



Upgrading the Bomb: Why and How the US Provides Advanced Nuclear Assistance to Junior Allies

Do Young Lee *

Postdoctoral Fellow, Department of Political Science, University of Oslo, Norway

*Corresponding author. Email: d.y.lee@stv.uio.no

Abstract

Why and how does the US provide advanced nuclear assistance to junior nuclear allies? Existing nuclear literature downplays the possibility that the US strategically employs the technical assistance option as a post-proliferation toolkit to control allied nuclear proliferation. Addressing the first question—why—I argue that the US provides advanced nuclear assistance to junior allies to inhibit the latter’s growing tendency towards unilateralism after nuclear acquisition, meanwhile inducing greater allied nuclear coordination. By forging advanced nuclear partnerships, the US seeks simultaneously to draw junior allies closer to the American nuclear leadership and establish coordinated nuclear strike plans and joint nuclear targeting. Addressing the second question—how—I claim that the US provides advanced nuclear assistance at a protracted pace and in a restricted manner, calculated to exert influence over recipient junior allies for as long as possible. To provide the plausibility probe of my argument, I explore two historical cases: The US’s strategic advanced nuclear assistance to the UK and to France. I conclude by identifying avenues for future study and the policy implications for China’s potential response to North Korea’s nuclear sophistication.

Introduction

Historically, the US has consistently refrained from transferring sensitive nuclear technology to its allies, which would help them develop nuclear weapons.¹ For example, it invariably adopted a policy of opposition to and non-cooperation with the nuclear pursuits of the UK and Israel.² However, after the UK and Israel developed nuclear weapons, the US transferred to them “advanced nuclear technologies,”³ including ballistic missile technology, multiple

¹ Matthew Kroenig, *Exporting the Bomb: Technology Transfer and the Spread of Nuclear Weapons* (Ithaca: Cornell University Press, 2010).

² Margaret Gowing, *Independence and Deterrence: Britain and Atomic Energy, 1945–1952, Vol. 1 Policy Making* (London: Macmillan, 1974), pp. 405–21; Harriet D. Schwar, ed., *Foreign Relations of the United States, 1964–1968, Volume XVIII, Arab-Israeli Dispute, 1964–1967* (Washington: Government Printing Office, 2000), pp. 152–9.

³ As I define the term, “advanced nuclear technologies” consist of the following three categories: (1) *Warhead technologies* that scale up the destructive power of a junior nuclear ally’s nascent low-yield nuclear arsenals (e.g. thermonuclear

re-entry vehicle (MRV) technology, nuclear submarine propulsion, and/or thermonuclear warhead technology.⁴ The imported American nuclear technologies helped the two junior nuclear allies to *upgrade* their fledgling nuclear programmes and strengthen their nuclear capabilities.

The sudden American about-face is puzzling, given the potentially vast costs this move could have incurred. For example, American atomic assistance risked inciting a cascade of nuclear proliferation and international criticism. The US's ostensibly self-contradictory assistance to its allies' *vertical* proliferations could indeed have undermined the country's own non-proliferation efforts in signalling to other (allied) nuclear aspirants that their nuclear drives may eventually be rewarded.⁵ Furthermore, by providing technical aid that strengthened the UK and Israel's nuclear forces, the US risked diminishing its power projection capability over these friendly allies. Superficially, it may seem illogical that the US harbours any concern that its allies could weaken its power projection capability may seem illogical. However, previous studies suggest that nuclear powers possessing a global power projection capability—the US and the Soviet Union—have a considerable incentive to inhibit both their allies' and enemies' acquisition of nuclear armaments because “nuclear proliferation to a state over which one can project military power can constrain one's military freedom of action.”⁶ According to this logic, therefore, the US should have maintained its original disobliging attitude towards the UK and Israel even after they acquired nuclear armaments. Predictably, the UK and Israel's acquisition of more sophisticated and diverse nuclear delivery platforms would significantly improve these countries' power projection and nuclear war-fighting capability. That is to say, these allies would now be able to project nuclear power into regions more distant from their territories, thereby constraining the US's military freedom of action in such regions. More importantly, its junior allies' growing nuclear strength and self-reliant deterrence capabilities could gain them greater autonomy and independence from the US's political influence.⁷ Despite the considerable expected costs of advanced nuclear cooperation, Washington unaccountably helped its junior nuclear allies—the UK, France, and Israel—to proliferate vertically.⁸

