anywhere, the aim [of India] will be to terminate the war at the earliest. One method will be to destroy the command and control system of the adversary to prevent further orders for nuclear strikes. This is feasible if all possible steps are taken to destroy the enemy's C4ISR [command, control, communication, computer, intelligence, surveillance, and reconnaissance] system and leadership. Selective targeting or small-scale strikes will not suffice and the call would be for massive retaliation to cause unacceptable damage in the expectation that these would be successful in eliminating the flow of orders.[52]

nuclear strikes," while reserving the phrase "first use" for countervalue or counter-military targeting. Koithara, *Managing India's Nuclear Forces*, p. 77.

52. Nagal, "India's Nuclear Strategy to Deter," p. 14.

Nagal's ambiguous wording—"once the adversary has decided to initiate nuclear attacks"—leaves open the possibility of Indian preemption with a massive disarming "retaliatory" strike, and is especially noteworthy given the language of the 1999 draft nuclear doctrine and the Chari et al. task force, which argued that a decision to initiate a nuclear attack, rather than an actual nuclear detonation, should be the trigger for Indian nuclear use. Elsewhere, Nagal has written explicitly about preemptive counterforce: "A shift to a proactive policy is reassuring to the public. It does not allow destruction of the nation and strategic forces at the outset; hence the arsenal is intact for use. It provides a better range of options to launch decapitating and/or disarming strikes to deal with the adversary leadership/arsenal."[53] Then, in 2019, Nagal, writing in a volume published by the Indian Army's think tank, offered the most explicit argument for preemptive counterforce to date: "Strategic deterrence can follow a policy of first use when there is an unstable and unpredictable adversary, thereby eliminating the dilemma of responding to battlefield weapons or having to qualify circumstances of use with no first use…The basic requirement is to have an assured capability of intelligence, surveillance, and reconnaissance to detect, identify, track, and destroy the nuclear assets of the adversary. This capability must be real time, day and night, all-weather and multi-mode to make it fool proof…[which] allows the employment of nuclear weapons at the right time and place."[54] He goes on to identify a variety of command and control and military targets of interest to neutralize the Pakistani nuclear force, but specifically highlights the need to be able to destroy "nuclear forces underground or deployed in field areas."[55]

Like Menon, Nagal, the highest-level officer in India's nuclear system to write on these issues, explicitly advocates Indian preemptive nuclear use in a counterforce mode to try to disarm the adversary. Interestingly, he discusses not only hard counterforce targets—the nuclear systems that India could locate and destroy—but command and control nodes as well, including leadership decapitation, to render Pakistan's remaining nuclear force impotent. These latter targets would only amplify Pakistan's incentive to use all of its nuclear weapons first, while it retained the ability to do so, and not restrict its nuclear use to just the battlefield.

If India is indeed contemplating counterforce strategies, it would likely have to employ nuclear weapons rather than conventional weapons for two rea-

53. Nagal, "Checks and Balances," p. 14.
54. Lt. Gen. B.S. Nagal (ret.), "India's Nuclear Doctrine and Strategy," in Lt. Gen. A.K. Singh and Nagal, eds., *Military Strategy for India in the 21st Century* (New Delhi: Centre for Land Warfare Studies, 2019), p. 218.
55. Ibid., p. 222.

sons. First, the sheer number of conventional weapons required to destroy an adversary's nuclear weapons makes them more expensive than using nuclear weapons. Second, the limitations of India's ISR capabilities mean that India would need a nuclear blast radius to offset intelligence uncertainties in order to destroy Pakistani systems. Indeed, Nagal argues that a massive nuclear strike would be required to ensure that India could limit damage from Pakistan's nuclear systems.[56]

Such interest in preemptive counterforce would constitute a radical shift from India's initial post-1998 strategy designed to "ride out and survive a first attack and retaliate later" and its explicit rejection of launch-on-warning postures.[57] The logic of developing a counterforce option is to eliminate the specter of Pakistani strategic nuclear use altogether and free India to execute the massive conventional retaliation for which its formidable strike corps have been built. In theory, this could then deter Pakistan from sponsoring terrorist attacks on India's homeland by negating Pakistan's nuclear parity and exposing it to unrelenting Indian conventional and nuclear superiority.

Analysts can dismiss these musings as nothing more than the personal opinions of former officials. All of these statements generated substantial publicity in India and abroad, however, and offered opportunities for these officials and the government to deny interpretations of a shift in thinking.[58] They have refused to do so. Indeed, Menon would later declare that India's "nuclear doctrine has far greater flexibility than it gets credit for," implying that it is broad enough to encompass both massive countervalue retaliation and preemptive counterforce options.[59]

The next section examines India's investment in a diverse array of capabilities that would be useful for damage-limiting first strikes, but which otherwise make little sense for an assured retaliation or a minimum deterrence posture. Such investments are consistent with the strategic logic that Menon and other

56. Vice Adm. Vijay Shankar (ret.), another former Strategic Forces commander, also concludes that India's strategic circumstances could require damage-limiting strikes, but argues that conventional counterforce weapons are sufficient. See Shankar, "Strategic Non-Nuclear Weapons: An Essential Consort to a Doctrine of No First Use" (New Delhi: Institute of Peace and Conflict Studies, January 13, 2014), http://www.ipcs.org/comm_select.php?articleNo=4256.
57. Rajesh Rajagopolan, "India: The Logic of Assured Retaliation," in Muthiah Alagappa, ed., *The Long Shadow: Nuclear Weapons and Security in 21st Century Asia* (Stanford, Calif.: Stanford University Press, 2008), p. 199; and C. Raja Mohan, "Interview with Jaswant Singh, Minister of External Affairs," *Hindu*, November 29, 1999.
58. Max Fisher, "India, Long at Odds with Pakistan, May Be Rethinking Nuclear First Strikes," *New York Times*, March 31, 2017, https://www.nytimes.com/2017/03/31/world/asia/india-long-at-odds-with-pakistan-may-be-rethinking-nuclear-first-strikes.html.
59. Ibid.

former Indian officials have laid out over the last decade, and are otherwise puzzling if India instead adheres to a strict countervalue retaliatory policy.

India's Capabilities: Moving toward Damage Limitation?

This section surveys Indian strategic force developments since the formal release of a summary of India's official nuclear doctrine in 2003.[60] That eight-point summary began with an assertion that India would build and maintain a "credible minimum deterrent," without defining what "minimum" meant, or toward whom. Because India faces two nuclear adversaries, one paradox of a credible minimum deterrent doctrine is that a posture that is "credible" to China may not seem "minimum" to Pakistan.

For example, India is investing in long-range missiles largely dedicated to Chinese high-value targets, but these could be used against Pakistan as well. Moreover, a desire to deter China cannot explain India's investment in a variety of counterforce-supporting capabilities that seem singularly dedicated to Pakistan. The combination of more weapons, a greater number of accurate delivery vehicles at a higher state of readiness and responsiveness, precise warheads, multiple independently targetable reentry vehicles (MIRVs), and a layered ballistic missile defense system allows Indian civilian and military leaders to start thinking about first-strike strategies—or damage-limiting, launch-on-warning strategies—that use nuclear missiles to target an adversary's nuclear arsenal and then rely on missile defenses to intercept any assets that survive the disarming strike attempt.

more precise delivery vehicles, and more of them

Currently, India is still struggling to achieve a credible deterrent against China (see table 1).[61] Systems developed by India's Defence Research and Development Organisation (DRDO) to give India strategic reach against China are only now being extensively tested and operationalized. These include the intermediate-range Agni III, which has been successfully tested only a handful of times, and the longer-range Agni V, first tested in April 2012. The Agni VI is reportedly in development.[62] These missiles will extend India's ability to tar-

60. PMO, "Cabinet Committee on Security Reviews Progress in Operationalizing India's Nuclear Doctrine."
61. Some of the arguments and evidence presented in this section are derived from Vipin Narang, "Five Myths about India's Nuclear Posture," *Washington Quarterly*, Vol. 36, No. 3 (Summer 2013), pp. 143–157, doi.org10.1080/0163660X.2013.825555.
62. Franz-Stefan Gady, "India Tests Most Advanced Nuclear-Capable ICBM," *Diplomat*, January 18, 2018, https://thediplomat.com/2018/01/India-tests-most-advanced-nuclear-capable-icbm.

Table 1. Operational Indian Systems, 2003 and 2018

	2003	2018
Estimated number of nuclear warheads	30–40	130–140
Estimated number of warhead-equivalents of fissile material	60–120	150–200
Potential nuclear delivery aircraft	Mirage-2000H	Mirage-2000H
	Jaguar IS/IB	Jaguar IS/IB
	MiG-27[a]	MiG-27[a]
Land-attack cruise missiles (range)	—	BrahMos 1 (300 km)
Precision-strike standoff rockets and glide bombs (range)[b]	—	Kh-59M (120 km)
Short-range ballistic missiles (range)	Prithvi-1 (150 km)	Prithvi-1 (150 km)
	Prithvi-2 (250 km)	Prithvi-2 (250 km)
		Agni-1 (700 km)[c]
Medium-range ballistic missiles	—	Agni-2 (2,000 km)[c]
Intermediate-range ballistic missile	—	Agni-3 (3,200 km)
Canisterized land-based ballistic missiles	none	yes
Submarine-launched ballistic missile (range)	—	K-15 Sagarika (750 km)
Ship-launched ballistic missile (range)	—	Dhanush (400 km)
Unmanned aerial vehicles/remotely piloted aircraft (range)	IAI Searcher Mk II (300 km)	IAI Searcher Mk II (300 km)
		IAI Heron (1000 km)
Best national imagery satellite (resolution)	IRS-1C/IRS-1D (5.8 m)	Cartosat-2 Series (0.65 m)
Best commercial imagery satellites	DigitalGlobe QuickBird (0.61 m)	DigitalGlobe WorldView-4 (0.31 m)
Best national radar satellites (resolution)	—	RISAT-1/RISAT-2 (1 m)
Best commercial radar satellites	—	TerraSAR-X (0.25 m)

[a]Nuclear role uncertain.
[b]Excludes anti-ship missiles.
[c]Although testing of the Agni-1 and Agni-2 was well under way by 2003, the missiles likely were not inducted formally until 2004 and 2008 and not fully operational until 2007 and 2011, respectively.

