COMMAND AND CONTROL IN REGIONAL NUCLEAR POWERS

GILES DAVID ARCENEAUX[1]

Word Count: 17,944
(includes notes, tables, and figures)

ABSTRACT

Command and control systems are the operational means by which a state conducts the management, deployment, and potential release of nuclear weapons. Command and control systems fundamentally underpin important dimensions of nuclear strategy and operations, such as deterrence and strategic stability. Despite these broader implications, however, detailed analysis on nuclear command and control remains scarce in the post-Cold War era. This article addresses the literature's shortcomings by making two contributions to the study of command and control in regional nuclear powers. First, the project presents a new conceptual framework of command and control arrangements that emphasizes the procedures employed to transition from peacetime to crisis arsenal management practices. Second, the project provides a theory that specifies how three variables interact to explain command and control outcomes in regional nuclear powers, including the presence of a proximate and conventionally superior adversary, the severity of domestic threats to the political regime, and the level of military organizational autonomy. Evidence from India, Pakistan, and the United Kingdom provide the empirical foundations of the analysis, including original interview data with political and military elites. These contributions inform academic research on nuclear strategy and operations and yield policy implications for engaging with emerging nuclear proliferators.

[1] Postdoctoral Fellow, Harvard University, John F. Kennedy School of Government, Robert and Renée Belfer Center for Science and International Affairs, Project on Managing the Atom/International Security Project. E-mail: gdarceneaux@hks.harvard.edu.

Command and control systems are the operational means by which a state conducts the management, deployment, and potential release of nuclear weapons. The arrangement of a state's command and control systems directly impacts critical dimensions of nuclear strategy. For example, although a significant portion of the literature on nuclear strategy views secure second-strike capabilities—referring to a state's ability to survive an adversary's first strike and respond with nuclear weapons—as easily obtainable, vulnerabilities in nuclear command and control frameworks undermine this assumption.[1] States with vulnerable command and control systems face pressures to use nuclear weapons early in a crisis before an adversary can negate the state's ability to retaliate with nuclear force.[2] During a crisis, these pressures can result in the deliberate or inadvertent escalation of hostilities that significantly increases the likelihood of nuclear use.[3] Command and control systems therefore fundamentally underpin core concepts of nuclear strategy such as deterrence and strategic stability by shaping the ability of a state to credibly deter its adversaries and creating pathways through which nuclear escalation may occur.

[1] For examples of such arguments, see: James Acton, "Managing Vulnerability," *Foreign Affairs*, Vol. 89, No. 2 (March/April 2010), p. 147; Michael S. Gerson, "No First Use: The Next Step for US Nuclear Policy," *International Security*, Vol. 35, No. 2 (Fall 2010), pp. 7-47; Charles L. Glaser, *Analyzing Strategic Nuclear Policy* (Princeton, N.J.: Princeton University Press, 1990), pp. 95-97, 320; Charles L. Glaser and Steve Fetter, "Should the United States Reject MAD? Damage Limitation and U.S. Nuclear Strategy toward China," *International Security*, Vol. 41, No. 1 (Summer 2016), pp. 49-98; Robert Jervis, *The Meaning of the Nuclear Revolution: Statecraft and the Prospect of Armageddon* (Ithaca, N.Y.: Cornell University Press, 1989); Jan Lodal, "The Counterforce Fallacy," *Foreign Affairs*, Vol. 89, No. 2 (March/April 2010), p. 146.

[2] Bruce G. Blair, *Strategic Command and Control: Redefining the Nuclear Threat* (Washington, D.C.: Brookings Institution Press, 1985); John D. Steinbruner, "National Security and the Concept of Strategic Stability," *Journal of Conflict Resolution*, Vol. 22, No. 3 (September 1978), pp. 411-428; Charles A. Zraket, "Strategic Command, Control, Communications, and Intelligence," *Science*, Vol. 224, No. 4655 (June 1984), pp. 1306-1311.

[3] Caitlin Talmadge, "Would China Go Nuclear? Assessing the Risk of Chinese Nuclear Escalation in a Conventional War with the United States," *International Security*, Vol. 41, No. 4 (Spring 2017), p. 52. For other important perspectives on the risk of nuclear escalation, see: James M. Acton, "Escalation through Entanglement: How the Vulnerability of Command-and-Control Systems Raises the Risks of an Inadvertent Nuclear War," *International Security*, Vol. 43, No. 1 (Summer 2018), pp. 56-99; Barry R. Posen, *Inadvertent Escalation: Conventional War and Nuclear Risks* (Ithaca, N.Y.: Cornell University Press, 1991); Steinbruner, "National Security and the Concept of Strategic Stability."

Despite the practical importance of command and control systems, however, detailed analysis on the sources of command and control remains scarce. A review of the recent literature on nuclear strategy and proliferation affirms this observation, noting that "Almost no attention has been focused on support, command and control, and the policy apparatus of nuclear capabilities."[4] Whereas scholars have made significant progress in explaining the causes of nuclear proliferation and the strategic behavior of nuclear states, researchers have done far less to theorize operational-level nuclear decision-making after states acquire nuclear weapons.[5] Indeed, although theories of command and control figured prominently in the debate between proliferation optimists and pessimists in the 1990s, these debates have since received little attention in the academic literature.[6] To date, theoretical frameworks developed in the immediate post-Cold War period by Peter Feaver and Scott Sagan remain the most direct attempts to explain command and control in

[4] Erik Gartzke and Matthew Kroenig, "Nukes with Numbers: Empirical Research on the Consequences of Nuclear Weapons for International Conflict," *Annual Review of Political Science*, Vol. 19 (May 2016), p. 408.

[5] On nuclear proliferation, see: Scott Sagan, "Why Do States Build Nuclear Weapons? Three Models in Search of a Bomb," *International Security*, Vol. 21, No. 3 (Winter 1996/97), pp. 54-86; Etel Solingen, *Nuclear Logics: Contrasting Paths in East Asia and the Middle East* (Princeton, N.J.: Princeton University Press, 2007); Christopher Way and Jessica L. P. Weeks, "Making it Personal: Regime Type and Nuclear Proliferation," *American Journal of Political Science*, Vol. 58, No. 3 (July 2014), pp. 705-719. For recent work on the relationship between nuclear weapons on strategic behavior, see: Mark S. Bell, "Beyond Emboldenment: How Acquiring Nuclear Weapons Can Change Foreign Policy," *International Security*, Vol. 40, No. 1 (Summer 2015), pp. 87-119; Mark S. Bell, "Nuclear Opportunism: A Theory of How States Use Nuclear Weapons in International Politics," *Journal of Strategic Studies*, Vol. 42, No. 1 (January 2019), pp. 3-28; Vipin Narang, "Posturing for Peace? Pakistan's Nuclear Postures and South Asian Stability," *International Security*, Vol. 34, No. 3 (Winter 2009/10), pp. 38-78; Vipin Narang, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict* (Princeton, N.J.: Princeton University Press, 2014).

[6] Proliferation optimists argue that nuclear weapons produce stabilizing qualities. Proliferation pessimists assert that the spread of nuclear weapons has dangerous implications for international security. For examples of nuclear optimism, see David J. Karl, "Proliferation Pessimism and Emerging Nuclear Powers," *International Security*, Vol. 21, No. 3 (Winter 1996/97), pp. 87-119; Jordan Seng, "Less is More: Command and Control Advantages of Minor Nuclear States," *Security Studies*, Vol. 6, No. 4 (Summer 1997), pp. 50-92; Kenneth N. Waltz, *The Spread of Nuclear Weapons: More May Be Better*, Adelphi Paper No. 171 (London: International Institute of Strategic Studies, Autumn 1981). For examples of nuclear pessimism, see Peter Feaver, "Neooptimists and the Enduring Problem of Nuclear Proliferation," *Security Studies*, Vol. 6, No. 4 (Summer 1997), pp. 93-125; Scott D. Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton, N.J.: Princeton University Press, 1993); Scott D. Sagan, "The Perils of Proliferation: Organization Theory, Deterrence Theory, and the Spread of Nuclear Weapons," *International Security*, Vol. 18, No. 4 (Spring 1994), pp. 66-107.

emerging nuclear nations.[7] These foundational studies extend lessons from the U.S. Cold War experience to explain command and control outcomes in regional nuclear powers.[8]

Recent research, however, demonstrates that the opportunities and constraints confronting regional nuclear powers differ significantly from those faced by the Cold War superpowers.[9] Regional nuclear powers are the non-superpower states that have developed independent nuclear arsenals, including: China, France, India, Israel, North Korea, Pakistan, South Africa, and the United Kingdom.[10] As Vipin Narang observes, "These states have small nuclear arsenals, are often ensnared in long-standing rivalries, participate in multiple active conflicts, and often have weak domestic political institutions."[11] Furthermore, many regional nuclear powers experience significant resource constraints on their nuclear programs.[12] In contrast, the U.S. and Soviet Union developed their nuclear arsenals with "virtually unlimited resources."[13] These differences have produced significant variation in strategic nuclear doctrine between the Cold War superpowers and regional nuclear powers. Whereas the U.S. and Soviet Union adopted maximalist nuclear postures during the Cold War—such as massive retaliation, flexible response, and damage limitation—

[7] Peter D. Feaver, "Command and Control in Emerging Nuclear Nations," *International Security*, Vol. 17, No. 3 (Winter 1992/93), pp. 160-187; Scott D. Sagan, "The Origins of Military Doctrine and Command and Control Systems," 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), pp. 16-46.
[8] Cold War-era studies include: Blair, *Strategic Command and Control*; Paul Bracken, *The Command and Control of Nuclear Forces* (New Haven, C.T.: Yale University Press, 1983); Ashton B. Carter, John D. Steinbruner, and Charles A. Zraket, eds., *Managing Nuclear Operations* (Washington, D.C.: Brookings Institution Press, 1987); Peter Douglas Feaver, *Guarding the Guardians: Civilian Control of Nuclear Weapons in the United States* (Ithaca, N.Y.: Cornell University Press, 1992).
[9] Paul Bracken, *The Second Nuclear Age: Strategy, Danger, and the New Power Politics* (New York, N.Y.: Times Books, 2012); Colin S. Gray, *The Second Nuclear Age* (Boulder, C.O.: Lynne Rienner, 1999); Narang, *Nuclear Strategy in the Modern Era*, pp. 1-8; Toshi Yoshihara and James R. Holmes, eds., *Strategy in the Second Nuclear Age: Power, Ambition, and the Ultimate Weapon* (Washington, D.C.: Georgetown University Press, 2012).
[10] Narang, *Nuclear Strategy in the Modern Era*, p. 3. Whereas Narang excludes the United Kingdom from his analysis, I include the United Kingdom in my study because it has exercised strictly independent control over some portion of its nuclear assets throughout its nuclear history.
[11] Narang, *Nuclear Strategy in the Modern Era*, p. 1.
[12] Lewis Dunn, *Containing Nuclear Proliferation*, Adelphi Paper No. 263 (London: International Institute for Strategic Studies, 1991), p. 20.
[13] Feaver, "Command and Control in Emerging Nuclear Nations," p. 186.

regional nuclear powers have adopted a variety of nuclear postures that entail a range of early-use and late-use doctrines.[14] My project builds upon this observation and shows that Cold War theories poorly explain variation in command and control systems in regional nuclear powers.

What factors explain variation in command and control systems in regional nuclear powers? I make two arguments to answer this question. First, I argue that current conceptual frameworks for nuclear command and control poorly describe command and control systems in regional nuclear powers. Existing frameworks ask *whether* political leaders delegate the ability to use nuclear weapons to lower-level military commanders. In practice, however, because military operators are ultimately required to deliver nuclear weapons, all states must eventually delegate nuclear use capability to conduct a nuclear strike. I therefore argue that the appropriate question for classifying command and control systems is *when* such delegation occurs. My conceptual framework emphasizes the timing of delegation with respect to the onset of a crisis—whether during peacetime, early in a crisis, or late in a crisis—to develop a new typology of nuclear command and control that accounts for how states envision transitioning from peacetime to crisis arsenal management procedures and identifies how these different patterns of command and control affect the likelihood of conventional crises escalating to nuclear use.

Second, I develop a framework that explains variation in regional nuclear power command and control systems. I argue that the interaction of three variables explains variation in regional nuclear power command and control arrangements: first, the presence of a proximate and conventionally superior adversary; second, the severity of domestic threats to the political regime;

[14] Significant overviews of maximalist nuclear strategies include: Lawrence Freedman, *The Evolution of Nuclear Strategy*, 3d ed. (New York, N.Y.: Palgrave Macmillan, 2003); Glaser, *Analyzing Strategic Nuclear Policy*; Scott D. Sagan, *Moving Targets: Nuclear Strategy and National Security* (Princeton, N.J.: Princeton University Press, 1989). For a discussion of nuclear strategies in regional nuclear powers, see Narang, *Nuclear Strategy in the Modern Era*, pp. 14-23.

and third, the level of military organizational autonomy. I structure this theory as a decision-theoretic framework that shows how states simultaneously evaluate threats to external security and domestic stability when developing command and control systems. Whereas current theories are unable to resolve how states respond to competing external and domestic pressures on command and control systems, my theory demonstrates how regional nuclear powers jointly evaluate these considerations and makes discrete predictions for command and control outcomes in all regional nuclear powers. To evaluate my theory, I empirically evaluate the development of command and control systems in India, Pakistan, and the United Kingdom, including extensive original interview data with political and military elites from India and Pakistan. These data provide the empirical foundations to advance the study of command and control in regional nuclear powers beyond deductive extensions of the Cold War superpower experience and offer new evidence that demonstrate the descriptive and theoretical contributions of my project.

This article proceeds in five sections. First, I develop a new conceptual framework for classifying nuclear command and control arrangements. Second, I present a theoretical framework that explains why states are likely to adopt specific patterns of command and control. Third, I test my theory against evidence from India, Pakistan, and the United Kingdom. Fourth, I evaluate the explanatory power of several alternative explanations. Finally, I discuss the theoretical and policy implications of my argument.