Also notable is that the process of advanced nuclear assistance often featured American foot-dragging and capricious flip-flopping. For example, the USA deliberately postponed its transfers of advanced nuclear technology to the UK.⁹ There were, furthermore, instances of

warhead technology); (2) *delivery platform technologies* that enhance the accuracy, range, survivability, and reliability of delivery vehicles that carry nuclear warheads to targeting destinations (e.g. ballistic missiles, bombers, and submarines); and (3) *nuclear-powered propulsion technologies* that improve either nuclear or conventional weapons' mobility and the area of combat operations (e.g. nuclear propulsion submarine technology). By extension, I define “advanced nuclear assistance” or “advanced nuclear transfer” as a state's act of conveying such advanced nuclear technologies to other states through the state-to-state channel. This takes either one of two forms: (1) The transfer of know-how, information, and knowledge about manufacturing advanced nuclear weapons and (2) the transfer of parts (components) or entire weapons as end-products.

⁴ John Baylis, “Exchanging Nuclear Secrets: Laying the Foundations of the Anglo-American Nuclear Relationship,” *Diplomatic History*, Vol. 25, No. 1 (2002), pp. 33–61; “US Helped Israel with H-Bomb—1980s Report Declassified,” *RT*, 13 February, 2015, <https://www.rt.com/usa/232203-us-israel-nuclear-weapon/>; Janet McMahon, “DOD Report Details Israel's Quest for Hydrogen Bomb,” *Courthouse News Service*, 12 February, 2015, <https://www.courthousenews.com/dod-report-details-israels-quest-for-hydrogen-bomb/>.

⁵ Vertical proliferation refers to a nuclear power's quantitative increase in its nuclear stockpile and the qualitative sophistication of its nuclear warheads and delivery vehicles. In this paper, I focus on improvements in the *qualitative* side of existing nuclear forces.

⁶ Kroenig, *Exporting the Bomb*; Matthew Kroenig, “Force or Friendship? Explaining Great Power Nonproliferation Policy,” *Security Studies*, Vol. 23, No. 2 (2014), p. 5.

⁷ Mark Bell, “Beyond Emboldenment: How Acquiring Nuclear Weapons Can Change Foreign Policy,” *International Security*, Vol. 40, No. 1 (2015), pp. 87–119.

⁸ Timothy J. Botti, *The Long Wait: The Forging of the Anglo-American Nuclear Alliance, 1945–1958* (Westport: Greenwood Press, 1987); Richard H. Ullman, “The Covert French Connection,” *Foreign Policy*, No. 75 (1989), pp. 3–33; See “US Helped Israel with H-Bomb”; See McMahon, “DOD Report Details Israel's Quest for Hydrogen Bomb.”

⁹ Details are provided in the case study section, “US Advanced Nuclear Assistance to the UK” further.

Washington cancelling—unilaterally and without a full consultation—the technology transfer promised to London. It is hard to understand why Washington should take unilateral actions that risk an unnecessary intra-alliance conflict. Facing a formidable common nuclear enemy, the Soviet Union, indeed made maintaining a cohesive alliance with its junior nuclear ally imperative for the US at that time.