SOURCES: "Nuclear Notebook," *Bulletin of the Atomic Scientists*, various issues; International Institute for Strategic Studies, *Military Balance*, various issues; and Defense Intelligence Ballistic Missile Analysis Committee, *Ballistic and Cruise Missile Threat* (Wright Patterson Air Force Base, Ohio: National Air and Space Intelligence Center, June 2017).

get China but can be used against Pakistan as well. India's Strategic Forces Command has publicized the testing of the intermediate-range Agni III in a shorter, lofted trajectory to a distance of 1,500 kilometers—a range notable for its inclusion of virtually all potential Pakistani targets.[63]

In addition, as part of its ballistic nuclear submarine project, India commissioned the *Arihant* in 2016. Its submarine-launched ballistic missile (SLBM), the K-15 Sagarika with a range of roughly 750 kilometers, was first launched from an underwater pontoon in January 2013, and a longer range 3,500-kilometer K-4 SLBM is in development. In 2017, the *Arihant* suffered an accident that necessitated large-scale repairs.[64] The *Arihant* test-fired three Sagarika missiles in August 2018, and Indian Prime Minister Narendra Modi subsequently announced that the submarine had conducted its first deterrent patrol in November.[65] Currently, however, nuclear-tipped Sagarika SLBMs are capable of targeting only Pakistan from Indian territorial waters: *Arihant* would have to transit thousands of kilometers to beyond the Indian Ocean to target any large Chinese city. Only after India is able to field the K-4 SLBM will India be able to reach eastern Chinese cities from the Indian Ocean. Notably, even the K-4 testing program has featured tests involving both shorter ranges and altered trajectories that appear more applicable to Pakistan than to China.[66]

Depressed trajectories place stresses on the reentry vehicle, but they can generate a shorter flight time, reducing warning times for systems such as aircraft that need several minutes to launch or for mobile ground-based systems to escape the blast radius.[67] Lofted trajectories put different stresses on the reentry vehicle, but they allow long-range missiles to be used against closer targets. Any missile capable of reaching Chinese targets can be employed against Pakistani targets (the reverse is obviously not true). Indian observers,

63. Y. Mallikarjun, "Agni-II Test Fired for a Shorter Range," *Hindu*, April 17, 2015.
64. Dinakar Peri and Josy Joseph, "INS Arihant Left Crippled after 'Accident' 10 Months Ago," *Hindu*, January 8, 2018, https://www.thehindu.com/news/national/ins-arihant-left-crippled-after-accident-10-months-ago/article22392049.ece.
65. Hemant Kumar Rout, "Nuke-capable Submarine-launched Missile Operationalised, India in Select Triad Club," *New Indian Express*, August 19, 2018, http://www.newindianexpress.com/specials/2018/aug/19/nuke-capable-submarine-launched-missile-operationalised-india-in-select-triad-club-1859992.html; and Narendra Modi (@narendramodi), Twitter, November 5, 2018, 12:26 a.m., https://twitter.com/narendramodi/status/1059361293579124736.
66. Hemant Kumar Rout, "Maiden Test of Undersea K-4 Missile from Arihant Submarine," *New Indian Express*, April 9, 2016.
67. Lisbeth Gronlund and David C. Wright, "Depressed Trajectory SLBMs: A Technical Evaluation and Arms Control Possibilities," *Science & Global Security*, Vol. 3, Nos. 1–2 (1992), pp. 101–159, doi.org/10.1080/08929889208426380.

such as then-Air Vice Marshal Arjun Subramanian, have acknowledged that the testing profile and publicly reported characteristics of India's SLBMs suggest that "in terms of technology India will have the capability to perform counter-force strikes."[68]

Moreover, DRDO claims that it has been developing MIRVs. Its director-general, V.K. Saraswat, explained in 2013, "Our design activity on the development and production of MIRV is at an advanced stage today. We are designing the MIRVs, we are integrating [them] with Agni IV and Agni V missiles."[69] In multiple interviews, Saraswat has stated that he views MIRVed Agnis as a "force multiplier," so that "where I was using four missiles, I may use only one missile."[70] It is possible that the acquisition of MIRVs could enhance India's nuclear survivability. Nuclear warheads are cheaper to produce than missiles—U.S. intercontinental ballistic missiles from the 1970s, for instance, cost at least six times as much as the individual warheads they carried.[71] If, in a hypothetical first-use scenario, India feared that China could target many of its long-range missiles, then MIRVed missiles offer a cheaper way to ensure sufficient throw weight with which to retaliate against China. The Cold War association of MIRVs as first-strike weapons is also compelling, however. A single missile that can carry multiple warheads is capable of destroying many targets at once, increasing the prospects for successful counterforce strikes. Further, if India used MIRVed missiles intended for China against Pakistan (by lofting or depressing their missile trajectories), what it pursues for survivability against the former could be employed as a potential first-strike weapon against the latter.

Further, India's expansion of its lower-order and shorter-range use options alone have caused India's nuclear posture to drift well beyond any reasonable definition of "minimum deterrence" toward Pakistan. India is developing an array of accurate shorter-range capabilities for potential use in retalia-

68. Arjun Subramanian, "Inching towards Credible Deterrence" (New Delhi: Center for Air Power Studies, December 26, 2013), http://capsindia.org/files/documents/CAPS_Infocus_AS_26DEC.pdf.
69. Quoted in Pallava Bagla, "India's Nuclear Deterrence Capacity Is In Place, the Country Can Sleep Well: Defence Research Chief," *NDTV*, May 4, 2013, https://www.ndtv.com/india-news/indias-nuclear-deterrence-capacity-is-in-place-the-country-can-sleep-well-defence-research-chief-521179.
70. Quoted in "Agni-V May Be Equipped with Multiple Warheads: DRDO Chief," *Economic Times*, May 10, 2012, https://economictimes.indiatimes.com/news/politics-and-nation/agni-v-may-be-equipped- with-multiple-warheads-drdo-chief/articleshow/13080683.cms.
71. Brookings Institution, "What Nuclear Weapons Delivery Systems Really Cost" (Washington, D.C.: Brookings Institution, 1998), https://www.brookings.edu/what-nuclear-weapons-delivery-systems-really-cost/.

tion against hard or soft counterforce targets such as military bases or concentrated armored formations. These include the 150-kilometer Prahaar tactical ballistic missile, aimed, according to DRDO Director-General Saraswat, at "bridg[ing] the [range] gap between the multi-barrel rocket system, Pinaka and the Prithvi missiles,"[72] and capable of carrying "different types of warheads."[73] In 2018, Saraswat refused to answer questions on whether Prahaar will be assigned a battlefield nuclear role.[74] Prahaar can be tipped with a 200-kilogram warhead, a throw-weight sufficient for a nuclear mission—a possibility that is supported by reports that Prahaar missiles will eventually replace all of India's 150-kilometer Prithvis, which were officially deemed dual use themselves.[75] Such short-range systems can target many of Pakistan's most important military centers. Four of the Pakistan Army's nine corps commands are located within 150 kilometers of the border, as are two of the Pakistan Air Force's eleven "flying bases,"[76] and all three of the headquarters for each Pakistan military service as well as its joint staff and the Strategic Plans Division. Similarly, the 750-kilometer Shourya hypersonic missile, the land-based variant of the Sagarika SLBM, could eventually be assigned a nuclear role given its stated payload capabilities. W. Selvamurthy of the DRDO stated that the Shourya's biggest advantage is its mobility and concealability: "It cannot be detected by satellite imaging. It will surprise our adversaries and strengthen our strategic defence."[77] The Shourya could reach any one of Pakistan's twenty largest cities, all of the Pakistan Air Force's flying bases, every corps command location, and the Pakistan Navy's two most important ports, Karachi and Ormara. Given that the Shourya's sea-based counterpart can fly a depressed trajectory to evade detection, presumably the land-based

72. T.S. Subramanian and Y. Mallikarjun, "'Prahaar' Missile Successfully Test-Fired," *Hindu*, July 21, 2011, https://www.thehindu.com/news/national/prahaar-missile-successfully-testfired/article2279166.ece.
73. Defence Research and Development Organization (DRDO), "'Prahaar': New Surface to Surface Tactical Missile Successfully Launched" (Delhi: DRDO, July 21, 2011), https://drdo.gov.in/drdo/English/dpi/press_release/PressReleasePraharnew.pdf.
74. A. Vinod Kumar, "Pruthvik Shankar Asked: Does India Have Tactical Nuclear Weapons?" (New Delhi: Institute for Defence Studies and Analyses, February 12, 2018), https://idsa.in/askanexpert/does-india-have-tactical-nuclear-weapons.
75. Debabrata Mohanty, "India Successfully Test Fires Surface-to-Surface Prahaar Missile," *Indian Express*, July 21, 2011, http://www.indianexpress.com/news/india-successfully-test-fires-surfacetosurface-prahar-missile/820344.
76. The Pakistan Air Force delineates bases used for air operations from those used for administrative or other tasks. Pakistan Air Force, "Active PAF Bases" (Islamabad: Pakistan Air Force, n.d.), accessed November 14, 2018, http://www.paf.gov.pk/active_bases.html.
77. Quoted in T.S. Subramanian and Y. Mallikarjun, "India Successfully Test Fires Shourya Missile," *Hindu*, September 24, 2011, https://www.thehindu.com/sci-tech/science/india-successfully-testfires-shourya-missile/article2482010.ece.

missile can as well, perhaps explaining Selvamurthy's use of the word "surprise." Even if the eventual K-4 or K-15 SLBM has difficulty reaching China, India could use these systems to support a counterforce mission against Pakistan, while its attack submarines and anti-submarine warfare capabilities would be tasked with locating and destroying its land-based and sea-based nuclear weapons.