Conceptualizing Command and Control

When developing command and control frameworks, decision-makers face a fundamental challenge known as the always/never dilemma. The always/never dilemma highlights a pair of

competing imperatives for nuclear-armed states: nuclear weapons should *always* launch when ordered, but *never* without proper authorization.[15] To satisfy the "always" dimension of the dilemma, nuclear weapons must be reliable—nuclear forces should be resilient to attack by an adversary and capable of responding under any circumstances. To satisfy "never," the arsenal must be safe and secure—nuclear weapons should not detonate accidentally due to errors in management or design, nor should they be used without proper authorization.[16]

Two threats exacerbate the always/never dilemma. First, the threat of nuclear decapitation challenges the "always" component of the always/never dilemma by threatening the reliability of nuclear forces. Nuclear decapitation refers to the ability of an adversary to launch a first strike that disables a state's ability to respond with nuclear force, whether by destroying warheads and delivery platforms or by disrupting command and control systems so that coordinating retaliatory strikes becomes impossible.[17] To protect against decapitation and bolster arsenal reliability, states must ensure that the physical arsenal and communication links to decision-makers survive an initial attack long enough to enable nuclear retaliation.[18]

Second, states must protect against unwanted nuclear use. Unwanted use represents the primary threat to "never" and includes two variants: accidental and unauthorized use. Accidental use refers to the unintentional launch of nuclear weapons due to mishandling, poor design, or some other unintended cause.[19] Unauthorized use refers to when the custodians of nuclear weapons use

[15] Feaver, "Command and Control in Emerging Nuclear Nations," p. 163; Seng, "Less is More," p. 55.
[16] Feaver, *Guarding the Guardians*, pp. 13-15.
[17] Decapitation specifically refers to threats to command and control systems, whereas preemption refers to the destruction of nuclear weapons and delivery systems. John D. Steinbruner, "Nuclear Decapitation," *Foreign Policy*, No. 45 (Winter 1981/82), pp. 16-28. I jointly consider these pressures on command and control systems because both decapitation and preemption present similar challenges to arsenal reliability. On the distinction between arsenal and command vulnerability, also see Steinbruner, "National Security and the Concept of Strategic Stability," pp. 411-428.
[18] Feaver, *Guarding the Guardians*, p. 13.
[19] Ibid., pp. 13-15.

those weapons without proper authorization from political leadership.[20] Unauthorized use may occur due to the deliberate decision of a lower-level commander to circumvent the chain of command and use nuclear weapons without obtaining authorization, or it may result from a situation in which a lower-level commander uses nuclear weapons during a crisis without requesting authorization in order to prevent being overrun by an enemy's military forces or losing control of nuclear weapons to the adversary. The dangers of unwanted use threaten nuclear safety and security and require states to consider measures to prevent accidental and unauthorized use.

Nuclear-armed states generally strive to balance arsenal reliability, safety, and security. The measures for addressing these imperatives, however, often entail stark tradeoffs. For example, a state that fears decapitation might maintain its nuclear forces in fully assembled form to guarantee that nuclear weapons are prepared for rapid use. Maintaining this high level of readiness improves arsenal reliability, but reliability comes at the expense of arsenal safety and security by reducing the barriers to unwanted nuclear use. Alternatively, a state fearing accidental or unauthorized use can maintain its weapons in a disassembled state to prevent lower-level commanders from using nuclear weapons without higher political authorization. By doing so, however, this state increases the time required to mobilize nuclear forces and reduces arsenal reliability by making the arsenal more vulnerable to preemption. As these examples demonstrate, states often face significant tradeoffs when operationalizing their nuclear arsenals.

Command and control systems represent a state's institutional approach to resolving the always/never dilemma.[21] Traditionally, scholars measure command and control frameworks as one of two ideal types: assertive or delegative control. Assertive control describes systems where

[20] Ibid., pp. 15-18.
[21] Feaver, "Command and Control in Emerging Nuclear Nations," p. 168.

political leadership maintains a high degree of administrative control over nuclear decision-making processes and extensive physical control of the arsenal.[22] These measures increase safeguards against accidental and unauthorized use but produce slower mobilization and response times that make a state's arsenal more vulnerable to preemption and decapitation. Delegative control, in contrast, grants peripheral nuclear custodians with decision-making autonomy and physical possession of weapons.[23] These measures increase arsenal readiness but reduce the steps required to conduct a nuclear launch and facilitate the accidental or unauthorized use of nuclear weapons.

The assertive/delegative framework remains the most widely accepted approach for conceptualizing command and control arrangements. This framework, however, overlooks an important dimension of command and control practices in nuclear states. The traditional assertive/delegative framework views command and control systems as fixed in time—states either assert political control over nuclear forces or delegate authority to peripheral commanders. In practice, however, because military operators are ultimately required to deliver nuclear weapons, all states must eventually delegate control to conduct a nuclear strike. I argue that the appropriate question when classifying command and control systems is therefore not *whether* states delegate nuclear use capability to lower levels of command, but rather *when* such delegation occurs.

Reframing the concept of command and control to account for the timing of delegation with respect to the onset of a crisis allows analysts to better identify the potential avenues through which nuclear escalation may occur. Depending on how states conduct nuclear operations during the transition from peacetime to crisis management, the challenges to arsenal reliability, safety, and security differ significantly. Command and control systems function best during peacetime,

[22] Feaver, *Guarding the Guardians*, pp. 9-11.
[23] Ibid., pp. 7-9.

but these systems face severe pressures that challenge nuclear stability and political oversight of nuclear operations as crises emerge.[24]

Political leaders possess three options for when to delegate the ability to use nuclear weapons: first, during peacetime; second, early in a crisis; or third, late in a crisis. I modify the existing assertive/delegative framework to identify three ideal patterns of command and control that respectively correspond to these temporal categories: delegative, conditional, and assertive. Building upon the traditional assertive/delegative framework allows me to maintain conceptual resonance within the broader literature, while also emphasizing the temporal aspects of nuclear management operations to make each pattern of command and control more analytically distinct. I also maintain the traditional assertive/delegative framework's emphasis on the delegation of nuclear use ability, rather than authority, as the *de facto* ability to use nuclear weapons more directly represents the challenges posed by the always/never dilemma.[25] Table 1 summarizes the central aspects of each command and control arrangement.

In this study, delegative control describes command and control arrangements where political leaders delegate nuclear launch capability to peripheral commanders during peacetime. At all times, military operators possess physical control of nuclear warheads and delivery platforms. These components are unconstrained by technical controls such as permissive action links (PALs) to guarantee that the custodians of nuclear assets can use nuclear weapons under any circumstances without requiring direct approval from senior leadership. If technical controls are

[24] Bruce G. Blair, *The Logic of Accidental Nuclear War* (Washington, D.C.: Brookings Institution Press, 1993); Christopher Clary, *Thinking about Pakistan's Nuclear Security in Peacetime, Crisis and War* (New Delhi: Institute for Defense Studies and Analyses, 2010); Kurt Gottfried and Bruce G. Blair, eds., *Crisis Stability and Nuclear War* (New York, N.Y.: Oxford University Press, 1988); and Richard Ned Lebow, *Nuclear Crisis Management: A Dangerous Illusion* (Ithaca, N.Y.: Cornell University Press, 1988).
[25] Feaver, *Guarding the Guardians*, p. 7.

Table 1. Patterns of Nuclear Command and Control

	Assertive	Conditional	Delegative
Administrative controls	Centralized use capability	Peacetime centralization, crisis decentralization	Decentralized use capability
Physical controls	Components dispersed and de-mated	Components highly proximate	Components assembled and mated
Technical controls	Extensive PALs or PAL-equivalents	Bypassable	Absent or minimal
Timing of delegation	Late-crisis delegation	Early-crisis delegation	Peacetime delegation
Primary threats to control	Decapitation	Unintended escalation	Accidental or unauthorized use

present, code management procedures enable peripheral commanders to disable these technical controls without requiring political authorization. Combined, these administrative, physical, and technical dimensions of delegative control strongly improve arsenal reliability. The core challenge for delegative command and control arrangements is the risk of unwanted use, as states employing delegative control rely almost exclusively upon the professionalism of peripheral military actors to avoid accidental and unauthorized use.

Conditional control refers to states that delegate the ability to use nuclear weapons early in a crisis. During peacetime, conditional control centralizes administrative authority, physically de-mates and disperses nuclear weapons and delivery platforms across some distance, and may entail at least modest technical controls on nuclear weapons. In the early stages of a crisis, however, states with conditional control procedures rapidly assemble deliverable nuclear weapons and delegate the ability for nuclear use to lower-level nuclear commanders. Through these measures,

conditional control attempts to promote arsenal safety and security during peacetime while also developing procedures that rapidly increase arsenal readiness to guarantee arsenal reliability.

Conditional control systems face three challenges that are not captured by the traditional assertive/delegative framework. First, the process of delegating authority and increasing arsenal readiness early in a crisis may signal malign intent to an adversary.[26] Actions such as mating warheads to delivery platforms and placing these weapons under military command may serve defensive purposes, but an adversary would likely view these efforts as offensive in nature and could elect to preemptively attack before the state can fully prepare its nuclear arsenal for use. Second, as political leaders reduce physical and technical barriers to use and delegate authority to lower levels of command, the military obtains significant influence in nuclear operations. This rapid inclusion of military influence severely weakens political oversight and increases the likelihood that national policy and military operations would diverge.[27] Third, the problems of signaling malign intent and weakened political control occur in a crisis setting, where actors face pervasive uncertainty and the likelihood of misperception increases dramatically. Although conditional control systems seek to balance arsenal safety, security, and reliability by maintaining centralized control during peacetime, the process of delegating control early in a crisis generates external and internal pathways to unwanted crisis escalation.

Assertive control describes systems where political authorities delegate control late in a crisis. Physically, nuclear warheads are typically de-mated from delivery platforms and geographically dispersed. Technical controls such as PALs further guarantee centralized political oversight by preventing nuclear weapons from being accessed, armed, or launched without

[26] Bruce G. Blair, "Alerting in Crisis and Conventional War," in Carter, Steinbruner, and Zraket, eds., *Managing Nuclear Operations*, pp. 75-78.
[27] Ibid., pp. 113-119.

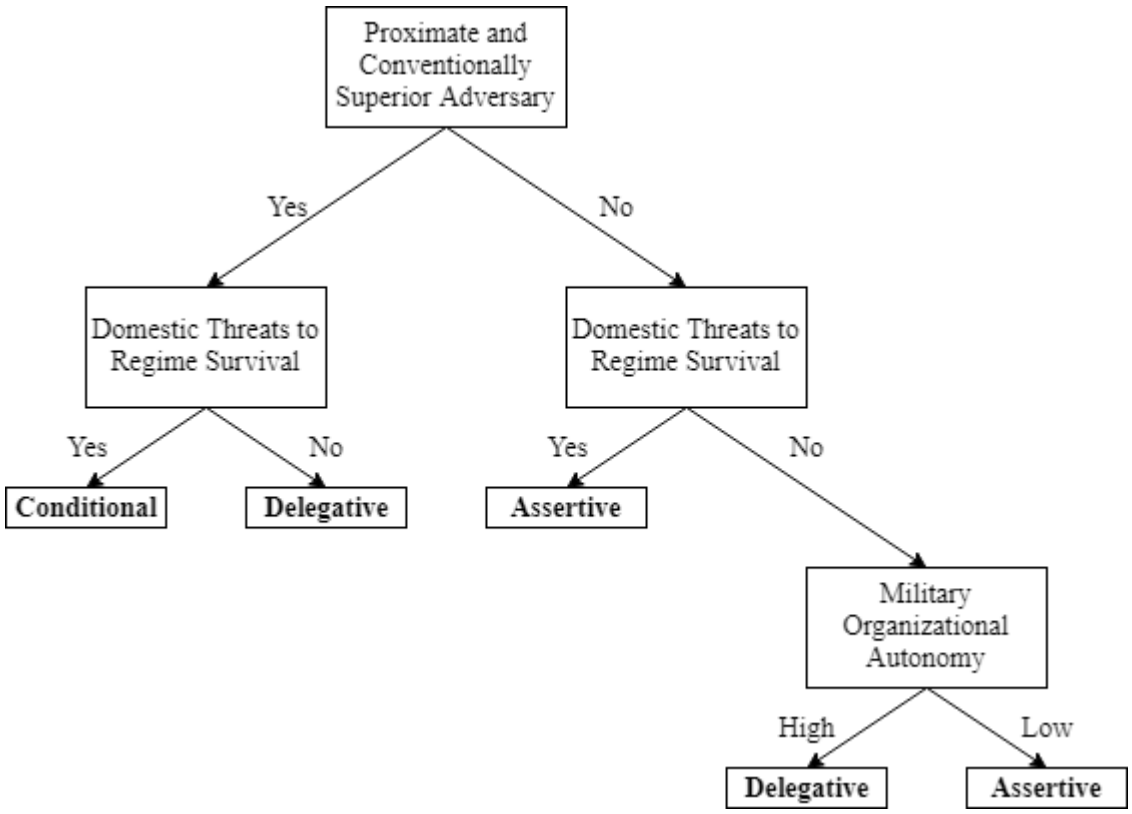
political authorization.[28] If technical controls are present, code management procedures strictly preclude lower-level commanders from using nuclear weapons without political authorization. Importantly, technical controls separate the administrative control of nuclear forces from the physical possession of nuclear weapons, allowing leaders to promote safety and security deep into crises when peripheral operators may otherwise obtain greater influence over nuclear operations.[29] These measures make assertive command and control systems more resilient against accidental and unauthorized nuclear use. By withholding launch authority late into crises, however, assertive control arrangements are susceptible to decapitation and may "fail safe," meaning that if command breaks down during a crisis, operators are likely to default to the non-use of nuclear weapons. In contrast to delegative and conditional control, arsenal reliability is lower in assertive command and control frameworks.

Theoretical Framework

I develop a theory of command and control in regional nuclear powers that identifies the effects of three variables on command and control frameworks: first, the presence of a proximate and conventionally superior adversary; second, the severity of domestic threats to the political regime; and third, the level of military organizational autonomy. I present my theory as a decision-theoretic framework that structures the interaction of these three variables to identify the conditions under which each variable affects command and control outcomes. In this section, I detail the logic of

[28] Feaver, *Guarding the Guardians*, pp. 17-18. On PALs, see Peter Stein and Peter Feaver, "Assuring Control of Nuclear Weapons: The Evolution of Permissive Action Links," CSIA Occasional Paper No. 2 (Cambridge, M.A.: CSIA Publications, 1987).
[29] Donald R. Cotter, "Peacetime Operations: Safety and Security," in Carter, Steinbruner, and Zraket, eds., *Managing Nuclear Operations*, p. 46.

Figure 1. Command and Control in Regional Nuclear Powers: Theoretical Framework



each component of the theory. Figure 1 depicts the structure and predicted outcomes of my theoretical framework.

Conventionally Superior Adversary

The first node of my theory asks: does the state face a proximate and conventionally superior adversary? The presence of a proximate and conventionally superior adversary represents an immediate and existential threat to state security that severely constrains a state's options when establishing command and control frameworks.