This puzzling US behaviour raises several questions, which this paper addresses. Why and how does the US help its junior nuclear allies' progress towards greater nuclear sophistication? In generic terms, why and how do senior nuclear allies offer advanced nuclear assistance to their junior nuclear allies? Responding to the first question (why), I argue that the US provides advanced nuclear assistance to its junior nuclear allies to inhibit the latter's growing tendency towards unilateralism while inducing better coordination between the nuclear forces of the US and its junior allies. Simply put, in return for atomic assistance and in line with its national interests, the US's specific aim is to reshape its junior allies' nuclear employment and, ultimately, also their foreign/defence policies. Regarding the second question (how), I claim that the US provides advanced nuclear assistance at a protracted pace and in a restrictive manner. It is an approach calculated to exert influence over a recipient ally's nuclear policies and nuclear strike planning for as long as possible.

This article proceeds as follows. First, I examine the existing literature on nuclear assistance in relation to nuclear proliferation. Second, I present my argument and propose hypotheses that explain the motivation for and method of US advanced nuclear assistance. Third, I introduce alternative explanations of US advanced nuclear assistance. Fourth, I examine two case studies: US advanced nuclear assistance to the UK and to France. Fifth, I evaluate alternative explanations of American advanced nuclear assistance. I conclude by discussing avenues for future research and the policy implications of such research for China's potential response to the growing nuclear sophistication of its junior nuclear ally, North Korea.

Existing Literature on Nuclear Assistance

Traditionally, demand-side studies of nuclear proliferation have focused on the internal and external factors that produce states' pursuit of nuclear weapons, positing that these are key drivers of the spread of nuclear weapons. For instance, such studies identify various factors that lead states to pursue nuclear weapons. These include acute security environment,¹⁰ political and economic considerations,¹¹ international prestige,¹² bureaucratic interests,¹³ and leader characteristics.¹⁴ Demand-side studies, however, cannot fully explain why some aspirants successfully develop nuclear weapons and others do not. Indeed, although a total of twenty-nine states have explored or pursued nuclear weapons for various reasons, only ten states have so far succeeded in developing them.¹⁵ To explain this gap, scholars have in recent years adopted a supply-side approach, which posits

¹⁰ Scott D. Sagan, "Why Do States Build Nuclear Weapons? Three Models in Search of a Bomb," *International Security*, Vol. 21, No. 3 (1996), pp. 54–86.

¹¹ Etel Solingen, *Nuclear Logics: Contrasting Paths in East Asia and the Middle East* (Princeton: Princeton University Press, 2007).

¹² Sagan, "Why Do States Build Nuclear Weapons?"

¹³ *Ibid.*

¹⁴ Jacques E. C. Hymans, *The Psychology of Nuclear Proliferation: Identity, Emotions and Foreign Policy* (Cambridge: Cambridge University Press, 2006).

¹⁵ For a full list of the twenty-nine states, see Vipin Narang, "Strategies of Nuclear Proliferation: How States Pursue the Bomb," *International Security*, Vol. 41, No. 3 (2017), p. 134. The ten states are South Africa and nine states that have nuclear arms today (China, France, India, Israel, North Korea, Pakistan, the US, the UK). The number of current nuclear armed states—nine—is much lower than the number previously predicted. See John F. Kennedy, "News Conference 52, 21 March 1963," John F. Kennedy Presidential Library, <https://www.jfklibrary.org/archives/other-resources/john-f-kennedy-press-conferences/news-conference-52>.

that the odds of becoming nuclear armed hinge on the opportunity to receive external nuclear assistance and gain access to nuclear materials/technology.¹⁶ Simply put, “the availability of international nuclear assistance” is an additional crucial factor of nuclear proliferation.¹⁷