The capabilities described above augment India's development of cruise missiles such as the BrahMos and the Nirbhay. The former is a joint venture with Russia that has been labeled publicly as a "nuclear-capable" system. After one test, a Russian defense industry official noted that, "fired from land, air and sea platforms, [the BrahMos] can hit targets at ranges of 300 to 500 kilometers and is also capable of carrying a nuclear warhead," though the Strategic Forces Command has not yet officially assigned it a nuclear role.[78] India is also advertising an extended-range BrahMos, a high-speed, highly accurate 800-kilometer missile that seems uniquely tailored for a counterforce role.[79] The Nirbhay, meanwhile, is a subsonic cruise missile that remains in development. With a range of 1,000 kilometers and reportedly capable of carrying a 300-kilogram warhead, the Nirbhay, according to some Indian press accounts, is being developed to fulfill a specific requirement for an Indian long-range, nuclear-capable cruise missile.[80] According to DRDO, the BrahMos and Nirbhay cruise missiles and the hypersonic missile Shourya evidently represent some of the world's most accurate capabilities, with DRDO stressing the comparative speed of the BrahMos and the Shourya.

In fact, DRDO has advertised for years the accuracy of its ballistic missiles, emphasizing a degree of precision not typically associated with countervalue targeting. Some of this improvement in accuracy can be traced to India's exploitation of widely available technologies such as the Global Positioning System. Yet, India has also invested substantial effort and resources in radar and optical correlation guidance systems for its warheads that use the terrain features of the surface below to improve accuracy.[81] Although it may be presti-

78. Quoted in Vladimir Radyuhin, "BrahMos Gains Sub-Strategic Super Weapon Capability," *Hindu*, October 13, 2012, http://www.thehindu.com/news/international/brahmos-gains-substrategic-super-weapon-capability/article3994856.ece.
79. Franz-Stefan Gady, "India to Test 800-km Range BrahMos Supersonic Cruise Missile in 2018," *Diplomat*, January 24, 2018, https://thediplomat.com/2018/01/india-to-test-800-km-range-brahmos-supersonic-cruise-missile-in-2018/.
80. Rajat Pandit, "India Successfully Tests Its First Nuclear-Capable Cruise Missile," *Times of India*, November 8, 2017, https://timesofindia.indiatimes.com/india/india-successfully-tests-its-first-nuclear-capable-cruise-missile/articleshow/61550465.cms.
81. Ajey Lele and Parveen Bhardwaj, "India's Nuclear Triad: A Net Assessment," IDSA Occasional Paper, No. 31 (New Delhi: Institute for Defense Studies and Analyses, 2013), pp. 30–31.

gious for India's scientists to develop accurate missiles, they are costly and, at the very least, enable counterforce targeting strategies.

In sum, despite its professed opposition to a nuclear warfighting posture, India is developing capabilities that enable a possible shift to a counterforce posture against Pakistan. In particular, as India's nuclear capabilities expand both horizontally and vertically (more systems, and more of them), and become more accurate and with smaller and potentially maneuverable warheads, India is quietly laying the groundwork for potential counterforce targeting options that would have been unthinkable a decade ago. India is increasingly capable of destroying what it can find in Pakistan. The next section focuses on how India is improving its ability to find Pakistani strategic nuclear systems.

identifying and intercepting pakistan's strategic systems

For comprehensive counterforce to be effective, a state has to be confident that it can find, fix, and destroy—or intercept—virtually the adversary's entire strategic nuclear arsenal. In recent years, India has made enormous improvements in these areas. These improvements alone do not necessarily suggest that India is seeking counterforce capabilities, as nearly all of its ISR platforms are inherently dual use. Additionally, many of these improvements reflect global technological trends, such as the proliferation of long-endurance unmanned aerial vehicles (UAVs), combined with growing Indian acumen in space flight, which the Indian state has funded for commercial and scientific reasons as well as for military and intelligence purposes. Nevertheless, the improvements since 2003 may give greater confidence to Indian planners that they can monitor and track Pakistani nuclear forces. One former Indian defense imagery analyst wrote triumphantly in a 2017 article publicizing the existence of a possible Pakistani nuclear weapons storage facility, "Nothing can be hidden from satellite imagery."[82] Regardless of whether this is true, it is certainly possible that some in India's intelligence and policy community believe it to be.

Compare India's ISR capabilities in 2003 to those in 2018. Indian remote sensing satellites in 2003 were rudimentary, with maximum resolutions of around 6 meters for panchromatic (visual spectrum) imagery. Imagery with such a low degree of resolution might be able to detect large structures, such as aircraft hangars or fixed radars, but it would have limited military purposes

82. Col. Vinayak Bhat (ret.), "Pakistan Builds New Tunneled Nuclear Weapons Storage Facility in Baluchistan," *ThePrint*, September 5, 2017, https://theprint.in/security/pakistan-builds-new-tunneled-nuclear-weapons-storage-facility-baluchistan/9291/.

and virtually no utility in locating mobile ground vehicles or aircraft. In contrast, India in 2018 had at least six high-resolution imaging satellites capable of capturing imagery between 0.6- and 1-meter resolution—and another satellite (Cartosat-3) capable of 0.3-meter resolution images scheduled for launch in 2018.[83] Such images can distinguish one type of aircraft from another, decoy aircraft from genuine aircraft, and one type of missile from another with detail sufficient to determine if a truck has a spare tire.[84]

India also can take advantage of an ongoing revolution in the availability of space-based imaging from commercial providers. There are two aspects important for remote sensing: quality of image and frequency of image capture of a specific location on the globe. Although high-quality images have been commercially available for decades—the IKONOS satellite, launched in 1999, offered 0.82-meter resolution imagery—there were relatively few satellites in all, let alone in any company's constellation, so revisit times often were days apart. Given the regularity of cloud cover, this could easily mean that one or two weeks could elapse between capture of usable images. Over time, the resolution of the most precise commercial sensors has continued to improve, with DigitalGlobe's Worldview-4 satellite, for example, currently offering 0.3-meter resolution.[85] More important, companies are launching large constellations of medium-resolution satellites with rapid revisit times across the constellation. The company Planet already has a 150-satellite fleet of 3-to-5-meter-resolution microsatellites that provide daily revisits, and that may be able to image the same ground location multiple times a day as the constellation grows further.[86] Although 3-meter resolution imagery is an order of magnitude below the best Indian or commercial satellite imagery available, it is still militarily useful. It is sufficient, for instance, to detect the presence or absence of support vehicles at a mobile missile base.

Panchromatic imagery sensors, or near-infrared imagery sensors that India has placed on several satellites, are mostly useless at night or in the presence of

83. Madhumathi D.S., "India Gets a Sharper Eye in the Sky," *Hindu*, June 29, 2017, https://www.thehindu.com/sci-tech/science/india-gets-a-sharper-eye-in-the-sky/article19180628.ece; and James A. Vedda, "Updating National Policy on Commercial Remote Sensing" (El Segundo, Calif.: Center for Space Policy and Strategy, Aerospace Corporation, March 2017).
84. Robert S. Walsh, "Imagery Intelligence," MCRP 2-10B.5 (Washington, D.C.: U.S. Marine Corps, February 29, 2016), pp. D1–D16; and Federation of American Scientists (FAS), "National Image Interpretability Rating Scales" (Washington, D.C.: FAS, last updated January 16, 1998), https://fas.org/irp/imint/niirs.htm.
85. DigitalGlobe, "WorldView-4" (Westminster, Colo.: DigitalGlobe, n.d), accessed July 4, 2017, http://worldview4.digitalglobe.com/#/main.
86. Planet, "Planet Imagery and Archive" (San Francisco: Planet, n.d.), accessed November 16, 2018, https://www.planet.com/products/planet-imagery/.

substantial cloud cover.[87] As an alternative, radar imagery can function at night and despite cloud cover. In 2003, India had access to, at best, 8-meter-resolution radar satellite imagery, from Canada's RADARSAT-1. In 2018, India operated two radar imaging satellites in orbit (one purchased from Israel), with more scheduled for launch in 2019.[88] The best commercially available radar imagery already has resolutions as low as 0.25 meters, while new commercial entrants seek to offer 1-meter-resolution radar imaging through large constellations able to provide multiple revisits of the same location per day.[89] One-meter satellite imagery could detect the presence of a missile transporter-erector-launcher (TEL) vehicle at a known location, while 0.25-meter imagery could distinguish whether a Pakistani fighter was an F-16 (presumed to have a nuclear delivery role) or an F-7 (presumed not to have such a role).