The concept of a conventionally superior adversary entails two necessary components. First, the adversary must be geographically proximate, with limited distances required to conduct

offensive operations and favorable terrain that facilitates offensive action.[30] Second, the adversary must possess decisive superiority—whether quantitative or qualitative—in conventional military capabilities.[31] States with approximate conventional parity or defensively advantageous terrain such as mountainous borders or wide water boundaries can rely on conventional military forces to deny an adversary of rapidly decisive military victory. In contrast, states facing an adversary with in-theater superiority and traversable terrain that enables offensive military operations experience an existential threat that the militarily inferior state cannot offset through conventional means. Instead, these conditions force the conventionally inferior state to rely on its nuclear arsenal to deter conventional threats and limit the doctrinal options available to states when establishing command and control frameworks.[32]

Because a proximate and conventionally superior adversary can rapidly seize territory, destroy forces, or sever lines of communications, states facing such adversaries experience incentives to lower the nuclear threshold to deter conventional attacks. Nuclear weapons provide strong deterrent credibility against nuclear use by other states, but the operational dispositions of nuclear forces unevenly shape the ability of a state to deter conventional aggression.[33] By lowering the threshold to nuclear use, a state can offset its conventionally inferiority and signal to its

[30] John J. Mearsheimer, *Conventional Deterrence* (Ithaca, N.Y.: Cornell University Press, 1983), pp. 23-66.
[31] A widely cited rule of thumb that suggests offensive operations require numerical preponderance is the "3:1 rule," which argues that attackers require a threefold advantage in troop levels to conduct successful breakthrough operations. For a debate on the utility of the 3:1 rule, see: Joshua M. Epstein, "Dynamic Analysis and the Conventional Balance in Europe," *International Security*, Vol. 12, No. 4 (Spring 1988), pp. 154-165; John J. Mearsheimer, "Assessing the Conventional Balance: The 3:1 Rule and Its Critics," *International Security*, Vol. 13, No. 4 (Spring 1989), pp. 54-89. For additional insights into qualitative superiority, see Stephen Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton, N.J.: Princeton University Press, 2004).
[32] Bell, "Nuclear Opportunism," pp. 10-13; and Narang, *Nuclear Strategy in the Modern Era*, pp. 35-36.
[33] Vipin Narang, "What Does It Take to Deter? Regional Power Nuclear Postures and International Conflict," *Journal of Conflict Resolution*, Vol. 57, No. 3 (June 2013), pp. 478-508.

adversaries that no room exists underneath the nuclear umbrella for conventional conflict, as even limited conventional disputes will risk escalation to the nuclear level.

States facing a proximate and conventionally superior adversary adopt more delegative command and control systems that provide the operational means for states to manipulate the nuclear threshold and bolster arsenal reliability. The delegation of nuclear launch authority to lower-level military commanders increases the operational ability of military operators to respond to a conventional incursion with nuclear weapons and signals to an adversary that non-nuclear aggression may result in nuclear escalation. For example, during the Cold War, France deployed tactical nuclear weapons and delegated nuclear use capability to the First Army to prevent the Soviet Union from winning even limited military objectives.[34] France's delegative command and control procedures purposefully lowered the threshold to nuclear use to offset the Soviet Union's conventional military superiority, exemplifying the logic of threshold manipulation proposed in my theoretical framework.

The presence of a proximate and conventionally superior adversary encourages states to manipulate the nuclear threshold and precludes states from adopting assertive command and control arrangements. A state's conventional threat environment, however, is not singularly determinative of its command and control frameworks. As the next section demonstrates, the effect of conventional threats on command and control systems is conditioned by the interaction of this variable with the severity of domestic threats to the political regime.

[34] Robbin F. Laird, "French Nuclear Forces in the 1980s and 1990s," Professional Paper 400 (Alexandria, V.A.: Center for Naval Analyses, August 1983), pp. 22-23; Shaun R. Gregory, *Nuclear Command and Control in NATO: Nuclear Weapons Operations and the Strategy of Flexible Response* (New York, N.Y.: St. Martin's, 1996), p. 132.

DOMESTIC THREATS TO REGIME SURVIVAL

The second node of my theoretical framework asks: does the state face domestic threats to regime survival? Civilian positions on military matters are simultaneously shaped by domestic and international considerations that force leaders to jointly consider internal and external challenges to their regime when developing military doctrine.[35] In addition to external threats to state security, domestic threats such as military coups, armed rebellion, and mass protests pose highly proximate threats to political regimes.[36] Because these domestic challenges also generate existential threats to the ruling elite, I argue that analysts must jointly consider the interaction of external and internal threats facing a state to explain command and control outcomes.

Whereas external security threats cause leaders to adopt more delegative command and control systems, domestic threats to the political regime encourage more assertive command and control measures for three reasons. First, centralizing authority over nuclear operations allows leaders to institutionally exclude and withhold resources and autonomy from domestic rivals. By adopting assertive control measures, leaders can politically weaken and deny potential domestic competitors the opportunity and ability to challenge the ruling regime.[37] Second, assertive control allows political leaders to exploit the domestic political value of nuclear weapons and guarantee that nuclear weapons only serve the political interests of the ruling regime. Leaders exercising

[35] Elizabeth Kier, *Imagining War: French and British Military Doctrine Between the Wars* (Princeton, N.J.: Princeton University Press, 1997), pp. 14, 21-38. Also see Steven R. David, "Explaining Third World Alignment," *World Politics*, Vol. 43, No. 2 (January 1991), pp. 233-256.

[36] On the dual imperatives of internal and external threats to a regime's rule, see Sheena Chestnut Greitens, *Dictators and Their Secret Police: Coercive Institutions and State Violence* (Cambridge: Cambridge University Press, 2016), pp. 3-71. On the differences between threats to a regime and threats to a state, see Caitlin Talmadge, *The Dictator's Army: Battlefield Effectiveness in Authoritarian Regimes* (Ithaca, N.Y.: Cornell University Press, 2015), pp. 18-27.

[37] For instance, in countries where leaders fear deposal by a military coup, nuclear weapons allow states to keep military organizations weak and disorganized while relying on centrally managed nuclear forces to deter external aggression. Cameron S. Brown, Christopher J. Fariss, and R. Blake McMahon, "Recouping after Coup-Proofing: Compromised Military Effectiveness and Strategic Substitution," *International Interactions*, Vol. 42, No. 1 (January 2016), pp. 1-30.

assertive control can strengthen their domestic position by leveraging nuclear weapons as a "symbol of governing authority" to coalesce support from key domestic constituencies.[38] Third, assertive control allows leaders in domestically unstable regimes to strengthen arsenal safety and security. This is especially important in states where the actors posing a threat to the political regime also threaten the physical safety and security of the nuclear arsenal.[39]

Political leaders optimize their command and control frameworks in response to the full range of domestic and international threats. By jointly evaluating external and internal threats, my theoretical framework makes determinate predictions for command and control outcomes and addresses the causal indeterminacy that confronts existing frameworks when multiple variables predict divergent outcomes.[40] Furthermore, by reframing the concept of command and control to account for the timing at which the delegation of nuclear use ability occurs, I offer a useful framework for describing the optimization strategies employed by states with nuclear weapons.

My theory makes three predictions for the interactive effects of the presence of a proximate and conventionally superior adversary and domestic threats to regime survival on command and control frameworks. First, states facing a proximate and conventionally superior adversary without a domestic threat to the political regime adopt delegative command and control systems. These states can focus nuclear planning solely on the external adversary and adopt delegative control patterns to lower the threshold to nuclear use and deter conventional aggression. Second, states facing both a conventionally superior adversary and domestic threats to the political regime adopt

[38] Peter D. Feaver, "Nuclear Command and Control in Crisis: Old Lessons from New History," in Henry D. Sokolski and Bruno Tertrais, eds., *Nuclear Weapons Security Crises: What Does History Teach?* (Carlisle, P.A.: Strategic Studies Institute and U.S. Army War College Press, 2013), p. 221.
[39] For instance, terrorist threats to Pakistan's arsenal have long concerned scholars and policymakers alike. Clary, *Thinking about Pakistan's Nuclear Security in Peacetime, Crisis and War*, pp. 3-4; Paul K. Kerr and Mary Beth Nikitin, "Pakistan's Nuclear Weapons: Proliferation and Security Issues," CRS Report for Congress, No. RL34248 (Washington, D.C.: Congressional Research Service, updated February 23, 2010).
[40] Narang, *Nuclear Strategy in the Modern Era*, p. 26.

conditional command and control frameworks. These states emphasize centralized control during peacetime to guarantee nuclear forces serve the regime's narrow political interests and to promote arsenal safety and security, but delegate launch capability early in a crisis to lower the nuclear threshold and deter conventional attacks by external actors. Third, states that do not face a proximate and conventionally superior adversary but face domestic threats to the political regime develop assertive command and control frameworks. For these states, external threats do not meaningfully shape the threat environment for political leaders. Instead, political elites become primarily concerned with internal threats and adopt assertive control measures to centralize their authority over nuclear decisions and bolster the power of the ruling regime.

MILITARY ORGANIZATIONAL AUTONOMY

If a state's external security environment is benign and the political regime is domestically stable, the final node of my theoretical framework asks: how autonomous are the state's military organizations? In the absence of external threats to state security and domestic threats to regime survival, I argue that the level of military organizational autonomy serves as the dominant explanatory factor for command and control outcomes.

Military organizations possess three core interests which may be pursued through political channels:[41] first, access to material resources;[42] second, autonomy over the management of internal

[41] Barry R. Posen, *The Sources of Military Doctrine: France, Britain, and Germany Between the World Wars* (Ithaca, N.Y.: Cornell University Press, 1984), pp. 41-59; Sagan, "The Perils of Proliferation," pp. 75-76; Jack Snyder, *The Ideology of the Offensive: Military Decision Making and the Disasters of 1914* (Ithaca, N.Y.: Cornell University Press, 1984), pp. 26-30; Stephen Van Evera, "The Cult of the Offensive and the Origins of the First World War," *International Security*, Vol. 9, No. 1 (Summer 1984), pp. 58-107.

[42] With greater size and wealth, military organizations can develop and acquire weapons systems necessary for conducting operations. Eric A. Nordlinger, *Soldiers in Politics: Military Coups and Governments* (Englewood Cliffs, N.J.: Prentice-Hall, 1977), pp. 65-71; Posen, *The Sources of Military Doctrine*, p. 49.

military affairs;[43] and third, command of operational and tactical decisions regarding the use of force.[44] Furthermore, military organizations are characterized by two procedural biases that seek to facilitate internal coordination and reduce operational uncertainty: first, a reliance on organizational routines designed to address specific tasks and issues;[45] and second, an emphasis on operational-level military issues.[46] This combination of interests and biases leads military organizations to systematically prefer offensive military doctrines that increase the military's organizational size and wealth,[47] enhance military autonomy,[48] and facilitate operational coordination within the military.[49]

In nuclear states, the preference for offensive doctrines causes military organizations to pursue more delegative patterns of command and control.[50] Delegative control systems satisfy military interests by providing military actors with physical control over nuclear assets and administrative autonomy over nuclear use decisions. These procedures allow the military to develop standard operating procedures that facilitate coordination within the military and reduces uncertainty in military operations by reducing dependence on senior leadership during crises.

The military's ability to advance its preferences for more delegative command and control systems depends upon its level of organizational autonomy, which refers to the decision-making

[43] Richard Betts highlights the importance of organizational autonomy, stating that "Military leaders prefer poverty with autonomy to wealth with dependency." Richard K. Betts, *Soldiers, Statesmen, and Cold War Crises* (New York, N.Y.: Columbia University Press, 1991), pp. 71-75.
[44] Ibid., p. 9. Also see James Q. Wilson, *Bureaucracy: What Government Agencies Do and Why They Do It* (New York, N.Y.: Basic Books, 1989), pp. 179-195.
[45] Posen, *The Sources of Military Doctrine*, pp. 44-48.
[46] Sagan, "The Perils of Proliferation," p. 72.
[47] Offensive operations typically require numerical superiority and extensive logistical support that demand greater financial support and manpower commitments. Posen, *The Sources of Military Doctrine*, p. 49; Sagan, "The Origins of Military Doctrine and Command and Control Systems," p. 18.
[48] Posen, *The Sources of Military Doctrine*, pp. 49-50.
[49] Ibid., pp. 47-49; Sagan, "The Origins of Military Doctrine and Command and Control Systems," p. 18.
[50] On the implications of offensive doctrines in nuclear states, see Sagan, "The Origins of Military Doctrine and Command and Control Systems," pp. 18-23.

authority of military organizations. Military organizations enjoy greater autonomy to the extent that they determine senior-level commander appointments, control military reforms such as weapons upgrades, troop deployments, and doctrinal formulation, and possess institutional roles for providing operational policy recommendations.[51] Importantly, these indicators narrowly focus on civil-military relations in the conventional realm and broader political institutions to avoid the tautology of using nuclear administrative control procedures to explain a state's overarching nuclear command and control frameworks.

My theory generates two predictions for command and control outcomes at this final node of the framework. First, states with high levels of military organizational autonomy adopt delegative command and control systems. Under these conditions, political leaders are willing to rely on the military's professionalism and obedience to protect against accidental and unauthorized use and allow military organizations to manage physical nuclear forces and include military leadership in the nuclear chain of command. Second, states with low levels of military organizational autonomy adopt assertive command and control frameworks. These states possess civil-military pathologies that purposefully exclude military organizations from conventional operational decision-making, and these patterns of civil-military relations travel to nuclear policy well. States with low military autonomy adopt assertive control measures to centralize nuclear authority and preclude military influence over nuclear doctrine.

[51] These institutional structures reflect greater direct political influence of military organizations. Betts, *Soldiers, Statesmen, and Cold War Crises*, p. 5. On military decision-making authority, see David Pion-Berlin, "Military Autonomy and Emerging Democracies in South America," *Comparative Politics*, Vol. 25, No. 1 (October 1992), pp. 84-88.