Notably, the bulk of studies adopting a supply-side approach examine why and to whom capable nuclear suppliers provide their civilian and sensitive nuclear assistance.¹⁸ They also examine whether such diverse forms of technical assistance increase the odds of non-nuclear recipients’ *horizontal* nuclear proliferation.¹⁹ Such studies suggest that nuclear assistance is a viable option for existing nuclear powers as a response to the nuclear pursuits of other states. Also notable is that these studies focus exclusively on states’ atomic assistance to *non-nuclear* allies, which happens *before* the latter acquires nuclear weapons. Surprisingly, however, the existing nuclear literature downplays the possibility that states may also employ the assistance option as a *post*-proliferation toolkit to *manage* new nuclear proliferations. Although some studies do explore the US’s response to new proliferations, their analyses are confined to US *stick* policy post-proliferation options (e.g. diplomatic coercion/condemnation, economic sanctions, and military options), which are designed to roll back new proliferators’ nascent nuclear arsenals.²⁰ In addition, some scholars have examined the US’s persistent efforts in cases where Washington’s initial non-proliferation efforts failed, to limit the negative consequences of nuclear proliferations (e.g. by preventing nuclear testing and public declarations of nuclear acquisition, weaponisation, and transfer of sensitive materials).²¹ However, this study contains only part of the history. As explored here, the US has sometimes dealt strategically with new proliferators by offering them advanced nuclear technology. Providing rewards for new proliferators may sound illogical. However, as Peter Feaver and Emerson Niou formally demonstrate, providing technical aid is a rational choice when it allows the US successfully to manage new proliferations.²² Yet, advanced nuclear assistance, despite its theoretical and empirical importance, has yet to receive scholarly attention. This study is the first to examine why and how the US has provided advanced nuclear assistance to its nuclear allies. Thus, it enriches our understanding of nuclear proliferation and offers a fuller picture of nuclear technology transfers.

¹⁶ For example, see Kroenig, *Exporting the Bomb*; Matthew Kroenig, “Exporting the Bomb: Why States Provide Sensitive Nuclear Assistance,” *American Political Science Review*, Vol. 103, No. 1 (2009), pp. 113–33; Erik Gartzke and Matthew Kroenig, “A Strategic Approach to Nuclear Proliferation,” *Journal of Conflict Resolution*, Vol. 53, No. 2 (2009), pp. 151–60; Matthew Fuhrmann, “Taking a Walk on the Supply Side: The Determinants of Civilian Nuclear Cooperation,” *Journal of Conflict Resolution*, Vol. 53, No. 2 (2009), pp. 181–208; Matthew Fuhrmann, *Atomic Assistance: How “Atoms for Peace” Programs Cause Nuclear Insecurity* (Ithaca: Cornell University Press, 2012); Eliza Gheorghe, “Proliferation and the Logic of the Nuclear Market,” *International Security*, Vol. 43, No. 4 (2019), pp. 88–127.

¹⁷ Nuno P. Monteiro and Alexander Debs, “The Strategic Logic of Nuclear Proliferation,” *International Security*, Vol. 39, No. 2 (2014), pp. 7–51.

¹⁸ Kroenig, *Exporting the Bomb*; Kroenig, “Exporting the Bomb”; Fuhrmann, *Atomic Assistance*; Fuhrmann, “Taking a Walk on the Supply Side.”

¹⁹ For example, see Fuhrmann, “Taking a Walk on the Supply Side”; Nicholas L. Miller, “Why Nuclear Energy Rarely Leads to Proliferation,” *International Security*, Vol. 42, No. 2 (2017), pp. 40–77; Rebecca Davis Gibbons, “Supply to Deny: The Benefits of Nuclear Assistance for Nuclear Nonproliferation,” *Journal of Global Security Studies*, Vol. 5, No. 2 (2020), pp. 282–98.

²⁰ For example, see Daniel Morrow and Michael Carriere, “Impacts of the 1998 Sanctions on India and Pakistan,” *The Nonproliferation Review*, Vol. 6, No. 4 (1999), pp. 1–16; Peter Liberman, “The Rise and Fall of the South African Bomb,” *International Security*, Vol. 26, No. 2 (2001), pp. 45–86; Victor Cha, “Giving North Korea a ‘Bloody Nose’ Carries a Huge Risk to Americans,” *The Washington Post*, 30 January, 2018, https://www.washingtonpost.com/opinions/victor-cha-giving-north-korea-a-bloody-nose-carries-a-huge-risk-to-americans/2018/01/30/43981c94-05f7-11e8-8777-2a059f168dd2_story.html.