Both during peacetime and in a conflict with Pakistan, all of this imagery would be supplemented by human and signals intelligence, as well as intelligence acquired from India's partners, such as Israel (which operates two radar imaging satellites and four panchromatic/multispectral imaging satellites).[90] Depending on the nature of India's spy network in Pakistan, ground sensors could be placed at important locations or could conceivably be deployed by manned or unmanned aircraft in the midst of a conflict.[91] Satellite imagery would also be complemented by real-time imagery provided by India's increasing number of unmanned aerial vehicles. In 2003, India operated

87. Jeffrey T. Richelson, "Intelligence: The Imagery Dimension," in Loch K. Johnson, ed. *Strategic Intelligence: The Intelligence Cycle* (Westport, Conn.: Praeger Security International, 2007), pp. 62–63.
88. National Remote Sensing Center (NRSC), "Radar Imaging Satellite (RISAT-1)" (Hyderabad, India: NRSC, February 3, 2016), https://www.nrsc.gov.in/sites/all/pdf/RISAT-1BROCHUREV4.pdf; "RISAT-2" (Hyderabad, India: NRSC, n.d.), accessed July 4, 2017, https://www.nrsc.gov.in/Remote_Sensing_Data_Policy?q=RISAT-2; Nitant Dube, Indian Space Research Organization, "Agency Report: Indian Earth Observation Programme," presentation to the Committee on Earth Observation Satellite in Canberra, Australia, March 2016, http://ceos.org/document_management/Working_Groups/WGISS/Meetings/WGISS-41/5_Friday%20(3.18)/2016.03.18_08.35_ISRO_Agency_Reports_ISRO.pdf; and Surendra Singh, "ISRO to Launch 19 Missions in Just 7 Months," *Times of India*, September 3, 2018, https://timesofindia.indiatimes.com/india/isro-to-launch-19-missions-in-just-7-months-from-september-15/articleshow/65648633.cms.
89. Airbus, "TerraSAR-X Image Products" (Toulouse, France: Airbus, n.d.), accessed January 30, 2018, http://www.intelligence-airbusds.com/en/5646-terrasar-x-image-products; and Ashley Vance, "Pint-Size Satellites Promise Spy-Quality Images—Cheap," *Bloomberg Businessweek*, May 9, 2017, https://www.bloomberg.com/news/articles/2017-05-09/pint-size-satellites-promise-spy-quality-images-cheap.
90. We classify Ofeq-8 (TecSAR) and -10 as radar imaging satellites and Ofeq-5, -7, -9, and -11 as optical imaging satellites. "UCS Satellite Database" (Cambridge, Mass.: Union of Concerned Scientists, August 10, 2018), https://www.ucsusa.org/nuclear-weapons/space-weapons/satellite-database; and Yuval Azoulay, "Ofeq-7 Satellite Lift-Off Is a Success," *Haaretz*, June 12, 2007, https://www.haaretz.com/1.4942320.
91. Alan J. Vick et al., *Aerospace Operations against Elusive Ground Targets* (Santa Monica, Calif.: RAND Corporation, 2001), p. 70.

only its own indigenous Nishant UAV, with a limited range of 160 kilometers and an operational ceiling of 3,600 meters—making it extremely vulnerable to Pakistani air defenses—as well as the Israeli Searcher UAV, with a 300-kilometer range and a 6,100-meter ceiling, which is vulnerable to a small but increasing number of Pakistani air defense systems while also having a limited range. Virtually all of Pakistan's western Balochistan Province, for instance, would have been inaccessible. In 2018, by comparison, India had more Searchers and Israeli Heron UAVs that can operate at ranges up to 1,000 kilometers with beyond line-of-sight controls capable of reaching and loitering above virtually any part of Pakistan (or all of Pakistan if India used satellite communications with the aircraft), and that are vulnerable only to Pakistani fighters and a small number of Chinese-origin surface-to-air missile systems.

These UAVs can carry not just electro-optical and infrared imagery sensors, but also multi-mode radars that can be used to provide high-resolution images or as a wide-area ground moving target indicator (GMTI). A GMTI could identify any ground vehicle leaving a suspected nuclear weapons storage facility, for instance, and then use inverse synthetic aperture radar imagery to provide a detailed image of that vehicle while it is still in motion. In fact, in higher-traffic areas, a modern GMTI would likely be able to distinguish a large TEL-like vehicle from trucks or other vehicles, simplifying the target discrimination task.[92]

Thus, a single Indian drone might loiter over a large potential storage complex and systematically track any missile launchers deployed from that site. Pakistani countermeasures to defeat Indian UAVs would carry costs. They could emplace surface-to-air missiles near such sites, but that would likely generate signatures that would complicate Pakistan's ability to conceal the site. Alternatively, Pakistan could divert scarce aircraft to fly patrols over such targets, though this too might generate signatures in remote areas that could arouse Indian interest in otherwise barren terrain. Newer techniques also permit radar imaging satellites to function as GMTI, though the benefits of this advancement may be harder for militaries to exploit given the short loiter times associated with a satellite orbital pass over a specific location.[93]

Despite all these improvements, India's near-term and medium-term capabilities might be able to locate only a large fraction of Pakistan's long-

92. Ibid., p. 143.
93. Keir A. Lieber and Daryl G. Press, "The New Era of Counterforce: Technological Change and the Future of Nuclear Deterrence," *International Security*, Vol. 41, No. 4 (Spring 2017), pp. 9–49, doi.org/10.1162/ISEC_a_00273.

range nuclear arsenal. What if India could find, fix, and destroy even a very high percentage—say, 90 percent—of Pakistan's strategic nuclear weapons? Normally the remaining 10 percent, perhaps five strategic nuclear missiles, would be sufficient to deter any reasonable Indian leader from authorizing such a risky strike. What if, however, India could erect working missile defenses that could theoretically intercept five warheads? If missile defenses could pick up the residual force, it is not fantastical to think that India might contemplate a shift to this strategy. Currently, India's missile defenses have nowhere near this capability, but serious minds in Delhi may be thinking about the prospect.

The requirement to intercept residual forces in a counterforce strategy is why DRDO's pursuit of ballistic missile defenses—and India's announced plans to acquire Russia's S-400 system, which can intercept both ballistic and cruise missile targets—is so important. Such systems can be characterized as defensive based strictly on their capabilities. Their primary purpose, however, could be to support an offensive nuclear counterforce strategy by being capable of, and tailored to, intercepting residual Pakistani forces. That is, India may not need to find and destroy 100 percent of Pakistan's strategic nuclear force to effectively disarm it. DRDO is pursuing the development of a layered system that includes the Prithvi Air Defense terminal defense system and the Ashwin Air Defense theater defense system. Although there has again been no political decision to deploy these systems, DRDO long ago publicly stated that it was ready to deploy "Phase I" capabilities—the protection of two cities—and that the layered system has a hit-to-kill probability of 99.8 percent, a claim that strains mathematical credulity.[94] Even if DRDO's reputation for broken promises on weapons systems leads one to doubt the efficacy of any indigenous system, India's planned acquisition of the S-400 system would provide India with a highly potent ballistic and cruise missile defense capability, one reportedly capable of intercepting any of Pakistan's current inventory of strategic ballistic missiles and possibly some of its nuclear cruise missiles.[95] That India has been willing to acquire the Russian S-400 system despite threats of U.S. sanctions reflects its strategic importance, which retired Indian Air Force officers publicly acknowledge derives from the system's broad missile defense capability as well as its traditional air defense role.[96]

94. "World's Best Interceptor Missile by 2011: DRDO," *Hindustan Times*, March 10, 2009.
95. Keir Giles, *Russian Ballistic Missile Defense: Rhetoric and Reality* (Carlisle Barracks, Pa.: U.S. Army War College, 2014), pp. 15–17.
96. Rajat Pandit, "India Moves toward Acquiring Russian S-400 Missile Systems despite U.S. Opposition," *Times of India*, July 1, 2018, https://timesofindia.indiatimes.com/india/india-moves-

Even if India can find a large fraction of Pakistan's strategic nuclear arsenal, and potentially intercept the rest, could it execute its counterforce strike quickly enough to maximize the prospects for success? The next section assesses whether India's nuclear command and control system is capable of supporting a counterforce strategy.

India's More Responsive Command and Control

Even with new missile and missile defense capabilities, could the Indian force be responsive enough to implement a preemptive counterforce strategy if it had evidence of imminent Pakistani use of nuclear weapons? As mentioned earlier, the conventional wisdom has long been that India maintains its nuclear force in a recessed and disassembled state. Evidence is emerging, however, that India's ability to launch upon deciding to do so has also improved rapidly since 2003. In his 2001 book, Ashley Tellis wrote that the three key features of India's nuclear posture were that it was limited in size, separated in disposition, and centralized in control.[97] He noted, "The weapons and delivery systems are developed and produced, with key subcomponents maintained under civilian custody, but these assets are not deployed in any way that enables the prompt conduct of nuclear operations. Such assets are, in fact, sequestered and covertly maintained in distributed form, with different custodians exercising strict stewardship over the components entrusted to them for safekeeping."[98] Although the narrative that India maintains all of its nuclear forces in a disassembled and demated state across various civilian agencies persists, it is largely a myth. Indeed, one of the tasks with which National Security Adviser Menon was reportedly charged was to streamline the nuclear force and make it more responsive, dispensing with the chaos and management nightmare of component separation, especially in time of a crisis.[99]

All recent observable indicators suggest that India has increased the baseline readiness of at least a subset, if not all, of its nuclear forces—particularly as it marches toward a force consisting largely of so-called canisterized systems in which warheads are likely premated to delivery vehicles and kept sealed for storage and transport. This canisterization is made possible by India's transi-

towards-acquiring-russian-s-400-missile-systems-despite-us-opposition/articleshow/64810964.cms; and Air Vice Marshal Arjun Subramaniam (ret.) (@rhinohistorian), Twitter, July 16, 2018, 3:54 a.m., https://twitter.com/rhinohistorian/status/1018811037594869761.

97. Tellis, *India's Emerging Nuclear Posture*, pp. 296–475.

98. Ibid., p. 367.

99. Vipin Narang discussion with retired Strategic Forces Command officer, New Delhi, December 2017.

tion to solid-fuel ballistic missiles. Canisterization enhances missile longevity by protecting the solid fuel from the elements, but it would complicate any effort by India to maintain its nuclear forces in a disassembled or demated state. Although it is possible that reserve components are stewarded by their respective civilian agencies—nuclear pits with the Department of Atomic Energy, explosives packages with DRDO, delivery vehicles with the Strategic Forces Command—it seems increasingly likely that some subset of the force is within minutes of readiness. This level of readiness likely includes colocation of subcomponents and, in some cases, potentially fully mated systems that can be digitally armed and released by central authorities. Civilian and scientific representatives may still be involved in the peacetime assembly and mating processes, but may no longer be required for arming and launching nuclear systems. Indeed, India's official 2017 Armed Forces Joint Doctrine revealed for the first time publicly that the Strategic Forces Command "controls all of India's nuclear warheads and delivery systems."[100]

Several Agni variants are already deployed in canisterized form, and the SLBM will almost surely have to be deployed in a premated state. Although there are ways to insert final components or mate a warhead in an SLBM tube while a submarine is on deterrent patrol, they are likely prohibitively complicated. With some portion of the nuclear force already moving to canisterization on land and sea, it is likely that India will rely increasingly on technological and procedural negative controls—such as two-person assent—to prevent unauthorized release, rather than on physical separation of components or demating.