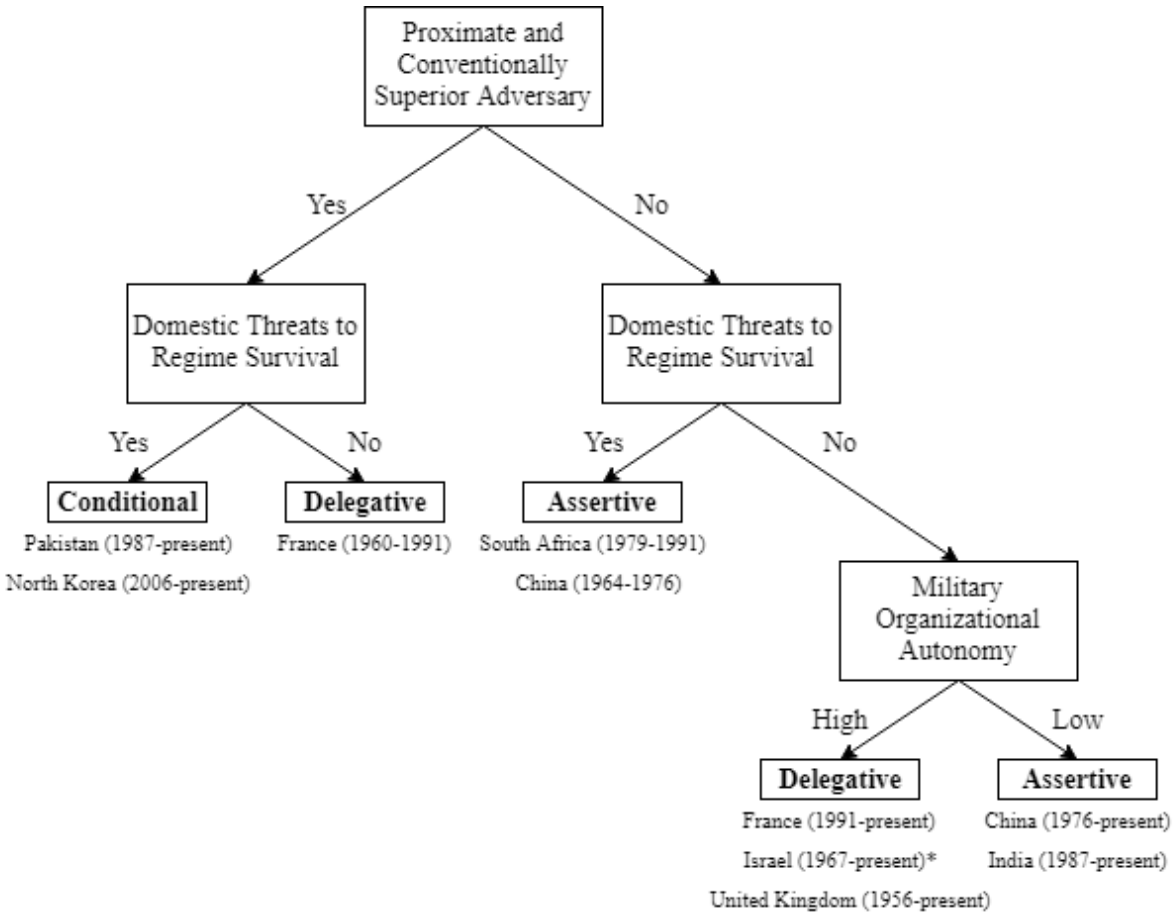
Empirical Analysis

I test the explanatory power of my theory with evidence from India, Pakistan, and the United Kingdom. Although space limitations preclude a comprehensive analysis of command and control decisions in all nuclear states, these cases allow me to demonstrate the descriptive and explanatory power of my theory. Figure 2 provides a summary of the predicted outcomes for command and control systems in regional nuclear powers generated by my theoretical framework.

India, Pakistan, and the United Kingdom are useful cases for two reasons. First, these countries have each adopted distinct patterns of command and control, with assertive control in India, conditional control in Pakistan, and delegative control in the United Kingdom. By selecting one case from each command and control outcome, this study represents the full range of potential variation and demonstrates the utility of my conceptual framework.[52] Second, these cases allow me to incorporate a combination of historical and primary source material to descriptively characterize and theoretically explain command and control outcomes. I provide original interview evidence with political and military elites from India and Pakistan to evaluate my theory. This empirical contribution is especially useful in the study of nuclear command and control, where significant data restrictions typically constrain academic analysis.

[52] Although "diverse" case selection strategy does not necessarily reflect the distribution of cases in the broader population of nuclear states, it "has stronger claims to representativeness than any other small-*N* sample." Jason Seawright and John Gerring, "Case Selection Techniques in Case Study Research: A Menu of Qualitative and Quantitative Options," *Political Research Quarterly*, Vol. 61, No. 2 (June 2008), pp. 300-301.

Figure 2. Command and Control in Regional Nuclear Powers: Empirical Predictions



An asterisk (*) denotes cases that are incorrectly predicted by the theoretical framework. The theory accurately predicts nine of ten cases for a success rate of 90%. Omitting North Korea for concerns of data limitations results in the successful prediction of eight of nine cases, yielding a success rate of approximately 89%.

India: Assertive Control

India has employed assertive command and control systems throughout its nuclear history. Command and control debates did not receive direct consideration in India until the country's overt weaponization in 1998,[53] but assertive political control has nevertheless served as a guiding principle of India's nuclear doctrine since the early stages of nuclear research.[54]

[53] Major General (ret.) Dipankar Banerjee, interview by author, January 29, 2019.
[54] Government of India, "Draft Report of National Security Advisory Board on Indian Nuclear Doctrine," August 17, 1999.

Highly centralized administrative control has guaranteed political control over nuclear forces in India since proliferation.[55] As India's 1999 draft nuclear doctrine states, "Nuclear weapons shall be tightly controlled and released for use at the highest political level."[56] The prime minister has the sole authority to issue orders for nuclear mobilization and use.[57] The national security advisor is responsible for assisting the prime minister in the decision to use nuclear weapons and guaranteeing that the prime minister's orders are executed. In the event of the prime minister's death, an alternate chain of command allows the prime minister's designated successor to authorize nuclear use.[58] These measures guarantee that India's nuclear arsenal firmly remains under political control under all circumstances.[59]

India's nuclear forces are organized around four levels of readiness, each of which requires direct authorization from the prime minister's office: first, arming of the weapons; second, dispersal of armed weapons; third, mating of nuclear weapons to delivery systems; and fourth, release of nuclear weapons to military control.[60] Each of these steps is subject to the two-man rule, requiring multiple individuals to access, move, or deploy nuclear assets.[61] Importantly, the chain of command for nuclear operations is completely separated from conventional military operations and subject to direct civilian oversight.[62] Military custodians of nuclear delivery systems operate within the Strategic Forces Command (SFC) and execute orders as directed by the civilian-led

[55] Ashley J. Tellis, *India's Emerging Nuclear Posture: Between Recessed Deterrent and Ready Arsenal* (Santa Monica, C.A.: RAND, 2001), pp. 251-475.
[56] Government of India, "Draft Report of National Security Advisory Board on Indian Nuclear Doctrine."
[57] Harsh V. Pant, "India's Nuclear Doctrine and Command Structure: Implications for Civil-Military Relations in India," *Armed Forces & Society*, Vol. 33, No. 2 (January 2007), p. 249.
[58] Ibid., pp. 249-253.
[59] Narang, *Nuclear Strategy in the Modern Era*, p. 105.
[60] Verghese Koithara, *Managing India's Nuclear Forces* (Washington, D.C.: Brookings Institution Press, 2012), pp. 168-171.
[61] Narang, *Nuclear Strategy in the Modern Era*, p. 106.
[62] Pant, "India's Nuclear Doctrine and Command Structure," p. 249. Corroborated by: Major General (ret.) Dipankar Banerjee, interview by author, January 29, 2019; Rear Admiral (ret.) Raja Menon, interview by author, February 5, 2019.

Nuclear Command Authority. The strict separation of conventional and nuclear operations ensures that nuclear decisions remain firmly under political control.

Physically, nuclear weapons have historically been disassembled and de-mated from delivery platforms.[63] At least through the mid-2000s, the Department of Atomic Energy (DAE) maintained custody of the fissile pits and the Defense Research and Development Organization (DRDO) managed non-fissile components, such as the nuclear triggers and detonators.[64] India's military forces operate the country's delivery vehicles—such as land-based ballistic missiles and nuclear-capable aircraft—but have no direct access to nuclear weapons components. These measures of arsenal disassembly and geographic dispersion constitute a "super-PAL" that guarantees nuclear weapons can only be used by order of the prime minister.[65]

Technically, nuclear forces are likely protected by an indigenously developed PAL equivalent.[66] Multiple interviews with Indian political and military elites reference the existence and importance of technical controls over nuclear assets, although details regarding the sophistication and technological specifics of these controls remain confidential.[67] In the event that political leaders authorize nuclear use, a code appears necessary at the final stages of deployment to arm and prepare the nuclear weapon for release across all platforms.[68] These codes are centrally managed to prevent lower-level commanders from bypassing the designated chain of command and to guarantee political oversight.

[63] Tellis, *India's Emerging Nuclear Posture*, pp. 401-428.
[64] Narang, *Nuclear Strategy in the Modern Era*, p. 101
[65] Tellis, *India's Emerging Nuclear Posture*, p. 433.
[66] Brigadier General (ret.) Gurmeet Kanwal, interview by author, August 4, 2016.
[67] Manoj Joshi, interview by author, February 4, 2019; Lieutenant General (ret.) Balraj Nagal, interview by author, January 17, 2019.
[68] Narang, *Nuclear Strategy in the Modern Era*, pp. 106-107.

India's assertive command and control practices appear likely to endure, even as India increases its reliance on canisterized systems that pre-mate warheads to delivery platforms and obviate physical de-mating practices.[69] These challenges are particularly pronounced for India's emerging sea-based nuclear capabilities, which exclusively rely on canisterized systems.[70] Nevertheless, civilian and military elites expect technical and administrative controls to maintain assertive control over India's emerging sea-based platforms.[71] Lieutenant General (ret.) Balraj Nagal, commander-in-chief of India's SFC from 2008-2010, refers to these developments as a "natural evolution" of nuclear capabilities simply aimed at improving the quality of India's nuclear arsenal.[72] Arvind Gupta, India's deputy national security advisor from 2014-2017, supports this perspective, noting that strict civilian oversight of nuclear operations remains an unassailable "guiding principle" of India's command and control procedures.[73] Although the underlying capabilities of India's nuclear arsenal are evolving, India remains committed to strictly assertive command and control practices.

Conventional Security and Regime Stability

Conventional military security and domestic political stability have allowed civil-military relations to decisively shape command and control outcomes. In this section, I demonstrate that despite a

[69] For an opposing perspective, see Christopher Clary and Vipin Narang, "India's Counterforce Temptations: Strategic Dilemmas, Doctrine, and Capabilities," *International Security*, Vol. 43, No. 3 (Winter 2018/19), pp. 7-52.
[70] Christopher Clary and Ankit Panda, "Safer at Sea? Pakistan's Sea-based Deterrent and Nuclear Weapons Security," *The Washington Quarterly*, Vol. 40, No. 3 (Fall 2017), pp. 153-155.
[71] Arvind Gupta, interview by author, February 5, 2019; Lieutenant General (ret.) Balraj Nagal, interview by author, January 17, 2019; Admiral (ret.) Arun Prakash, interview by author, January 29, 2019.
[72] Lieutenant General (ret.) Balraj Nagal, interview by author, January 17, 2019.
[73] Arvind Gupta, interview by author, February 5, 2019.

complex threat environment, India's conventional security and domestic stability allow political leaders to maintain centralized control over nuclear weapons during peacetime and crises.

India faces an enduring border dispute with China dating back to the 1962 Sino-Indian War, in which Chinese forces decisively defeated India's military in battle.[74] This border dispute remains unresolved, with both China and India maintaining deployed forces in the region. Additionally, India has experienced numerous militarized disputes with Pakistan.[75] These disputes have remained a defining feature of Indo-Pakistani relations since the two countries first fought over control of the Jammu and Kashmir territory after partition in 1947.

Despite a prolonged history of militarized conflict with China and Pakistan, however, neither country poses an existential conventional threat to Indian security. The mountainous border with China limits the potential avenues for an offensive incursion and provides India with a defensively advantageous position.[76] Threat assessments by Indian elites reflect these circumstances, with leaders viewing the conventional threat from China as modest and unlikely to escalate into a broader conflict.[77] With respect to Pakistan, India enjoys clear numerical conventional superiority in land, air, and sea capabilities.[78] Bharat Karnad—a member of the first National Security Advisory Board (NSAB) which produced India's 1999 draft nuclear doctrine—suggests that Pakistan's conventional inferiority limited its influence on India's earliest command and control decisions and remains a low-priority threat.[79] Former NSAB member Manoj Joshi

[74] M. Taylor Fravel, *Strong Borders, Secure Nation: Cooperation and Conflict in China's Territorial Disputes* (Princeton, N.J.: Princeton University Press, 2008), pp. 173-219.
[75] P. R. Chari, Pervaiz Iqbal Cheema, and Stephen P. Cohen, *Four Crises and a Peace Process: American Engagement in South Asia* (Washington, D.C.: Brookings Institution Press, 2007).
[76] Narang, *Nuclear Strategy in the Modern Era*, pp. 111-112.
[77] Major General (ret.) Dipankar Banerjee, interview by author, January 29, 2019; Arvind Gupta, interview by author, February 5, 2019; Admiral (ret.) Arun Prakash, interview by author, January 29, 2019.
[78] Ashley J. Tellis, *Strategic Stability in South Asia*, Arroyo Center Document Briefing (Santa Monica, C.A.: RAND Corporation, 1997), pp. 12-33.
[79] Bharat Karnad, interview by author, February 4, 2019.

further supports this perspective by arguing that the absence of existential conventional threats continues to allow India to narrowly employ nuclear weapons as deterrents against other nuclear states and retain centralized control over its nuclear arsenal.[80]

Pakistan has also used its nuclear weapons as a shield behind which to support attacks against India.[81] Indian policymakers, however, do not view the delegation of nuclear authority as a viable policy response to these subconventional threats.[82] Instead, India has developed conventional proactive strategy operations—commonly referred to as the "Cold Start" doctrine—to deter Pakistan-sponsored terrorist attacks.[83] These operations would entail India rapidly massing ground and air assets to make limited territorial gains and then using those gains to extract concessions from Pakistan in post-conflict negotiations.[84] Although Cold Start faces numerous challenges and has failed to deter Pakistani support for subconventional attacks, the continued study of proactive strategy operations further demonstrates India's reliance on conventional military forces to address non-nuclear threats.