In interviews, senior Indian civilian security officials and former Strategic Forces Command officers repeatedly suggest that some portion of India's nuclear force, particularly those weapons and capabilities designed for use against Pakistan, are now kept at a high state of readiness, capable of being operationalized and released within seconds or minutes in a crisis—not hours, as had been assumed. For example, discussions with former officers in the Strategic Forces Command confirmed that, even during peacetime, a portion of India's land-based missiles are maintained at very high levels of readiness, and that at least some nuclear bombs for aircraft are colocated with aircraft on bases and stored in underground bunkers for rapid mating if necessary.[101] As a

100. Directorate of Doctrine, Headquarters Integrated Defence Staff, *Joint Doctrine Indian Armed Forces*, 2nd ed. (New Delhi: Ministry of Defence, April 2017), p. 37.
101. Vipin Narang interview with Vice Adm. Vijay Shankar (ret.), New York City, July 15, 2011; and Vipin Narang interview with former civilian national security officials, New Delhi, December 2017.

crisis escalated, it would be possible for India to ready a significant number of weapons that could be used in counterforce mode.

In the previous disassembled and dispersed configuration, there would have likely been visible signals of movement up alert levels in the Indian system as subcomponents were moved, assembled, and mated to delivery vehicles. Now, however, the maintenance of at least some subset of the force at a higher baseline level of readiness means that there may not be any indicators that India has readied nuclear weapons for use. This lack of visibility could complicate signaling in future crises. It also enables India to possibly release a full counterforce strike with few indications to Pakistan that it was coming (a necessary precondition for success). If Pakistan believed that India had a "comprehensive first strike" strategy and with no indication of when a strike was coming, crisis instability would be amplified significantly.

Every Indian government official and military officer with whom we spoke emphasized that control over India's nuclear arsenal remains highly centralized. That control, however, is increasingly digital rather than mechanical or procedural, compressing the time required to arm and release nuclear weapons. In short, at least a subset of India's nuclear force is no longer maintained in a highly recessed state and is instead increasingly responsive, making a posture or strategy of counterforce more plausible than is generally appreciated. Even if there may not yet be an official consensus in Delhi as to the wisdom of fully transitioning to a counterforce strategy, there has been agreement to permit the development of capabilities and changes in readiness that would make it possible for Indian leaders to contemplate a shift toward preemptive counterforce options *in extremis*.

Consequential Actions and Reactions

At a minimum, India is taking steps that could be interpreted as demonstrating interest in nuclear and nonnuclear counterforce capabilities. This perceived evolution—whether intentional or unplanned—is risky, and any shift toward counterforce options is unlikely to achieve lasting nuclear superiority over Pakistan for several reasons. First, India would have to make substantial investments in delivery vehicle and intelligence, surveillance, and reconnaissance capabilities. Even then, it would have only a modest chance of eliminating Pakistan's current strategic nuclear force. Moreover, the cost would be substantial for a country with a developing economy and weak defense industry. Even so, India has taken steps beyond those that most observers would expect for a state nominally committed to credible minimum deterrence, and it

has shown a willingness to incur real costs to achieve many of the capabilities discussed above.

Second, Pakistan has not, and will not, sit idly by if it believes that India seeks to develop options that may threaten the survivability of its strategic nuclear forces; it will adjust its behavior in both crises and peacetime. Even nascent discussions of counterforce options risk creating first-strike instability in a crisis, because nuclear states have an incentive to use their weapons first if they believe that their nuclear adversary has a counterforce doctrine. Pakistan cannot allow India to go first, because it risks being completely disarmed. India cannot allow Pakistan to go first and reduce its ability to disarm Pakistan. Therefore, as soon as one side believed there was even the possibility of nuclear use, it would have an incentive to go first and go massively. Every crisis between India and Pakistan could potentially carry the risk of becoming a nuclear crisis very early, with the mere possibility of counterforce making preemption a potentially self-fulfilling prophecy.[102] This destabilizing crisis dynamic was obviated so long as Pakistan perceived a firmer Indian NFU and countervalue strategy, which minimized its use-them-or-lose-them fears.

In addition to first-strike instability in a crisis, an Indian counterforce strategy would spark an interminable arms race in peacetime, as Pakistan sprinted to maintain survivability and India built up to sustain its ability to threaten it. Even India's suggestive statements to date are likely enough to reinforce Pakistani fears that India has an interest in fully disarming it.[103] As Peter Feaver stressed two decades ago, even if a disarming first strike is unlikely, that does not rule out the possibility.[104]

Raising the peacetime costs of maintaining Pakistan's nuclear deterrent could be an important motivation for Indian planners who might be attracted to the idea of encouraging its smaller, poorer neighbor to expend greater financial resources to maintain its survivable nuclear forces. At the margin, this could trigger a greater diversion of resources away from conventional warfighting capabilities. It could also further heighten civil-military tensions in Pakistan given the already oversized role of the military in the country's

102. See Thomas C. Schelling, *The Strategy of Conflict* (Cambridge, Mass.: Harvard University Press, 1980), pp. 207–229.
103. Air Commodore Adil Sultan of Pakistan's Strategic Plans Division writes, "India's incoherent nuclear expansion would compel its adversaries to take remedial measures." Sultan, "India's Nuclear Doctrine: A Case of Strategic Dissonance or Deliberate Ambiguity," *IPRI Journal*, Vol. 18, No. 2 (Summer 2018), p. 52, doi.org/10.31945/iprij.180202.
104. Peter D. Feaver, Scott D. Sagan, and David J. Karl, "Correspondence: Proliferation Pessimism and Emerging Nuclear Powers," *International Security*, Vol. 22, No. 2 (Fall 1997), pp. 185–207, at p. 188, doi.org/10.1162/isec.22.2.185.

economy. Indian planners might hope that, at some point, Pakistani civilians and leaders abandon the strategic competition with India.

Nevertheless, India would have difficulty disarming the current Pakistani force, let alone one that rapidly expands and disperses to account for counterforce fears. Pakistan has already built much of the infrastructure necessary to engage in an arms race, decreasing the marginal expenditures necessary to participate in even an intense prospective arms competition. Pakistan has four operational plutonium production reactors and multiple uranium centrifuge enrichment facilities. Credible nongovernmental organizations estimate that Pakistan has 140–150 nuclear warheads, slightly more than India is thought to possess.[105] Some portion of the Pakistani nuclear force is likely devoted to battlefield nuclear use, however.[106] Although such warheads are not irrelevant for India's counterforce concerns, they could not easily strike major Indian cities even if deployed to the forward edge of the battle area. If India believed that Pakistani nuclear use was imminent, its civilian leaders might prioritize targeting Pakistan's strategic systems, relegating tactical systems to a subsequent mopping-up phase when conventional capabilities could focus on their capture or destruction. Comparable nongovernmental estimates of the size of India's nuclear arsenal suggest that India likely has parity or a small advantage in terms of the number of warheads that it can use for strategic (vs. battlefield) purposes. Pakistani fissile material production, though, continues. Pakistan has constructed three plutonium production reactors since 2000 and appears to have built a new uranium enrichment facility as recently as 2015. By 2025, even conservative estimates conclude that Pakistan might possess as many as 250 warheads, though a nontrivial portion of these likely would be apportioned for so-called tactical missions.[107]

The net result of a counterforce exchange would depend not just on the rela-

105. Hans M. Kristensen, Robert S. Norris, and Julia Diamond, "Pakistani Nuclear Forces, 2018," *Bulletin of the Atomic Scientists*, Vol. 74, No. 5 (September 2018), pp. 348–358, doi.org/10.1080/00963402.2018.1507796.

106. Christopher Clary, "The Future of Pakistan's Nuclear Weapons Program" in Ashley J. Tellis, Abraham Denmark, and Travis Tanner, eds., *Strategic Asia, 2013–2014: Asia in the Second Nuclear Age* (Washington, D.C.: National Bureau of Asian Research, 2013); and Jaganath Sankaran, "Pakistan's Battlefield Nuclear Policy: A Risky Solution to an Exaggerated Threat," *International Security*, Vol. 39, No. 3 (Winter 2014/15), pp. 118–151, doi.org/10.1162/ISEC_a_00191.