In addition to its external security, India's political regime has remained insulated from domestic threats for the duration of its nuclear weapons program. To the extent that India has experienced domestic instability, this instability has come in the form of inter-caste conflicts and

[80] Manoj Joshi, interview by author, February 4, 2019.
[81] S. Paul Kapur, "India and Pakistan's Unstable Peace: Why Nuclear South Asia Is Not Like Cold War Europe," *International Security*, Vol. 30, No. 2 (Fall 2005), pp. 127-152.
[82] Major General (ret.) Dipankar Banerjee, interview by author, January 29, 2019; Arvind Gupta, interview by author, February 5, 2019.
[83] Shashank Joshi, "India's Military Instrument: A Doctrine Stillborn," *Journal of Strategic Studies*, Vol. 36, No. 4 (August 2013), pp. 512-540; 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; Walter C. Ladwig III, "Indian Military Modernization and Conventional Deterrence in South Asia," *Journal of Strategic Studies*, Vol. 38, No. 5 (July 2015), pp. 729-772. The continued study of "proactive strategy" options was corroborated by Brigadier General (ret.) Gurmeet Kanwal, interview by author, August 4, 2016.
[84] Ladwig III, "A Cold Start for Hot Wars?", pp. 163-167.

nationalist movements that do not threaten India's political order.[85] Furthermore, India's military organizations have remained uninvolved in politics and do not pose a threat to civilian leaders. Despite occasional tensions between civilian leaders and military organizations—especially during the initial period after Indian independence—military actors have not questioned or challenged the principle of civilian supremacy.[86] Combined, India's conventional security and domestic stability have generated a permissive threat environment that allows for India's civil-military relations to influence command and control decisions.

Low Military Organizational Autonomy

I argue that India's low levels of military organizational autonomy explain the persistence of assertive command and control systems over time. Civilian elites have systematically excluded the military from doctrinal debates, allowing political leaders to centralize control over all aspects of nuclear management operations and resulting in highly assertive command and control procedures.

Strict civilian control of the military has a long legacy in India's civil-military relations. Jawaharlal Nehru, India's first prime minister, "thoroughly indoctrinated" the military with the principles of civilian control during the early years of independence.[87] Two institutional changes occurred shortly after India obtained independence in 1947 to cement civilian control of the military.[88] First, civilian elites abolished the post of the military commander-in-chief—the primary

[85] For an overview of the presence of domestic tensions and conflict in India, see Paul R. Brass, *The Politics of India Since Independence*, 2d ed. (New York, N.Y.: Cambridge University Press, 1994).
[86] P. R. Chari, "Civil-Military Relations in India," *Armed Forces & Society*, Vol. 4, No. 1 (November 1977), p. 3.
[87] Stephen P. Cohen, *The Indian Army: Its Contribution to the Development of a Nation* (Berkeley, C.A.: University of California Press: 1971), pp. 170-177. Also see Stephen P. Rosen, *Societies and Military Power: India and its Armies* (Ithaca, N.Y.: Cornell University Press, 1996), pp. 197-256.
[88] Pant, "India's Nuclear Doctrine and Command Structure," p. 243.

military advisor to the civilian government—to prevent the Indian military from challenging civilian authority.[89] Second, Indian leaders established the Ministry of Defense to act as an intermediary between civilian and military leaders to minimize the threats to civilian control.[90]

Until recently, the fear of a unified military body has generated civilian opposition to the establishment of a chief of defense staff (CDS). The CDS position would appoint a single military officer to coordinate military affairs across services and provide a single point of counsel to the prime minister. Several senior military officers have openly called for the establishment of a CDS to improve jointness between India's services for decades.[91] The government sponsored Kargil Review Committee and Naresh Chandra committee have also advocated for the establishment of a CDS to help India's military coordinate operations.[92]

Prime Minister Narendra Modi deviated from the longstanding political consensus in August 2019 by announcing plans to develop a CDS post.[93] Analysts, however, have expressed skepticism regarding the significance of the development.[94] For example, the formal guidelines of the CDS approval include political directives for the procurement of indigenous military equipment and—in both the conventional and nuclear spheres—subordinates the CDS to direct civilian oversight.[95] Despite the apparent value of a CDS for operational military effectiveness,

[89] Ayesha Ray, *The Soldier and the State in India: Nuclear Weapons, Counterinsurgency, and the Transformation of Indian Civil-Military Relations* (Thousand Oaks, C.A.: SAGE, 2013) p. 37.
[90] Ibid., pp. 37-38.
[91] Brigadier General (ret.) Gurmeet Kanwal, interview by author, August 4, 2016; Admiral (ret.) Arun Prakash, interview by author, January 29, 2019.
[92] For example, see Kargil Review Committee, "Report of the Group of Ministers on National Security," February 2000, p. 100.
[93] "PM Narendra Modi's Mega Announcement: India Will Now Have Chief of Defense Staff," *India Today*, August 15, 2019.
[94] Prakash Menon, "The Chief of Defense Staff Challenge," *Telegraph*, August 24, 2019.
[95] Government of India, Press Information Bureau, "Cabinet Approves Creation of the Post of Chief of Defense Staff in the Rank of Four Star General," December 24, 2019.

civilian resistance to military influence in political affairs appears likely to limit the military's organizational autonomy moving forward.

The historically institutionalized political exclusion of the military extends to the nuclear realm. India's nuclear weapons program developed exclusively under the supervision of civilian politicians and scientists.[96] Once civilian elites began to fashion an operational nuclear doctrine, leaders prioritized centralized political control over the military applications of nuclear weapons.[97] As Gaurav Kampani states: "Until 1998, the air force was the only military service with any knowledge of the weaponization program because of its role in delivering the weapons. But even as the user service tasked with delivery, until the early 1990s the Indian Air Force only participated in the weaponization program at the margins."[98]

According to Admiral (ret.) Arun Prakash, a key driver of the political emphasis on centralized control was the fear that providing the military access to nuclear weapons would grant the military an unacceptable lever of domestic power with which to challenge civilian authority.[99] Vice Admiral (ret.) Verghese Koithara supports this perspective, noting that civilians have systematically resisted incorporating the military into the nuclear chain of command. Koithara argues that "Keeping the military at arm's length and sidelining military competencies the way India has done has no parallel in global nuclear weapons development history."[100]

---

[96] On the role of civilian scientists in the development of India's nuclear program, see George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, C.A.: University of California Press, 1999).
[97] Perkovich, *India's Nuclear Bomb*, p. 178.
[98] Gaurav Kampani, "New Delhi's Long Nuclear Journey: How Secrecy and Institutional Roadblocks Delayed India's Weaponization," *International Security*, Vol. 38, No. 4 (Spring 2014), p. 94.
[99] Admiral (ret.) Arun Prakash, interview by author, January 29, 2019.
[100] Koithara, *Managing India's Nuclear Forces*, p. 91. Also see Perkovich, *India's Nuclear Bomb*, p. 450; Tellis, *India's Emerging Nuclear Posture*, p. 282.

India's military is institutionally represented in the nuclear sphere through the Strategic Forces Command, but three features of the SFC demonstrate the lack of military influence in nuclear decision-making processes. First, the military is unable to coordinate with civilian bodies on nuclear matters without receiving approval from the prime minister's office.[101] Although the military's service chiefs can advise the NCA political council if requested by civilian leaders during a crisis, the service chiefs do not regularly meet with the political council.[102] Second, the SFC is a tri-service command, meaning that the Indian Army, Navy, and Air Force take turns directing the SFC. This rotation of officers prevents any single service from dominating nuclear debates and posing a challenge to political authority.[103] Third, because many SFC commanders return to another role after their SFC posting, these officers cannot risk challenging their civilian superiors without simultaneously threatening their future career trajectory.[104] On an institutional level, the military has been so thoroughly excluded from nuclear debates that Admiral (ret.) Arun Prakash has referred to these command and control arrangements as "a policy of segregation."[105]

Given its conventional military security and domestic political stability, civil-military relations have proven highly influential in the formation of India's nuclear command and control systems. Low levels of military organizational autonomy have allowed civilian elites to dominate nuclear debates and exclude military influence over nuclear doctrine. As predicted by my theoretical framework, these patterns of civil-military relations have led India to employ assertive command and control systems for the duration of its nuclear weapons program.

---

[101] Kampani, "New Delhi's Long Nuclear Journey," pp. 99-101; Narang, *Nuclear Strategy in the Modern Era*, pp. 105-106.
[102] Richard B. White, "Command and Control of India's Nuclear Forces," *Nonproliferation Review*, Vol. 21, Nos. 3-4 (October 2014), p. 267.
[103] Manoj Joshi, interview by author, February 4, 2019; Admiral (ret.) Arun Prakash, interview by author, January 29, 2019.
[104] Rear Admiral (ret.) Raja Menon, interview by author, February 5, 2019.
[105] Arun Prakash, "9 Minutes to Midnight," *Force* (July 2012), p. 4.

Pakistan: Conditional Control

Pakistan employs conditional command and control arrangements over its nuclear arsenal. Conditional control allows Pakistan to centralize oversight of nuclear use decisions during peacetime, while also enabling the rapid delegation of nuclear use authority during crises to deter conventional aggression and bolster arsenal reliability. These conditional control arrangements reflect the competing imperatives of external security threats that require the early delegation of nuclear use capability and domestic political instability that compels actors to assert control over nuclear doctrine and operations during peacetime.

Administrative control in Pakistan is centralized during peacetime. Since 2000, Pakistan has managed its nuclear weapons through the National Command Authority (NCA). The prime minister officially chairs the NCA, which is responsible for policy formulation and the oversight of nuclear forces.[106] Within the NCA, the military-led Strategic Plans Division (SPD) is responsible for operational control of the arsenal. Over time, the SPD has developed "a firm hold of Pakistan's nuclear organization and policy,"[107] resulting in significant military influence over nuclear doctrine.[108] Although civilian leadership possesses *de jure* authority over nuclear decisions, military commanders ultimately exercise *de facto* authority over nuclear use.[109]

During crises, Pakistan's command and control systems allow for the rapid devolution of nuclear use capability to lower-level commanders. If communications are severed during a crisis and a field commander is unable to receive orders from higher-level authorities, the field

[106] "Pakistan Announcement of Nuclear-Weapons Command-and-Control Mechanism," *Associated Press of Pakistan*, February 3, 2000.
[107] Feroz Hassan Khan, *Eating Grass: The Making of the Pakistani Bomb* (Stanford, C.A.: Stanford University Press, 2012), p. 331.
[108] Ibid., pp. 95-123; Naeem Salik, *Learning to Live with the Bomb: Pakistan: 1998-2016* (Karachi: Oxford University Press, 2017), pp. 133-176.
[109] Narang, *Nuclear Strategy in the Modern Era*, p. 84.

commander appears capable of authorizing nuclear use.[110] Major General (ret.) Mahmud Durrani—Pakistan's national security advisor from 2008-2009—suggested in 2004 that authorization codes are held at military bases and can be assembled by lower-level officers at the direction of group and unit commanders.[111] This practice is representative of Pakistan's broader nuclear arsenal management practices, as the two- or three-man rule applies to all steps in the nuclear use process.[112]

Physically, Pakistan's warheads are partially disassembled during peacetime, with the fissile cores and detonators separated from one another and dispersed across an unknown distance.[113] These components are maintained in theft- and tamper-resistant containers during storage and transport, and the facilities housing these components are surrounded by a three-tier security structure to protect nuclear assets.[114] Warheads are also de-mated from delivery vehicles and separated by some distance during peacetime.[115]

As crises escalate, however, Pakistan is likely to begin assembling weapons and mating those weapons to delivery platforms to increase the readiness of its nuclear forces. Analysts suggest that Pakistan disperses its nuclear components no more than ten kilometers apart during

[110] Feroz Hassan Khan, "Nuclear Command-and-Control in South Asia during Peace, Crisis, and War," *Contemporary South Asia*, Vol. 14, No. 2 (June 2005), p. 169.
[111] Mahmud Ali Durrani, "Pakistan's Strategic Thinking and the Role of Nuclear Weapons," Cooperative Monitoring Center Occasional Paper, No. 37 (Albuquerque, N.M.: Sandia National Laboratories, 2004) p. 33.
[112] Brigadier General (ret.) Feroz Hassan Khan, interview by author, February 20, 2019.
[113] Clary and Panda, "Safer at Sea?", p. 153; Hans M. Kristensen and Robert S. Norris, "Pakistani Nuclear Forces, 2016," *Bulletin of the Atomic Scientists*, Vol. 72, No. 6 (November 2016), p. 370.
[114] Clary, *Thinking about Pakistan's Nuclear Security in Peacetime, Crisis and War*, p. 13; and David O. Smith, "The Management of Pakistan's Nuclear Arsenal," *Nonproliferation Review*, Vol. 21, Nos. 3-4 (October 2014), p. 282.
[115] Clary, *Thinking about Pakistan's Nuclear Security in Peacetime, Crisis and War*, p. 10; Clary and Panda, "Safer at Sea?", p. 154; Salik, *Learning to Live with the Bomb*, p. 189.

peacetime and may even collocate all components at a single location.[116] As a result, Pakistan's military can quickly prepare nuclear weapons for deployment in the event of a crisis.[117]

Pakistan's primary technical control over nuclear forces is a PAL-like device that aims to prevent unauthorized use. Lieutenant General (ret.) Khalid Kidwai—Director General of SPD from 2000-2013—has stated that these "Pak-PALs" require twelve-digit alphanumeric codes to disable the technical controls.[118] Pak-PALs are likely simple code-lock devices that lock subcomponents of the weapon or blocks the fusing space to prevent a nuclear detonation.[119]

Importantly, Pak-PALs can be bypassed to allow for nuclear use in the absence of authorization codes from political authorities.[120] The military custodians of nuclear forces likely include technical teams on base with the capacity to bypass these locks and enable nuclear use.[121] Former SPD official Brigadier General (ret.) Feroz Hassan Khan offers support for this perspective, noting that the military custodians of Pakistan's nuclear weapons must be "technically self-sufficient and capable of launch even if orders from the NCA are not received."[122] Pak-PALs tighten political control during peacetime, but the ability of lower-level military commanders to bypass these technical controls in case of emergency allows Pakistan to rapidly transition its arsenal to a higher level of readiness.

---

[116] Kristensen and Norris, "Pakistani Nuclear Forces, 2016," pp. 370-372.
[117] Brigadier General (ret.) Feroz Hassan Khan, interview by author, November 28, 2017.
[118] Narang, *Nuclear Strategy in the Modern Era*, p. 88.
[119] Clary, *Thinking about Pakistan's Nuclear Security in Peacetime, Crisis and War*, p. 15; Clary and Panda, "Safer at Sea?", p. 154; Durrani, "Pakistan's Strategic Thinking and the Role of Nuclear Weapons," p. 33.
[120] Clary, *Thinking about Pakistan's Nuclear Security in Peacetime, Crisis and War*, p. 16; Smith, "The Management of Pakistan's Nuclear Arsenal," p. 283.
[121] Narang, *Nuclear Strategy in the Modern Era*, p. 89.
[122] Feroz Hassan Khan, "Challenges to Nuclear Stability in South Asia," *The Nonproliferation Review*, Vol. 10, No. 1 (Spring 2003), p. 68.