107. Kristensen, Norris, and Diamond, "Pakistani Nuclear Forces, 2018"; Sarah Burkhard, Allison Lach, and Frank Pabian, "Khushab Update" (Washington, D.C.: Institute for Science and International Security, September 7, 2017), http://isis-online.org/isis-reports/detail/khushab-update/; David Albright and Serena Kelleher-Vergantini, "Pakistan's Fourth Reactor at Khushab Now Appears Operational" (Washington, D.C.: Institute for Science and International Security, January 16, 2015), http://isis-online.org/isis-reports/detail/pakistans-fourth-reactor-at-khushab-now-appears-operational/; and International Panel on Fissile Materials (IPFM), "Pakistan May Be

tive number of Indian and Pakistani strategic nuclear weapons, but also on how many weapons Pakistan colocates at different alert states—or, on how many nuclear weapons are distributed across how many storage or deployment locations. While Pakistan will face increasingly strong incentives to widely disperse its warheads if India explores counterforce options, some level of colocation is almost inevitable—especially for the air-based and (probably future) sea-based legs of Pakistan's nuclear triad, and the degree of colocation is almost certainly greater earlier in a crisis before forces can be deployed into the field. Even for the mobile, ground-based systems, countries have frequently deployed multiple missiles per launcher (e.g., the Soviet Union deployed four missiles per SCUD-B mobile launcher), so destroying a single launcher can effectively prevent several warheads from being fired.[108] Also, Pakistan tested a MIRVed medium-range ballistic missile, the Ababeel, in January 2017, expressly stating that the goal of developing a MIRVed platform was to defeat any potential Indian missile defenses.[109] On the one hand, ballistic missile defenses encourage MIRVing, because a salvo of multiple warheads can quickly overwhelm and penetrate the ballistic missile defense interceptors. On the other hand, MIRVing may undermine the survivability of Pakistan's strategic nuclear weapons, because one Indian warhead can now destroy several Pakistani warheads if it successfully destroys the missile on which they are placed (e.g., a four-for-one payoff). Consequently, South Asia is already experiencing a counterforce feedback loop where India's pursuit of ballistic missile defenses is encouraging Pakistan to develop countermeasures such as MIRVs to ensure survivability and penetrability, which then increases the incentives Indian planners have to find and destroy MIRVed missiles.

Evidence that warheads might be colocated with delivery systems, especially early in a crisis, is also supported by Pakistan's development of remote, hardened storage sites as a survivability measure, including large underground facilities. Destroying the entrances to such a facility—or causing collapse of the facility—would potentially neutralize any warheads or launch vehicles stored there. Such facilities, however, could contain an unknown number of warheads or launch vehicles (or possibly even none), potentially

Building a New Enrichment Facility" (Princeton, N.J.: IPFM blog, September 16, 2016), http://fissilematerials.org/blog/2016/09/pakistan_may_be_building_.html.

108. Dean A. Wilkening, "A Simple Model for Calculating Ballistic Missile Defense Effectiveness," *Science & Global Security*, Vol. 8, No. 2 (1999), p. 203, doi.org/10.1080/08929880008426475.

109. Inter-Services Public Relations (ISPR), press release, no. PR-34/2017-ISPR, (Rawalpindi, Pakistan: Pakistan Armed Forces, January 24, 2017), https://www.ispr.gov.pk/press-release-detail.php?id=3705.

turning them into a warhead sponge. This would force India to commit many warheads—far more than it presently has relative to Pakistan—to destroying potentially empty sites on the small chance that they may in fact be large nuclear storage facilities. Multiple analysts claim to have located potential underground nuclear weapons warhead facilities from commercially available satellite images. The process of excavating such sites likely makes it extraordinarily difficult to hide their development. If India did not have precise intelligence as to their layout underground, it might be forced to target each entrance separately, which would again inflate the number of warheads it would need to complete a successful counterforce strike. The payoff, though, could be enormous, because such facilities appear to be large enough to hold dozens of TEL vehicles.[110]

In addition to going underground to protect and hide its nuclear weapons, Pakistan is going underwater. Consideration of counterforce options would almost certainly accelerate Pakistan's shift to sea-based forces on the assumption that those systems are more survivable. This carries risks of accidents or unauthorized use if the Pakistan Navy is forced to manage sea-based nuclear weapons before it is ready.[111] The same month that it tested the MIRVed Ababeel, Pakistan tested the Babur-3 sea-launched cruise missile, with a publicized 450-kilometer range, which the Pakistan military pointedly stressed was "capable of delivering various types of payloads."[112] Pakistan currently possesses five submarines that could carry cruise missiles, and reports suggest that it is acquiring up to eight Type 041 Yuan-class submarines from China, which presumably would also be capable of performing that mission.[113] The short range of the Babur-3 precludes Pakistan from a bastion-model of submarine basing—deploying the submarine in the sanctuary of territorial waters—because no major Indian city is within range from Pakistani waters. Although the sea-based arsenal's survivability might in theory discourage first strikes, in

110. Kristensen, "Pakistan's Evolving Nuclear Weapons Infrastructure"; David Albright et al., "Potential Nuclear Weapons-Related Military Area in Baluchistan, Pakistan" (Washington, D.C.: Institute for Science and International Security, August 10, 2017), http://isis-online.org/isis-reports/detail/potential-nuclear-weapons-related-military-area-in-baluchistan-pakistan/; and Bhat, "Pakistan Builds New Tunneled Nuclear Weapons Storage Facility in Baluchistan."
111. Christopher Clary and Ankit Panda, "Safer at Sea? Pakistan's Sea-Based Deterrent and Nuclear Weapons Security," *Washington Quarterly*, Vol. 40, No. 3 (Fall 2017), pp. 149–168, doi.org10.1080/0163660X.2017.1370344.
112. ISPR, press release, no. PR-10/2017-ISPR (Rawalpindi, Pakistan: Pakistan Armed Forces, January 9, 2017), https://www.ispr.gov.pk/press-release-detail.php?id=3672.
113. Franz-Stefan Gady, "China to Supply Pakistan with 8 New Stealth Attack Submarines by 2028," *Diplomat*, August 30, 2016, https://thediplomat.com/2016/08/china-to-supply-pakistan-with-8-new-stealth-attack-submarines-by-2028/.

practice it is less clear. Because any given submarine may carry only a handful of nuclear-tipped cruise missiles, and only a fraction of the submarine force would be on patrol during peacetime, India might have stronger incentives to strike early at Pakistan's submarine fleet in the event of conflict, before these submarines could be flushed out of port. The dual-use role of Pakistani submarines would make them legitimate targets for Indian conventional air and cruise missile attacks on Pakistani ports; and in the 1971 war, India showed an interest and capability in undertaking such attacks. Here too, then, there is an emerging counterforce feedback loop: fear of disarming strikes incentivizes Pakistani sea-based capabilities, but those same capabilities become high-priority targets, vulnerable to first strikes early in a conflict.[114]

In addition, Pakistan could disperse its airborne weapons and nuclear-capable aircraft early in a crisis, complicating India's intelligence and targeting task. Such nuclear-capable aircraft (F-16s and Mirage 5s) routinely operate from just four Pakistani airfields.[115] In a crisis, though, they almost certainly would be dispersed. The Pakistan Air Force has practiced dispersal to, and use of, satellite airfields for decades, and it has dispersed combat aircraft occasionally during periods of heightened tensions, including as recently as 2017.[116] Pakistan does not appear to have constructed specially hardened shelters or additional security fencing at potential dispersal bases, but this may merely be a prudent effort at avoiding telltale visual signatures.[117] Pakistan's ground-attack aircraft require runways of 7,500 feet for safe takeoff and landing, and Pakistan has at least thirty-five runways of such length overall.[118] The Mirage 5 might be able to take off in as little as 5,250 feet, allowing it to operate from as many as forty-three additional airports or air bases in Pakistan.[119] Some of these airfields, such as Mushaf air base at Sargodha, are quite large, permitting aircraft distribution within the base at locations more than 1 mile

114. Clary and Panda, "Safer at Sea?" pp. 155–157.
115. International Institute for Strategic Studies (IISS), *The Military Balance, 2016* (London: IISS, February 2016), pp. 320–322; and "Pakistan—Air Force," *Jane's World Air Forces*, posted June 1, 2017.
116. Kanti P. Bajpai et al., *Brasstacks and Beyond: Perception and Management of Crisis in South Asia* (New Delhi: Manohar, 1995), p. 165; and "Pakistan Makes All Forward Airbases Operational," *News International*, May 24, 2017, https://www.thenews.com.pk/latest/206367-Pakistan-makes-all-forward-airbases-operational.
117. Kristensen, "Pakistan's Evolving Nuclear Weapons Infrastructure."
118. The 7,500-foot requirement is from David A. Schlapak et al., *A Global Access Strategy for the U.S. Air Force* (Santa Monica, Calif.: RAND Corporation, 2002), p. 48; and the runway total is from Central Intelligence Agency, "Pakistan" (Washington, D.C.: World Factbook, n.d), accessed June 7, 2017, https://www.cia.gov/library/publications/the-world-factbook/geos/pk.html.
119. "Dassault Mirage 5," *Jane's Aircraft Upgrades*, posted April 21, 2017. The runway total includes all airports with runways between 5,000 and 8,000 feet.

apart. Even if Pakistan does not store nuclear delivery aircraft in hardened shelters, simply distributing some aircraft along the perimeter of a facility can dramatically increase survivability. A past U.S. study found that distributing bomber aircraft to the perimeter of bases reduced aircraft attrition from 80 percent to 22 percent after the detonation of a 40-kiloton warhead.[120] In general, to evade potential Indian ISR, Pakistan would want to reposition its nuclear assets continuously and rapidly, so that India could not completely disarm them in peacetime or early in a crisis. In a country that is facing a significant terrorism threat and that is host to radical violent actors who may want to steal nuclear weapons, this deployment procedure can carry serious risks of loss and theft.[121]

If Pakistan adopted passive measures for nuclear delivery aircraft such as those discussed above at home and at forward operating bases, India would be forced to make difficult choices. It may not have any warheads in its arsenal of sufficient yield to assure a high likelihood of destruction of all of Pakistan's delivery aircraft on a large air base, given continued doubts about the success of its 1998 thermonuclear weapons test. Even if it did, using large boosted fission devices would generate widespread civilian casualties. Alex Wellerstein's NUKEMAP program estimates that a 10-kiloton device might generate fewer than 35,000 dead if dropped at the center of Mushaf air base, whereas a sufficiently large device to destroy aircraft along the perimeter would kill nearly 400,000.[122] Alternatively, India could opt to have the warhead detonate closer to the surface, which would create a large crater, likely rendering the runways unusable even if aircraft survived. (Even a 1-megaton device detonated in an airburst produces "no appreciable" crater, authoritative U.S. government studies conclude.[123]) This would also generate radioactive fallout, with unpredictable long-term effects. Although the effect on Indian citizens from fallout might be minimal at a location such as Sargodha far away from the Indian border, targeting many of Pakistan's other nuclear locations would create a high likelihood that substantial fallout would contaminate Indian territory. As another option, India could target every large Pakistani air base with

120. Albert Wohlstetter et al., *Selection and Use of Strategic Air Bases* (Santa Monica, Calif.: RAND Corporation, April 1954), p. 298.
121. See Jeffrey Goldberg and Marc Ambinder, "The Ally from Hell," *Atlantic*, December 2011, https://www.theatlantic.com/magazine/archive/2011/12/the-ally-from-hell/308730/.
122. Alex Wallerstein, NUKEMAP, https://nuclearsecrecy.com/nukemap/ (accessed January 7, 2019).
123. Samuel Glasstone and Philip J. Dolan, *The Effects of Nuclear Weapons*, 3rd ed. (Washington, D.C.: U.S. Government Printing Office [U.S. GPO], 1977), p. 36.

multiple warheads. This would further inflate the target set for a counterforce campaign. Attacking the eleven airfields designated as flying bases by the Pakistan Air Force with two weapons each would require twenty-two weapons. Targeting Pakistan's potential dispersal locations (airfields with paved runways longer than 7,500 feet) with just one warhead would add twenty-four targets to the list. If the Mirage 5 can operate with even shorter takeoff distances, as some public estimates suggest, an additional forty-three airfields might host bomb-carrying aircraft. Even this target list assumes that Pakistan will not be operating aircraft from motorways, though the Pakistan Air Force practices precisely this operation during its Highmark exercise series.[124] Therefore, to destroy Pakistan's air-breathing leg with confidence if the Pakistan Air Force were on a crisis-footing, India might require nearly 100 warheads or precise information about the location of virtually all of Pakistan's hundred-plus potential delivery aircraft.[125] In practice, perhaps, particularly after a prolonged air campaign, India might feel confident that, as long as it could locate the vast majority of Pakistan's aircraft, it would be able to rely on its air defenses to protect its major population centers from the handful of Pakistani aircraft that might remain following a counterforce strike. Such reliance, however, would necessarily entail substantial risk, because if even one Pakistani aircraft penetrated those defenses to deliver a nuclear payload, an Indian city could face destruction.

Furthermore, Pakistan could also intersperse decoy vehicles among its transporter-erector-launcher vehicles. A 2001 RAND analysis concluded by emphasizing "that the TEL is a pretty unsatisfying target. After all, it is little more than a dressed-up tractor-trailer rig."[126] As a consequence, building more of them, or vehicles that look like them, is relatively inexpensive. Famously in the 1991 Gulf War, the United States and coalition air forces likely failed to destroy a single SCUD missile launcher despite conducting nearly 1,500 air strikes targeting them. At the time, coalition aircrews believed that they had destroyed approximately eighty mobile launchers, which highlights the wide gap between believing one can successfully disarm one's opponent and actually doing so. In retrospect, it seems clear that the aircrews were likely reporting the destruction of decoys or ground vehicles such as fuel tanker trucks that

124. Baqir Sajjad Syed and Asif Chaudhry, "'Exercise' Fuels Indo-Pak Escalation Fears, Drives Stocks Down," *Dawn*, September 22, 2016, https://www.dawn.com/news/1285317.
125. See also Perkovich and Dalton, *Not War, Not Peace*? pp. 212–213.
126. Vick et al., *Aerospace Operations against Elusive Ground Targets*, p. 81.

had visual, radar, or infrared signatures difficult to distinguish from TELs.[127] Although India likely has more persistent ISR capabilities today than the United States did in Iraq in 1991, the gap between contemporary Indian and historic U.S. capabilities is not enormous. The advent of long-endurance UAVs is comparatively new, but the United States operated manned U-2 spy planes with electro-optical sensors and synthetic aperture radar alongside a wide array of imaging and signals intelligence satellites in 1991.[128] According to the *Gulf War Air Power Survey Summary Report*, the great SCUD hunt was certainly disadvantaged by a lack of intelligence preparation of the battlefield: "The presurveyed launch sites and hiding places used by the mobile launchers were not identified" prior to the onset of the air campaign.[129] India, in contrast, likely has considered the location of such sites as one of its highest intelligence priorities for decades. Pakistan could greatly complicate these tracking efforts, however, by developing a large number of inexpensive decoys, putting pressure on India's intelligence and surveillance capabilities, as well as inflating the number of targets India would have to neutralize.

In sum, Pakistan will not remain idle if India shifts to a counterforce strategy. Indeed, fears that India is already moving in this direction have likely already set Islamabad's nuclear planners off to the races. Building up its nuclear forces, building out its delivery platforms and decoys to generate greater diversity and survivability, and moving them around to complicate Indian targeting even during peacetime are all likely responses—in a state beset by a large number of militants who have already shown an appetite for targeting vulnerable nuclear facilities and assets. Moreover, India's evolving nuclear posture may generate many of the risks of a counterforce strategy with few of the benefits. Although India has made considerable strides in acquiring the capabilities it would need to successfully execute a disarming strike, these appear insufficient to destroy the growing Pakistani arsenal in the near to medium term, and India's missile defenses are not yet capable of reliably intercepting residual Pakistani nuclear forces. Looking ahead, Pakistan can likely

127. Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey Summary Report* (Washington, D.C.: U.S. GPO, 1993), p. 83.
128. Coy F. Cross II, *The Dragon Lady Meets the Challenge: The U-2 in Desert Storm* (Beale Air Force Base, Calif.: 9th Reconnaissance Wing, 1992), https://nsarchive2.gwu.edu/NSAEBB/NSAEBB39/document11.pdf.
129. Keaney and Cohen, *Gulf War Air Power Survey Summary Report*, p. 83. See also Austin Long and Brendan Rittenhouse Green, "Stalking the Secure Second Strike: Intelligence, Counterforce, and Nuclear Strategy," *Journal of Strategic Studies*, Vol. 38, Nos. 1–2 (February 2015), p. 58, doi.org/10.1080/01402390.2014.958150.

build up its nuclear forces and alter its various deployment procedures faster than India can plausibly obtain and maintain a credible counterforce option, all while incentivizing Pakistan to use nuclear weapons early and massively in a crisis.

Alternative Explanations

We have presented evidence of a strategic explanation for India's potential interest in developing counterforce targeting options against Pakistan. That is, the observed capability developments and professed interest in counterforce targeting are both real and intentional—they are the product of neither technological drift nor simply "noise" in the ether. We believe this to be the most consistent and parsimonious explanation for India's otherwise puzzling nuclear developments and statements. There are two alternative explanations worth considering, however.

The first alternative explanation is inadvertent technological drift—that Indian scientists operate with limited oversight from national policymakers, that their motives are purely organizational and technological, and that the public statements by (nonscientist) Indian officials expressing interest in counterforce are merely "noise" signifying no change in the distribution of views held by Indian policymakers on the desirability of preemptive options. Although past scholarship has rejected such technological determinist explanations in explaining the emergence of counterforce capabilities in other countries,[130] this does not necessarily disprove organizational and bureaucratic politics as the driver of recent Indian behavior. Such a hypothesis is potentially more worrisome than arguments based on rational top-down decisionmaking, because it suggests that India might be stumbling into all of the downsides of counterforce strategies without intending to do so. After all, one argument for the "illogic" of U.S. nuclear strategy—and perhaps now India's—is the prevalence of organizational and bureaucratic pathologies driving its posture.[131] Although in the past these pathologies may have hampered India's ability to develop capabilities and doctrines because of the inattention of civilian

130. Donald Mackenzie, *Inventing Accuracy: A Historical Sociology of Nuclear Missile Guidance* (Cambridge, Mass.: MIT Press, 1993).
131. Scott Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton, N.J.: Princeton University Press, 1993); see also Sagan's portions of Sagan and Kenneth N. Waltz, *The Spread of Nuclear Weapons: An Enduring Debate* (New York: W.W. Norton, 2013), especially chap. 2.

overseers,[132] as India becomes wealthier, these pathologies have the potential to generate excess and unwanted capabilities. We generally find these arguments uncompelling, because India is still a poor country where defense expenditures are subject to serious scrutiny, even if the defense expertise of Indian politicians and bureaucrats is often lacking.[133] It seems unlikely that Indian politicians and bureaucrats have continued to fund such precise and expensive counterforce-enabling systems without some strategic purpose, especially when so many other defense priorities go unfunded. Technological determinism also cannot account for the growing chorus of statements from members of the national security establishment who seem to be attracted to the concept of nuclear counterforce for explicitly strategic reasons.

Alternatively, perhaps India's recent behavior is an elaborate bluff designed to enhance its general deterrence posture, where Indian officials drop ambiguous hints about preemptive counterforce despite having no real interest in India ever being able to execute a first strike in a crisis or war. Despite its potential to create significant crisis instability, the true aim may be to provoke massive Pakistani military spending to bankrupt the state in an arms race. Periodic statements by retiring government and military officials and press releases advertising the accuracy of indigenous missile defense systems are all essentially cost free. In the late Cold War, some U.S. officials may have doubted that President Ronald Reagan's Strategic Defense Initiative would succeed, but they believed that publicly pursuing it was strategically useful because it would generate pressure on the Soviet Union to develop and deploy expensive countermeasures.[134] If India's recent behavior is merely a strategic feint, however, then it seems likely that Pakistan's responses—higher readiness, greater dispersal, and more frequent movement of Pakistani nuclear weapons in peacetime, crisis, and war—may carry much higher nuclear risk for India (and the world) than any added deterrent or competitive value that would come from bluffing about the pursuit of a preemptive counterforce strategy. It is a possibility, but seems unlikely.