CONVENTIONAL THREATS AND THRESHOLD MANIPULATION

Conventional threats play a major role in Pakistan's strategic thinking. In particular, the 1971 Indo-Pakistani War—which severed Pakistan in half and transformed East Pakistan into the sovereign state of Bangladesh—prompted Pakistan's pursuit of nuclear weapons and remains politically salient in contemporary foreign policy decisions.[123] As Brigadier General (ret.) Feroz Hassan Khan notes, "No other event in the history of Pakistan left as indelible a mark as the humiliating defeat of 1971, a key theme of Pakistani strategic culture today."[124]

India's ongoing military modernization efforts continue to exacerbate the existing disparity in conventional power between India and Pakistan. India has recently increased its acquisitions of advanced precision-strike munitions, reconnaissance platforms, and command and control capabilities, causing greater concern within Pakistan about its quantitative and qualitative disadvantages relative to India.[125] Pakistan has responded to these challenges by emphasizing high-quality materiel and developing internal lines of communication,[126] but Pakistan's primary lines of communication and major cities are located near the India-Pakistan border and imminently vulnerable to India's conventional forces.[127]

Some analysts suggest that the conventional military balance in South Asia may not disadvantage Pakistan to the extent that scholars traditionally assume,[128] but two factors highlight

[123] Lowell Dittmer, "South Asia's Security Dilemma," *Asian Survey*, Vol. 41, No. 6 (November/December 2001), p. 900; Sumit Ganguly and Devin T. Hagerty, *Fearful Symmetry: India-Pakistan Crises in the Shadow of Nuclear Weapons* (Seattle, W.A.: University of Washington Press, 2005), p. 123.
[124] Khan, *Eating Grass*, p. 70.
[125] Ladwig III, "Indian Military Modernization and Conventional Deterrence in South Asia," p. 731.
[126] Narang, *Nuclear Strategy in the Modern Era*, p. 78.
[127] Brigadier General (ret.) Feroz Hassan Khan, interview by author, November 28, 2017.
[128] Christopher Clary, "Deterrence Stability and the Conventional Balance of Forces in South Asia," in Michael Krepon and Julia Thompson, eds., *Deterrence Stability and Escalation Control in South Asia* (Washington, D.C.: Stimson Center, 2013), p. 136, 141-152; Ladwig III, "Indian Military Modernization and Conventional Deterrence in South Asia."

the continued importance of India's aggregate conventional military advantage. First, even if India cannot quickly seize strategically valuable territory near the disputed line of control separating India and Pakistan, India may still be able to achieve rapid success in other regions along the international border.[129] Brigadier General (ret.) Feroz Hassan Khan offers support for this analysis, suggesting that India's conventional preponderance would result in a decisive breakthrough within one to two weeks of combat.[130] Second, the historical trends promise to worsen Pakistan's relative conventional inferiority in the future. Since India and Pakistan overtly tested nuclear weapons in 1998, India has spent on average over $44.1 billion U.S. dollars (USD) per year on military expenditures, while Pakistan averaged just over $7.9 billion USD per year.[131] As Christopher Clary notes, "As long as India continues to grow faster than Pakistan and continues to spend at rates comparable to historical averages…there is no doubt that Pakistan will be unable to maintain even a patina of conventional parity over time."[132]

Statements by senior Pakistani officials provide evidence that Pakistan's conventional vulnerability has resulted in more responsive command and control arrangements that seek to lower the nuclear threshold. For example, in 2009 Pakistan's Foreign Office spokesman Abdul Basit explicitly demonstrated Pakistan's willingness to lower the nuclear threshold in response to India's growing conventional military superiority:

> Pakistan cannot remain oblivious to increasing conventional asymmetries…It is important that asymmetry between Pakistan and India in the context of conventional arms should not be widened too much. We have noticed that there are acquisitions of sophisticated

[129] Clary, "Deterrence Stability and the Conventional Balance of Forces in South Asia," p. 149.
[130] Brigadier General (ret.) Feroz Hassan Khan, interview by author, February 20, 2019.
[131] Military spending data in this section are provided by the Stockholm International Peace Research Institute (SIPRI) Military Expenditure Database, available at: <https://www.sipri.org/databases/milex>. These values reflect constant 2017 U.S. dollars.
[132] Clary, "Deterrence Stability and the Conventional Balance of Forces in South Asia," p. 136.

> weaponry by our neighbor which will disturb the conventional balance between our two countries and hence, lower the nuclear threshold.[133]

Several years later, Pakistan began deployment of its Nasr/Hatf-IX tactical nuclear weapon platform. Lieutenant General (ret.) Khalid Kidwai further emphasized Pakistan's efforts to lower the nuclear threshold in 2015 when discussing the purpose of the Nasr/Hatf-IX platform:

> Nasr, specifically, was born out of a compulsion of this thing that I mentioned about some people on the other side toying with the idea of finding space for conventional war, despite [Pakistan's] nuclear weapons…That there was some kind of gap in their realization at their tactical level, and therefore it was leading to this encouragement, or this idea of the concept on the other side that there was space for conventional war…So it was this particular gap that we felt needed to be plugged at the lowest rung. Because war was being brought down under the Cold Start Doctrine to the tactical level.[134]

As these examples demonstrate, Pakistan's conventional military inferiority with respect to India strongly encourages Pakistan to lower the threshold to nuclear use. Pakistan's conditional command and control systems enable lower-level military commanders to quickly respond to a conventional attack with nuclear weapons. Delegating nuclear use capability early in a crisis provides Pakistan with the necessary operational procedures to lower the nuclear threshold and strengthen deterrence against the conventionally superior India.

Domestic Threats and Arsenal Safety and Security

Pakistan's conventional military insecurity provides strong incentives for Pakistan to adopt delegative command and control systems. In practice, however, Pakistan's conditional control arrangements stop short of delegating nuclear use capability during peacetime and instead rely

[133] Abdul Basit quoted in Baqir Sajjad Syed, "Minimum N-Deterrence Will Be Maintained: FO," *Dawn*, May 22, 2009.
[134] "A Conversation with Gen. Khalid Kidwai," Carnegie International Nuclear Policy Conference 2015, transcript (Washington, D.C.: Carnegie Endowment for International Peace, 2015), p. 8.

upon highly centralized oversight of nuclear forces during peacetime. I argue that Pakistan's employment of conditional control arrangements represents an attempt to simultaneously address two competing pressures: first, conventional security threats that encourage more delegative control; and second, domestic threats that encourage more assertive control.

Poor civil-military relations have produced a longstanding source of domestic instability in Pakistan.[135] Pakistan has experienced four successful military takeovers of government since independence in 1947. With each alternation between military and civilian government since the early-1970s, political leaders attempted to increase their control of the nuclear weapons program. Over time, however, Pakistan's military—especially the Pakistan Army—has gained nearly absolute control over nuclear doctrine and operations.

Prime Minister Zulfiqar Ali Bhutto sought to centralize his control of Pakistan's nuclear weapons program immediately after initiating the program in 1972 by replacing Ishrat Hussain Usmani—longstanding chairman of the Pakistan Atomic Energy Commission's (PAEC)—with Bhutto's close friend Munir Ahmad Khan and placing the PAEC under strict political control.[136] Through these measures, Bhutto attempted to centralize his control over the nuclear program and exclude military interference. In 1977, however, General Zia ul-Haq deposed Bhutto through a military coup and discovered Pakistan's nuclear weapons program.[137] Samina Ahmed notes that after this point, "The nuclear weapons program operated under the absolute control of the armed forces, while the civil bureaucracy played an active role through its subsidiary arm, the nuclear

[135] For overviews of civil-military relations in Pakistan, see: Stephen P. Cohen, *The Pakistan Army*, 2d ed. (Oxford: Oxford University Press, 1998); C. Christine Fair, *Fighting to the End: The Pakistan Army's Way of War* (Oxford: Oxford University Press, 2014); Aqil Shah, *The Army and Democracy: Military Politics in Pakistan* (Cambridge, M.A.: Harvard University Press, 2014).
[136] Khan, *Eating Grass*, pp. 87-88.
[137] Ibid., p. 137.

scientific establishment."[138] Through General Zia's coup, Pakistan's military had seized a foothold in the nuclear weapons program.

After Zia's death in 1988, General Mirza Aslam Beg became Chief of Army Staff (COAS), Ghulam Ishaq Khan assumed the office of president, and Benazir Bhutto was elected as prime minister.[139] Benazir Bhutto's rise to prime minister, however, was conditional upon her acceptance of several conditions proposed by President Ghulam Ishaq Khan and brokered by General Beg, including an agreement "not to alter nuclear policy."[140] Through this agreement, Pakistan's military leaders were able to further consolidate their control and sideline Bhutto in high-level decisions regarding nuclear doctrine even during a transition to a civilian-led political regime.

By the early-2000s, the army had institutionalized its control of the nuclear weapons program under the NCA and through the SPD. In 2007, President and COAS General Pervez Musharraf passed the NCA Ordinance to cement this institutional arrangement and prevent efforts by domestic competitors to undermine the Pakistan Army's oversight of nuclear weapons.[141] A nominally civilian government returned in 2008, but by this point Pakistan's nuclear program was soundly under the control of the COAS and SPD.[142] Over time, the Pakistan Army has obtained dominance in the nuclear realm and remains capable of resisting civilian pressure and refusing political appointments within the SPD hierarchy.[143]

In addition to the domestic political competition for control of Pakistan's nuclear weapons program, domestic instability and security challenges continue to affect nuclear decision-making.

---

[138] Samina Ahmed, "Pakistan's Nuclear Weapons Program: Turning Points and Nuclear Choices," *International Security*, Vol. 23, No. 4 (Spring 1999), p. 186.
[139] Khan, *Eating Grass*, p. 227.
[140] Ibid., pp. 227-228.
[141] Salik, *Learning to Live with the Bomb*, pp. 152-154.
[142] Narang, *Nuclear Strategy in the Modern Era*, p. 84.
[143] Clary, *Thinking about Pakistan's Nuclear Security in Peacetime, Crisis and War*, p. 17.

In the aftermath of the A. Q. Khan scandal, in which Pakistan's preeminent scientist A. Q. Khan illicitly transferred nuclear technology and knowledge to international actors such as Iran and held meetings with North Korea and Al Qaeda, Pakistan restructured its command and control systems to emphasize the security of its nuclear arsenal. In addition to creating a security division within SPD, Pakistan instituted a personnel reliability program (PRP) and human reliability program (HRP).[144] The PRP and HRP screen all military and civilian personnel involved in Pakistan's nuclear program and evaluate candidates on multiple dimensions every two years, including known associates, political affiliations, financial background, and physical and psychological health.[145]

Although outside observers frequently worry about the physical safety and security of Pakistan's nuclear arsenal,[146] Lieutenant General (ret.) Khalid Kidwai has dismissed such concerns, stating that "nuclear security in Pakistan is a non-issue."[147] Despite such statements, however, the threats of religious extremism, domestic terrorism, and political instability continue to shape Pakistan's command and control frameworks. To address these domestic threats, Pakistan maintains an emphasis on its PRP and HRP requirements and de-mates and disperses nuclear weapon components to guarantee physical control over its nuclear arsenal. These measures guarantee centralized oversight and reinforce arsenal safety and security during peacetime to protect against unauthorized nuclear access, mobilization, or use.

The combination of domestic political competition between civilian and military leaders and domestic instability has led Pakistan to prioritize arsenal safety and security during peacetime.

---

[144] For an overview of the A. Q. Khan affair, see Khan, *Eating Grass*, pp. 359-376.
[145] Clary, *Thinking about Pakistan's Nuclear Security in Peacetime, Crisis and War*, p. 14; Khan, *Eating Grass*, pp. 373-375.
[146] For example, see Jeffrey Goldberg and Marc Ambinder, "The Ally From Hell," *Atlantic*, December 2011.
[147] "A Conversation with Gen. Khalid Kidwai,", p. 5.

Through centralized peacetime control, Pakistan's military has consolidated its control over nuclear forces and developed measures to protect against broader domestic threats to Pakistan's arsenal. Given the persistent threat posed by a proximate and conventionally superior India, however, Pakistan also plans to delegate nuclear use capability early in a crisis to lower the nuclear threshold and deter conventional Indian aggression. As this section demonstrates, Pakistan's employment of conditional command and control systems demonstrates the utility of my conceptual framework and supports the empirical prediction of my theoretical framework.

United Kingdom: Delegative Control

The United Kingdom has employed delegative command and control systems throughout its nuclear history. This project focuses exclusively on the United Kingdom's independent nuclear command and control arrangements to allow for a more direct comparison of the United Kingdom to other cases and control for the potential influence of alliance dynamics. In addition to its contributions to the North Atlantic Treaty Organization's (NATO) nuclear command structure,[148] Britain has also emphasized the importance of maintaining an independent nuclear capability to protect its strategic interests.[149] As a result, the United Kingdom possesses two parallel chains of nuclear command and control: one for NATO forces and a second for national purposes.[150]

The history of Britain's independent nuclear capabilities can be divided into two phases. First, Britain relied upon air-delivery systems from 1956 to 1969 for its strategic nuclear deterrent

[148] On U.S.-UK nuclear cooperation, see Gregory, *Nuclear Command and Control in NATO*, pp. 103-129.
[149] Lawrence Freedman, "British Nuclear Targeting," *Defense Analysis*, Vol. 1, No. 2 (June 1985), p. 84; John Simpson and Jenny Nielsen, "The United Kingdom," in Hans Born, Bates Gill, and Heiner Hänggi, eds., *Governing the Bomb: Civilian Control and Democratic Accountability of Nuclear Weapons* (Oxford: Oxford University Press, 2010), p. 77.
[150] Gregory, *Nuclear Command and Control in NATO*, p. 121.

after forming its "V-bomber" squadrons of Valiant and Vulcan bombers.[151] Second, from 1969 to present the United Kingdom has relied upon nuclear-armed submarines (SSBNs) conducting continuous at-sea deterrent patrols to maintain its independent nuclear capabilities.[152] Britain's Vanguard-class SSBNs are now the only operational delivery platform in the United Kingdom's nuclear arsenal.[153]

Britain exercised delegative control over its air-delivered nuclear weapons during the first phase of its nuclear weapons program. Administratively, civilian leaders predelegated *de facto* nuclear use capability to Bomber Command during peacetime.[154] The chief of air staff could mobilize the bomber force, at which point the bombers would either conduct a strike or proceed to a holding area to await further instructions from Bomber Command.[155] Physically, RAF operators possessed all weapons components required to conduct a nuclear attack. The RAF stored fissile cores and weapons casings in two separate compounds, with fissile cores maintained in a special locked container to prevent unauthorized access.[156] Technically, the RAF's nuclear weapons were free from any electronic controls.[157] In practice, these measures enabled lower-level RAF commanders to mobilize and deploy nuclear weapons without receiving explicit authorization from the prime minister.[158]

---

[151] Freedman, "British Nuclear Targeting," p. 85.
[152] Michael Clarke, "Does My Bomb Look Big in This? Britain's Nuclear Choices after Trident," *International Affairs*, Vol. 80, No. 1 (January 2004), p. 50.
[153] Robert S. Norris and Hans M. Kristensen, "The British Nuclear Stockpile, 1953-2013," *Bulletin of the Atomic Scientists*, Vol. 69, No. 4 (July/August 2013), pp. 70-72.
[154] Jeffrey G. Lewis and Bruno Tertrais, "The Finger on the Button: The Authority to Use Nuclear Weapons in Nuclear-Armed States," Occasional Paper No. 45 (Monterey, C.A.: James Martin Center for Nonproliferation Studies, February 2019), p. 14.
[155] Stephen Twigge and Len Scott, "Learning to Love the Bomb: The Command and Control of British Nuclear Forces, 1953-1964," *Journal of Strategic Studies*, Vol. 22, No. 1 (March 1999), pp. 36, 39.
[156] Ibid., pp. 33-34.
[157] Gregory, *Nuclear Command and Control in NATO*, p. 128; Twigge and Scott, "Learning to Love the Bomb," p. 45.
[158] Twigge and Scott, "Learning to Love the Bomb," p. 45.