132. Vipin Narang and Paul Staniland, "Democratic Accountability and Foreign Security Policy: Theory and Evidence from India," *Security Studies*, Vol. 27, No. 3 (2018), pp. 410–447, doi.org/10.1080/09636412.2017.1416818; and Stephen P. Cohen and Sunil Dasgupta, *Arming without Aiming: India's Military Modernization* (Washington, D.C.: Brookings Institution Press, 2010).
133. Anit Mukherjee, "The Absent Dialogue: Civil-Military Relations and Military Effectiveness in India," Ph.D. dissertation, Johns Hopkins University, 2012.
134. Hal Brands, *What Good Is Grand Strategy? Power and Purpose in American Statecraft from Harry S. Truman to George W. Bush* (Ithaca, N.Y.: Cornell University Press, 2014), pp. 111–113.

Theoretical Implications

If India does have a sustained, strategic interest in developing counterforce options, what does that imply for theories of nuclear strategy? First, it adds another data point to evidence that the strictures of the "nuclear revolution" do not decisively favor second-strike assured retaliation strategies nor do they always inhibit the adoption of nuclear counterforce and broader damage limitation strategies. Although both the United States and the Soviet Union adopted such strategies during the Cold War, if India were to adopt counterforce targeting options, it would be the first regional power to explicitly do so.[135] This outcome would suggest that superpower pursuit of counterforce was neither unique to the Cold War nor solely the product of either extended deterrence commitments or distinct pathological tendencies in the United States and the Soviet Union.

Second, India's consideration of counterforce options may offer evidence of a new era of counterforce where the balance of technological advantage is shifting in ways that encourage damage limitation strategies. Proponents for such a technological shift argue that strike systems, including ballistic missiles, are more accurate and cheaper today than they have ever been, while revolutionary improvements in remote sensing make the location of adversary targets more discernable. Nuclear survivability previously was ensured through hardening of storage locations and the concealment and mobility of weapons systems. Accuracy nearly eliminates the benefit of hardening while transparency dramatically reduces the survivability afforded by concealment and movement.[136] The assumption that nuclear survivability is both cheaper and easier to obtain and maintain than it is to threaten—particularly when one is dealing with only tens, rather than tens of thousands, of strategic nuclear weapons—may be challenged at the regional level, and not just by the United States.[137]

135. Brendan Rittenhouse Green and Austin Long, "The Geopolitical Origins of U.S. Hard-Target-Kill Counterforce Capabilities and MIRVs," in Michael Krepon, Travis Wheeler, and Shane Mason, eds., *The Lure and Pitfalls of MIRVs: From the First to the Second Nuclear Age* (Washington, D.C.: Stimson Center, May 2016), pp. 19–54; Long and Green, "Stalking the Secure Second Strike," pp. 38–73; Lieber and Press, "The New Era of Counterforce"; and Keir A. Lieber and Daryl G. Press, "The End of MAD? The Nuclear Dimension of U.S. Primacy," *International Security*, Vol. 30, No. 4 (Spring 2006), pp. 7–44, doi.org/10.1162/isec.2006.30.4.7.
136. Lieber and Press, "The New Era of Counterforce."
137. See also Leonard S. Spector, *Going Nuclear* (Cambridge, Mass.: Ballinger, 1987); Peter D. Feaver, "Command and Control in Emerging Nuclear Nations," *International Security*, Vol. 17, No. 3 (Winter 1992/93), pp. 160–187, https://www.jstor.org/stable/2539133; Feaver, Sagan, and

Third, India has struggled with novel revisionist threats from Pakistan, the likes of which neither superpower had to face. The 1999 Kargil conflict was a blatant attempt by Pakistan to seize territory of a nuclear-armed India in a place that would not merit full-scale conventional escalation to repel the intruders, especially given the nuclear risk associated with full-scale war.[138] And in the 2000s, Pakistan demonstrated that even mass-casualty terrorist violence in major Indian cities could take place without triggering war. Such attacks on India were far deadlier than those that Soviet-supported groups (e.g., the Red Army Faction) conducted against Western targets during the Cold War. Pakistan's sponsorship of violent proxies has led to enraged, but thus far deterred, Indian leaders.[139] This state of affairs triggered an understandable search for punitive options to compel a change in Pakistani strategy and reestablish deterrence. Counterforce options threaten to eliminate Pakistan's nuclear shield. In so doing, they offer the final piece for a strategy of escalation dominance, where India can threaten credibly to escalate and defeat Pakistan at every potential level of violence. They also provide India a last-resort option if control of Pakistan's nuclear forces were to fall into extremist hands—a small but nonzero risk.[140]

India's present challenges with Pakistan, and its resulting flirtation with a counterforce strategy, may not be unique. The contemporary and future nuclear landscape will likely include states that may be emboldened by nuclear weapons to engage in more dangerous pursuit of revisionist aims,[141] or states where the prospect of extremist takeover cannot be entirely dismissed, making disarming attacks more attractive[142]—all while the costs of implement-

Karl, "Correspondence: Proliferation Pessimism and Emerging Nuclear Powers"; Peter D. Feaver, "Neooptimists and the Enduring Problem of Nuclear Proliferation," *Security Studies*, Vol. 6, No. 4 (1997), pp. 93–125, doi.org/10.1080/09636419708429323; S. Paul Kapur's arguments in Sumit Ganguly and Kapur, *India, Pakistan, and the Bomb: Debating Nuclear Stability in South Asia* (New York: Columbia University Press, 2010); and Sagan's arguments in Sagan and Waltz, *The Spread of Nuclear Weapons*, especially pp. 156–175.

138. Peter Lavoy, Feroz Hassan Khan, and Christopher Clary, "Pakistan's Motivations and Calculations for the Kargil Conflict," in Peter R. Lavoy, ed., *Asymmetric Warfare in South Asia: The 1999 Kargil Conflict between India and Pakistan* (New York: Cambridge University Press, 2009), pp. 64–91.

139. Kapur, *Dangerous Deterrent*; and S. Paul Kapur, *Jihad as Grand Strategy: Islamist Militancy, National Security, and the Pakistani State* (New York: Oxford University Press, 2017).

140. Christopher Clary, "The Safety and Security of the Pakistani Nuclear Arsenal," in C. Christine Fair and Sarah J. Watson, eds., *Pakistan's Enduring Challenges* (Philadelphia: University of Pennsylvania Press, 2015), pp. 98–127.

141. Mark S. Bell, "Beyond Emboldenment: How Acquiring Nuclear Weapons Can Change Foreign Policy," *International Security*, Vol. 40, No. 1 (Summer 2015), pp. 87–119, doi.org/10.1162/ISEC_a_00204.

142. Joshua R. Itzkowitz Shifrinson and Christopher Clary, "Political Instability, Nuclear Weapons, and the Threat of Nuclear Collapse," presentation at the annual conference of the American Political Science Association, Boston, Massachusetts, August 30, 2018–September 2, 2018.

ing counterforce strategies against small arsenals (i.e., those that look like Pakistan's, not the Soviet Union's) may be falling. For example, Israel would almost certainly be in a position to consider nuclear counterforce strategies if it faced an emerging nuclear adversary that used its nuclear weapons as a shield behind which to unleash proxies with greater devastation against the Israeli homeland. If other states believe that counterforce options are necessary to confront nuclear-armed adversaries, it could have implications for the stability and safety of a world with more nuclear weapons powers.

Conclusion

This article has presented evidence that, even without formally modifying its long-standing declaratory doctrine, India has quietly developed or acquired many of the capabilities that might make a counterforce strike possible. Meanwhile serious national security thinkers in India have increasingly discussed the permissibility and strategic benefits of such a nuclear disarming strike in certain extreme circumstances. India has historically had a restrained nuclear strategy emphasizing no first use and countervalue retaliation. It was a uniform nuclear strategy against both of India's primary adversaries: China and Pakistan. We believe that India continues to maintain this strategy vis-à-vis China for a variety of structural reasons—namely, the low risk of conventional war with China; China's own NFU policy; and its larger and increasingly mobile nuclear arsenal, which would be extremely difficult for India to destroy.

As India's security dynamics with Pakistan have evolved, however, and Pakistan has shifted to a strategy of threatening tactical nuclear use against Indian forces should Delhi choose to retaliate following a Pakistani-backed provocation, Indian nuclear strategy toward its two nuclear adversaries may be decoupling as India searches for a way out its perceived strategic paralysis toward Pakistan. In addition to debating whether it can continue to exercise restraint, as well as considering calibrated conventional options, there is evidence that Indian national security officials are simultaneously interested in developing more flexible nuclear options against Pakistan, beyond countervalue targeting strategies. The incentives to remove the constraints of Pakistan's nuclear arsenal through counterforce strikes are rising at the same time as the costs of building a force capable of doing so are falling.

A shift—or even perception of a shift—by India toward developing counterforce options carries major risks, however. First, it is a recipe for an arms race as Pakistan struggles to maintain survivability while India seeks to sustain its ability to threaten it. Second, it creates crisis instability by producing incen-

tives for both sides to escalate to nuclear use early and massively to avoid adversary first use. Every serious crisis now risks a potential strategic nuclear exchange at the outset. Third, it is doubtful that India could destroy enough Pakistani weapons on the ground such that India's ballistic missile and air defenses could intercept the residual force. It almost certainly cannot do so today, and it is unclear if it ever could in the future. Indeed, the fear of reciprocal first strikes may set in before India has a workable capability to execute a counterforce strike.[143] This has significant implications for South Asian and global security. India may be writing security checks that its counterforce option may not be able to cash when the time comes.

India's flirtation with preemptive counterforce also has significant implications for other regional nuclear powers and the broader nuclear landscape. If the siren song of counterforce finds appeal in other regional nuclear states confronted with both the threat of revisionist adversaries and the opportunity afforded by less expensive counterforce capabilities, the world may indeed be moving toward a much broader era of counterforce.

143. See Perkovich and Dalton, *Not War, Not Peace*? pp. 217–218.