The United Kingdom has maintained delegative command and control procedures since transitioning to continuous at-sea deterrent patrols. Administratively, official doctrine states that "Only the Prime Minister can authorize the use of nuclear weapons, which ensures that political control is maintained at all times."[159] In practice, however, the ability to use nuclear weapons remains predelegated to SSBN commanders during peacetime.[160] Upon assuming office, each prime minister writes a "letter of last resort" that is held in a safe aboard each SSBN. This letter provides instructions to the SSBN commander if case the SSBN cannot communicate with political leadership. Through these letters, SSBN crews possess the administrative capability to autonomously conduct a nuclear launch.[161] Physically, the Royal Navy possesses all necessary components to launch nuclear weapons at all times while conducting patrols.[162] Technically, SLBMs remain unconstrained by use-control technologies. A statement by the UK Ministry of Defense clearly shows this point, arguing that "The number of participants required to act in concert means that the 'Permissive Action Link' type safeguards found in other systems are not relevant in the SSBN domain."[163] Combined, these measures illustrate Britain's continued reliance on delegative control over its nuclear forces.

Conventional Security and Domestic Stability

The military standoff between NATO countries and the Soviet Union served as the defining feature of Britain's conventional threat environment during the Cold War. As Britain's nuclear arsenal

[159] HM Government, "National Security Strategy and Strategic Defense and Security Review 2015: A Secure and Prosperous United Kingdom," (London: Crown, 2015), p. 34.
[160] Simpson and Nielsen, "The United Kingdom," pp. 84-85.
[161] For an overview of the full launch process, see Gregory, *Nuclear Command and Control in NATO*, p. 118.
[162] John Gower, "United Kingdom: Nuclear Weapon Command, Control, and Communications," NAPSNet Special Reports, September 12, 2019.
[163] UK Ministry of Defense, "Nuclear Weapons Security – MoD Statement," November 17, 2007.

became operational, many analysts suggested that the Soviet Union had upwards of a 10:1 numerical advantage over NATO in conventional military forces.[164] Subsequent analyses provided more optimistic assessments of NATO's relative conventional capabilities as analysts paid greater attention to geographical constraints on offensive operations and qualitative differences between Soviet and NATO forces,[165] but concerns regarding NATO's ability to defend against a Soviet invasion of Western Europe remained Britain's primary conventional military concern for the duration of the Cold War.[166]

Despite the threat of Soviet forces to Western Europe, however, the United Kingdom's homeland remained conventionally secure from immediate territorial threats throughout the Cold War.[167] British policymakers undoubtedly viewed the Soviet Union as an adversary with hostile intentions, but NATO forces in Western Europe and the geographical buffer of the English Channel provided protection against a rapid military defeat.[168] Furthermore, deficiencies in communications and logistics suggested that a Soviet advance across Western Europe would be "slow and ponderous," thereby providing the United Kingdom with time to mobilize its forces in response to a Soviet attack.[169] Indeed, British policymakers incorporated these advantages in their defense planning. Britain's 1952 Global Strategy Paper emphasized the utility of land and air

[164] For a summary of perspectives during this period, see Richard A. Bitzinger, *Assessing the Conventional Balance in Europe, 1945-1975* (Santa Monica, C.A.: RAND, 1989), pp. 3-12.
[165] Ibid., pp. 13-32.
[166] Ibid., pp. 24-32. Also see Richard K. Betts, "Surprise Attack NATO's Political Vulnerability," *International Security*, Vol. 5, No. 4 (Spring 1981), pp. 117-149; John J. Mearsheimer, "Why the Soviets Can't Win Quickly in Central Europe," *International Security*, Vol. 7, No. 1 (Summer 1982), pp. 3-39; and Barry R. Posen, "Measuring the European Conventional Balance: Coping with Complexity in Threat Assessment," *International Security*, Vol. 9, No. 3 (Winter 1984/85), pp. 47-88.
[167] Bell, "Nuclear Opportunism," p. 20.
[168] Bell, "Beyond Emboldenment," p. 103; Sebastian Rosato, *Europe United: Power Politics and the Making of the European Community* (Ithaca, N.Y.: Cornell University Press, 2011), pp. 83-87.
[169] C. J. Bartlett, *The Long Retreat: A Short History of British Defense Policy, 1945-70* (London: Macmillan, 1972), p. 59.

forces to make any Soviet advance across Western Europe "slow and difficult,"[170] while Britain's maritime strategy "relied on geography and a strong navy to buy sufficient time to mobilize against an attacking force."[171] The combination of geographic depth and conventional NATO forces ameliorated Britain's conventional threat environment and allowed Britain to use its nuclear arsenal for strategic deterrence, rather than lowering the nuclear threshold to deter a conventional attack on the British homeland.

Domestically, Britain has experienced high levels of political regime stability throughout its nuclear history. The greatest internal challenges facing British policymakers during the early stages of its nuclear weapons program were demands for self-determination by British colonies, rather than direct threats to the existence of Britain's domestic political regime.[172] The combined absence of a proximate and conventionally superior adversary and longstanding domestic stability have enabled civil-military relations to shape Britain's nuclear command and control systems.

HIGH MILITARY ORGANIZATIONAL AUTONOMY

High levels of military organizational autonomy explain the development and persistence of delegative nuclear command and control systems in the United Kingdom. Military organizations have traditionally enjoyed significant autonomy in conventional defense planning and civilian leaders have granted similar levels of autonomy to military organizations in nuclear planning,

[170] John Baylis and Alan Macmillan, "The British Global Strategy Paper of 1952," *Journal of Strategic Studies*, Vol. 16, No. 2 (June 1993), p. 213.
[171] William P. Snyder, *The Politics of British Defense Policy, 1945-1962* (Columbus, O.H.: Ohio State University Press, 1964), p. 23.
[172] Mark Stephen Bell, "Nuclear Weapons and Foreign Policy," Ph.D. dissertation, Massachusetts Institute of Technology, 2016, p. 97; John Darwin, *The Empire Project: The Rise and Fall of the British World-System, 1830-1970* (Cambridge: Cambridge University Press, 2009), p. 574.

thereby allowing military actors to promote delegative command and control systems in accordance with their organizational preferences.

British civil-military relations are characterized by high levels of military organizational autonomy. Civilian policymakers have historically viewed political and military matters as distinct policy realms and granted control over operational planning to the armed forces.[173] Civilian leaders determine the nation's overarching political priorities and decide what proportion of the national budget is allocated for defense purposes,[174] while military leaders advise policymakers on how to administer those resources and autonomously develop military doctrine in support of political goals.[175] Military advice also carries significant weight in Britain's political sphere, thereby granting military organizations greater control over internal affairs and influence in political debates.[176]

The evolution of Britain's civil-military institutions during the nuclear era have continually reinforced the military's organizational autonomy. The Defense Committee established under Prime Minister Clement Atlee in 1946 provided the military with direct access to senior cabinet members, including the prime minister.[177] Prime Minister Anthony Eden's government appointed a chairman to the Chiefs of Staff Committee in 1955 and later elevated this position to chief of defense staff.[178] The chief of defense staff thereby became the most senior military advisor to the minister of defense, but the service chiefs also remained prominent in the Defense Committee. The

[173] Daniel Korski, "British Civil-Military Integration: The History and Next Steps," *RUSI Journal*, Vol. 154, No. 6 (December 2009), pp. 14-24.
[174] John Slessor, "British Defense Policy," *Foreign Affairs*, Vol. 35, No. 4 (July 1957), p. 555.
[175] Korski, "British Civil-Military Integration," p. 15.
[176] Lawrence Freedman, "On Military Advice," *RUSI Journal*, Vol. 162, No. 3 (June/July 2017), pp. 12-18; John Kiszely, "The Political-Military Dynamic in the Conduct of Strategy," *Journal of Strategic Studies*, Vol. 42, No. 2 (February 2019), p. 236.
[177] Bartlett, *The Long Retreat*, p. 40.
[178] Ibid., pp. 129-132.

1982 Nott-Lewin defense reforms made the chief of defense staff a strategic advisor to the government, rather than a position designed to present divergent perspectives of the various armed services.[179] The development of the National Security Council in 2010 reduced numerical military representation to only the chief of defense staff, but the various chiefs of staff still retain direct access to the defense minister.[180] The presence of the chief of defense on the National Security Council demonstrates the enduring strategic influence of the United Kingdom's military organizations, as this council has developed guiding documents such as the Strategic Defense and Security Review and the National Security Strategy.[181]

High levels of military organizational autonomy have allowed the military to influence the United Kingdom's command and control decisions from the inception of its nuclear weapons program. In 1948, civilian leaders tasked the chiefs of staff to examine various aspects of integrating nuclear weapons into the armed services. The chiefs of staff established the Herod Committee under the direction of Air Vice Marshal Sir Ralph Cochrane, then the Vice Chief of the Air Staff.[182] The Herod Committee was exclusively staffed by senior military officers who immediately became responsible for the use and management of Britain's emerging nuclear weapons capability.[183] Per the military's suggestion, all nuclear weapons components were placed under RAF custody to enable operational readiness and treated as equivalent to any other military platform, thereby allowing the Air Ministry to manage nuclear weapons with limited civilian involvement in nuclear operations.[184]

---

[179] Hew Strachan, "The Civil-Military 'Gap' in Britain," *Journal of Strategic Studies,* Vol. 26, No. 2 (June 2003), pp. 55-56.
[180] Kiszely, "The Political-Military Dynamic in the Conduct of Strategy," pp. 251-254.
[181] Joe Devanny, "Co-ordinating UK Foreign and Security Policy: The National Security Council," *RUSI Journal*, Vol. 160, No. 6 (December 2015), pp. 20-26.
[182] Twigge and Scott, "Learning to Love the Bomb," p. 32.
[183] Ibid.
[184] Ibid., pp. 33-35.

In 1952, shortly after returning to the office of prime minister, Winston Churchill tasked the British chiefs of staff to reassess the role of nuclear weapons in UK national security.[185] This effort resulted in the 1952 Global Strategy Paper, a highly influential document that crystalized British security priorities in the nuclear era.[186] In this document, the chiefs of staff emphasized the challenges that a nuclear-armed Soviet Union posed to British security and provided the foundations for the military's preference for delegative control.[187] Although the individual services held divergent preferences for responding to the Soviet threat,[188] the chiefs of staff jointly argued that the RAF should have the ability to mobilize nuclear forces before receiving civilian authorization and issued such a command to Bomber Command in 1954.[189] Lingering concerns about ambiguities in the political procedures for nuclear launch authorization later led the chiefs of staff to request a review of these procedures in the early-1960s. This review formalized the prime minister's control over nuclear use authority, but also reinforced delegative control procedures by guaranteeing that military operators retained the ability to use nuclear weapons without higher authorization in the event of political command failures.[190]

The United Kingdom's reliance on sea-based deterrence since 1969 illustrates the continued reliance on delegative control and trust in military operators to simultaneously promote nuclear arsenal reliability, safety, and security. Although some outside observers have previously called for greater civilian oversight of nuclear weapons, members of the Royal Navy have argued that "officers of the Royal Navy as the Senior Service Should be trusted" with unfettered control

[185] Andrew J. Pierre, *Nuclear Politics: The British Experience with an Independent Strategic Force, 1939-1970* (London: Oxford University Press, 1972), p. 87.
[186] Baylis and Macmillan, "The British Global Strategy Paper of 1952," pp. 200-226.
[187] Ibid., pp. 211-213.
[188] Martin S. Navias, *Nuclear Weapons and British Strategic Planning, 1955-1958* (Oxford: Oxford University Press, 1991), pp. 68-98.
[189] Twigge and Scott, "Learning to Love the Bomb," p. 36.
[190] Ibid., pp. 39-42.

over nuclear weapons.[191] Civilian leaders support the Royal Navy in this regard, arguing that the number and reliability of crewmembers required to execute a nuclear launch obviate the need for civilian involvement in control of direct oversight over the Royal Navy's nuclear operations.[192] Over time, the military's influence in doctrinal development and an enduring civilian reliance on the military's organizational professionalism have made delegative control the unquestioned form of British nuclear command and control systems.

Alternative Explanations

The empirical evidence presented in this article offers support for my theoretical framework. The academic literature also provides three alternative explanations for command and control systems in regional nuclear powers that deserve explicit evaluation. In this section I describe the logic, identify the predicted outcomes, and evaluate the empirical record of each explanation.

First, the civil-military stability hypothesis expects military operators to obey political mandates in countries with stable civil-military relations, leading civilians to delegate greater autonomy and arsenal custody to military operators to promote arsenal survivability. Conversely, unstable civil-military relations produce assertive control that prevents domestic rivals from leveraging the political utility of nuclear weapons.[193]

A brief evaluation of this theory in the context of South Asia illustrates significant empirical challenges. This argument expects India's civil-military stability to produce delegative control systems and Pakistan's civil-military volatility to create assertive patterns of nuclear

[191] Meirion Jones, "British Nukes Were Protected by Bike Locks," *Newsnight*, November 15, 2007.
[192] UK Ministry of Defense, "Nuclear Weapons Security – MoD Statement."
[193] Feaver, "Command and Control in Emerging Nuclear Nations," pp. 176-178.

command and control. The theory's predictions are inaccurate in both cases, however, with India adopting highly assertive control procedures and Pakistan employing conditional control. These empirical observations are especially problematic for the civil-military stability hypothesis because the extreme values of civil-military stability generate clear expectations for command and control outcomes and the hypothesis fails to explain a pair of "most-likely" cases.[194] The inability of the civil-military stability hypothesis to explain command and control outcomes in South Asia therefore casts significant doubt on the theory's ability to explain command and control outcomes within the broader population of regional nuclear powers.

Second, the arsenal vulnerability hypothesis argues that states with nuclear arsenals that are vulnerable to preemption or decapitation face challenges to the survivability and responsiveness of their nuclear forces.[195] States with greater arsenal vulnerability experience increased time-urgency—the degree to which a state believes its arsenal must be ready for rapid use—and adopt more delegative command and control frameworks that bolster arsenal reliability.[196] Time-urgency is particularly pronounced in states with small arsenals, limited geographic depth, and nuclear-armed adversaries, as these conditions generate "use them or lose them" pressures on states to safeguard against an adversary's preemptive strike.[197]

The cases discussed in this article show that regional nuclear powers have responded differently to time-urgency pressures, with arsenal vulnerability providing a weak explanation for variation in these responses.[198] India's command and control systems remain assertive despite

[194] Alexander L. George and Andrew Bennett, *Case Studies and Theory Development in the Social Sciences* (Cambridge, M.A.: MIT Press, 2005), p. 121.
[195] Sagan, "The Origins of Military Doctrine and Command and Control Systems," pp. 39-42.
[196] Feaver, "Command and Control in Emerging Nuclear Nations," p. 178.
[197] Ibid.; Sagan, "The Origins of Military Doctrine and Command and Control Systems," pp. 39-40.
[198] Feaver, *Guarding the Guardians*, pp. 149-171.

sharing borders with two states capable of quickly striking Indian forces with nuclear. Pakistan's conditional control arrangements enable early-crisis delegation, but the evidence provided in this project shows that Pakistan has explicitly developed these command and control systems to counter conventional military threats from India, rather than nuclear threats to the survivability of Pakistan's nuclear arsenal. The United Kingdom's vulnerability to Soviet nuclear attacks during the Cold War provides some evidence in support of the arsenal vulnerability hypothesis,[199] but the delegation of nuclear use capability to lower-level military operators preceded political fears that British nuclear forces would be vulnerable to Soviet preemption and remained in place after the collapse of the Soviet Union significantly reduced threats to Britain's arsenal survivability.[200] For these regional nuclear powers, arsenal vulnerability provides little explanatory power.

Third, the strategic rationale hypothesis assigns explanatory power to the strategic motivations underlying a state's nuclear weapons program. At its core, the strategic rationale hypothesis argues that states with nuclear postures that envision early-use capabilities require the delegation authority to peripheral commanders, whereas late-use doctrines permit assertive political control over the arsenal.[201]

The evidence presented in this project provides only limited support for the strategic rationale hypothesis. For example, as expected by the strategic rationale argument, India's late-use posture corresponds to assertive control. A broader evaluation of the cases, however, highlights

[199] The Soviet Union's nuclear arsenal reached a peak of approximately 45,000 warheads by the late-1980s, while Britain only possessed approximately 300 nuclear warheads during this period. Robert S. Norris and Hans M. Kristensen, "Global Nuclear Stockpiles, 1945-2006," *Bulletin of the Atomic Scientists*, Vol. 62, No. 4 (July/August 2006), pp. 65-66.

[200] British policymakers expected V-bombers to remain viable until the mid-1960s, but delegative control procedures allowed the RAF to practice scrambling its bomber force several years beforehand to guarantee that nuclear-armed bombers could be airborne within a four-minute warning period. Freedman, "British Nuclear Targeting," p. 88.

[201] Vipin Narang offers the most explicit presentation of this argument with respect to regional nuclear powers. In his theory, however, command and control systems are treated as a descriptive component of nuclear posture. Narang, *Nuclear Strategy in the Modern Era*, p. 22.

two challenges to the strategic rationale hypothesis. First, although both India and Britain possess late-use nuclear doctrines, India's assertive control measures produce late-crisis delegation, while Britain's delegative control systems entail peacetime delegation. Despite sharing similar late-use doctrines, India and Britain possess drastically different command and control arrangements. Second, although Pakistan's nuclear doctrine entails first-use scenarios, its command and control systems nevertheless emphasize centralized control during peacetime. The strategic rationale perspective cannot explain why an explicit first-use doctrine would rely on command and control systems that wait until a crisis emerges to delegate nuclear use capability rather than adopt fully delegative control measures.

This review of the existing explanations for command and control demonstrates that the extant literature requires renewed attention. Although these explanations offer valuable insights into particular cases, each perspective faces challenges from a variety of empirical considerations. My theoretical framework provides the most complete cross-national explanation of command and control decisions in regional nuclear powers.

Conclusion

This article makes three contributions to the study of command and control in regional nuclear powers. First, I develop a new conceptual typology of nuclear command and control systems. My conceptual framework accounts for *when* political leaders delegate nuclear use capability to lower levels of command—in contrast to existing frameworks that emphasize *whether* such delegation occurs—and specifies how the timing of delegation affects the likelihood of nuclear escalation. Second, I present a theoretical framework that incorporates three variables to explain command

and control systems in regional nuclear powers: the presence of a proximate and conventionally superior adversary, the severity of domestic threats to the political regime, and the level of military organizational autonomy. My framework specifies the conditions under which these variables shape command and control arrangements in regional nuclear powers and resolves the causal indeterminacy inherent to existing theories. Third, I incorporate new empirical material from regional nuclear powers to test the explanatory power of my theory. I employ evidence from India, Pakistan, and the United Kingdom—including extensive original interviews with political and military elites—to develop an empirical basis for evaluating a debate that is primarily built upon deductive foundations.

My research yields two broader implications for U.S. foreign policy. First, my theoretical framework allows policymakers to better anticipate the likely configuration of command and control systems in contemporary nuclear proliferators. By evaluating a regional nuclear power's conventional security environment, levels of domestic political stability, and patterns of civil-military relations, my theory provides a baseline for policymakers to consider when analyzing nuclear strategy and operations in emerging nuclear proliferators. Second, by providing a new conceptual framework for analyzing command and control systems, my project allows policymakers to more accurately assess the potential threats to strategic stability in interactions with regional nuclear powers. Specifically, my conceptual framework identifies potential threats to strategic stability by demonstrating how different command and control frameworks produce distinct pathways through which conventional crises might escalate across the nuclear threshold.

These policy implications inform contemporary assessments of North Korea's nuclear weapons program. Because very little information is currently available on North Korea's command and control arrangements, analysts have primarily relied upon lessons from the Cold

War superpowers to predict the structure of North Korea's emerging command and control systems. The frameworks designed to describe and explain command and control systems in the Cold War superpowers, however, provide indeterminate guidance for how North Korea might resolve the competing pressures on its command and control systems. On the one hand, North Korea's threat environment encourages more delegative control. The combined U.S. and South Korean military forces pose an existential conventional threat to North Korean security and both states have signaled potential interest in conducting regime change in North Korea.[202] On the other hand, the Kim dynasty has historically worried about domestic threats to the family's continued political rule and possesses incentives to employ more assertive control measures that maximize political oversight.[203] Cold War frameworks are indeterminate in this instance because they do not account for how states will develop command and control systems when facing such competing pressures.[204] These frameworks have led analysts to drastically different conclusions regarding the likely nature of nuclear command and control systems in North Korea.[205]

The theoretical and conceptual frameworks that I develop in this article allow researchers to better anticipate the emerging characteristics of North Korea's nuclear command and control systems. Given the presence of a proximate and conventionally superior adversary and domestic threats to regime survival, my theory expects that North Korea likely employs conditional control arrangements that allow the Kim regime to centralize political oversight of nuclear operations

[202] Choe Sang-Hun, "South Korea Plans 'Decapitation Unit' to Try to Scare North's Leaders," *New York Times*, September 12, 2017; Megan Specia and David E. Sanger, "How the 'Libya Model' Became a Sticking Point in North Korea Nuclear Talks," *New York Times*, May 16, 2018.
[203] For examples of the domestic threats facing the Kim regimes over time, see: Daniel Byman and Jennifer Lind, "Pyongyang's Survival Strategy: Tools of Authoritarian Control in North Korea," *International Security*, Vol. 35, No. 1 (Summer 2010), pp. 44-74; Scott Snyder, "North Korea's Challenge of Regime Survival: Internal Problems and Implications for the Future," *Pacific Affairs*, Vol. 73, No. 4 (Winter 2000/01), pp. 517-533.
[204] Narang, *Nuclear Strategy in the Modern Era*, p. 26.
[205] Austin Long, "The Rorschach Test of New Nuclear Powers: Analogies for North Korean Command and Control," *War on the Rocks*, October 6, 2017; Vipin Narang and Ankit Panda, "Command and Control in North Korea: What A Nuclear Launch Might Look Like," *War on the Rocks*, September 15, 2017.

during peacetime, while also enabling the rapid delegation of nuclear use capability early in a crisis. This theoretical prediction is made possible by my conceptual emphasis on the timing of delegation. Whereas existing frameworks are unable to make clear predictions for how North Korea will resolve the competing pressures on its command and control systems, my emphasis on the timing of delegation allows me to make a distinct prediction for North Korean command and control systems that simultaneously accounts for the external incentives for early delegation and domestic incentives for late delegation.

The limited information available on North Korea's nuclear weapons program offers some evidence in support of my theoretical expectation that North Korea is developing conditional command and control systems. Administratively, the chairman of the Workers' Party exercises the final authority over nuclear use decisions. As North Korea's state-run Korean Central News Agency (KCNA) reported, "nuclear weapons can be used only by a final order of the Supreme Commander of the Korean People's Army (KPA)," indicating highly centralized peacetime management.[206] North Korea institutionalized centralized peacetime control in 2012 by creating the Strategic Rocket Forces Command, a military body with equal status to the other KPA services that reports directly to the supreme leader.[207] At the same time, the KCNA emphasizes that nuclear weapons must remain "on standby so as to be fired any moment."[208] Given North Korea's doctrinal emphasis on preemptive strikes,[209] it appears likely that Kim Jong Un would rapidly decentralize

[206] "Law on Consolidating Position of Nuclear Weapons State Adopted," Korean Central News Agency, April 1, 2013.
[207] Andrew O'Neil, "North Korea's Dangerously Rudimentary Nuclear Command-and-Control Systems," *Interpreter*, August 14, 2017.
[208] "Kim Jong Un Guides Test-Fire of New Multiple Launch Rocket System," Korean Central News Agency, March 4, 2016.
[209] Léonie Allard, Mathieu Duchâtel, and François Godement, "Pre-Empting Defeat: In Search of North Korea's Nuclear Doctrine," Policy Brief, European Council on Foreign Relations, 2017, p. 7.

control early in a crisis and delegate nuclear use capability to lower-level commanders.[210] Physically, the Central Military Committee (CMC) of the Workers' Party of Korea likely manages nuclear warheads during peacetime. Once the supreme leader authorizes the release of nuclear weapons, military operators can obtain warheads from the CMC and mount the warheads to their delivery platforms.[211] Technically, no evidence exists to suggest that North Korea employs technical constraints on its nuclear weapons.[212]

North Korea's likely employment of conditional control bears directly on matters of strategic stability between the U.S. and North Korea. Although North Korea seemingly maintains centralized control over its nuclear forces during peacetime, its conventional military inferiority with respect to the combined U.S. and South Korean forces encourages the delegation of nuclear use capability early in a crisis. As a result, actions that the U.S. views as benign attempts to reassure its allies or signal resolve could cause North Korean political elites to proactively prepare their nuclear arsenal for use to prevent a successful decapitation strike. For example, the U.S. may choose to resume the large-scale military exercises with South Korea in the future, but North Korea could view a sudden increase in U.S. military forces in the region as an imminent threat to state security.[213] The delegation of nuclear use capability to lower-level military commanders would reduce the barriers to use, thereby increasing the likelihood of accidental or unauthorized nuclear use. Furthermore, if lower-level commanders elect to prepare their nuclear weapons for deployment, the U.S. would likely detect the mobilization of North Korea's nuclear assets and

[210] Nathan Beauchamp-Mustafaga, "North Korea's Weak Nuclear C2 Challenges Korean Crisis Stability," Pacific Forum Brief No. 22, March 14, 2017.
[211] Myeongguk Cheon, "DPRK's NC3 System," NAPSNet Special Reports, June 6, 2019.
[212] Beauchamp-Mustafaga, "North Korea's Weak Nuclear C2 Challenges Korean Crisis Stability."
[213] Dan Lamothe, "U.S. and South Korea End Military Exercises That Riled North Korea in Favor of Something Smaller," *Washington Post*, March 3, 2019.

view these actions as imminently threatening.[214] As this example illustrates, seemingly benign actions by U.S. policymakers can place pressures on North Korea's conditional command and control systems that increase the likelihood of unwanted nuclear use and crisis escalation.

In sum, this project contributes to the broader literature on nuclear strategy and operations by providing new frameworks for conceptualizing and explaining nuclear command and control systems in regional nuclear powers and by specifying how command and control arrangements affect strategic stability. Future research can build upon this paper's findings by incorporating new data as they become available from countries that currently involve severe data restrictions—such as China and North Korea—to further evaluate the generalizability and limitations of the project. The continued expansion of North Korea's nuclear capabilities and uncertainty regarding Iran's nuclear weapons program suggest that the spread of nuclear weapons is likely to continue in the twenty-first century. Continued advances in the theoretical and empirical study of nuclear operations in regional nuclear powers are therefore essential for scholars and policymakers to promote nuclear security and stability in those countries with nuclear weapons.

[214] On U.S. nuclear detection and surveillance capabilities, see: Owen R. Coté, Jr., "Invisible Nuclear-Armed Submarines, or Transparent Oceans? Are Ballistic Missile Submarines Still the Best Deterrent for the United States?", *Bulletin of the Atomic Scientists*, Vol. 75, No. 1 (January 2019), pp. 30-35; Brendan R. Green and Austin Long, "The MAD Who Wasn't There: Soviet Reactions to the Late Cold War Nuclear Balance," *Security Studies*, Vol. 26, No. 4 (Summer 2017), pp. 606-641; 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; 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 (January 2015), pp. 38-73.