²¹ Or Rabinowitz and Nicholas L. Miller, “Keeping the Bombs in the Basement: U.S. Nonproliferation Policy toward Israel, South Africa, and Pakistan,” *International Security*, Vol. 40, No. 1 (2015), pp. 47–86.

²² Peter D. Feaver and Emerson M. S. Niou, “Managing Nuclear Proliferation: Condemn, Strike, or Assist?” *International Studies Quarterly*, Vol. 40, No. 2 (1996), pp. 209–33.

The Argument

I now unpack my argument. First, I demonstrate why the US provides advanced nuclear assistance to its junior nuclear allies. I then explain how the US provides such assistance.²³

Motivation

I argue that the US provides advanced nuclear assistance to inhibit a junior nuclear ally's independence of the US, which generally occurs after the ally's nuclear acquisition or—more precisely, acquisition of a minimum deterrence capability. By forging a sustained technology partnership with the new proliferator, the US seeks to rebuild the security ties with it that became strained due to Washington's disapproving posture towards the junior ally's nuclear pursuit. Use of such a technical instrument is also intended to reshape the junior ally's nuclear deterrence/defence strategy and military/foreign policies so as to bring them into line with US national interests. Simply put, the US provides advanced nuclear assistance in the expectation that it will lay foundation for a deeper allied coordination and synchronisation between the two countries in the nuclear and security fields.

To illustrate, being a non-nuclear client gives a junior ally the incentive to rely on the US security umbrella as security against external threats.²⁴ In return, this explicitly asymmetric alliance gains the US significant leverage over a junior ally's behaviour.²⁵ Therefore, Washington has considerable power to wield in inhibiting independent and/or unilateral movements on the part of the ally which run counter to US national interests. The immense security gains afforded by the US nuclear umbrella, however, incentivise a junior ally's maintenance of a united front with the US, albeit at the expense of its autonomy. However, not all junior allies are satisfied with their non-nuclear status under the US security umbrella. Junior allies may pursue their own nuclear weapons for wide-ranging reasons. These include the waning credibility of US security guarantees, a worsening security environment, domestic political values, and the symbolic value of nuclear acquisition.²⁶ In any event, acquiring indigenous nuclear weapons reduces a junior ally's reliance on the US security umbrella.²⁷ However, as Mark Bell astutely observes, a new allied proliferator is unlikely to act independently of the US's wishes *immediately* after crossing the nuclear threshold. This is because, until the new proliferator develops a *minimum deterrence* capability, the US security umbrella remains indispensable to ensuring its security.²⁸ Only then will the junior nuclear ally have the capability to deliver nuclear warheads to a far-flung foe that inflicts on it “the lowest level of damage necessary to prevent attack.”²⁹ This implies that a junior ally's

²³ In this paper, allies refer to both formal allies (i.e., treaty-based) and informal allies (i.e., non-treaty-based). More detailed definition of the two notions is provided in [Online Appendix](#).

²⁴ Mark S. Bell, *Nuclear Reactions: How Nuclear-Armed States Behave* (Ithaca: Cornell University Press, 2021), p. 16. For further details on various extended deterrence arrangements, see Do Young Lee, “Strategies of Extended Deterrence: How States Provide the Security Umbrella,” *Security Studies*, Vol. 30, No. 5 (2021), pp. 761–96; Joshua Byun and Do Young Lee, “The Case Against Nuclear Sharing in East Asia,” *The Washington Quarterly*, Vol. 44, No. 4 (2021), pp. 67–87.

²⁵ James D. Morrow, “Alliances and Asymmetry: An Alternative to the Capability Aggregation Model of Alliances,” *American Journal of Political Science*, Vol. 35, No. 4 (1991), pp. 904–33.

²⁶ Sagan, “Why Do States Build Nuclear Weapons?”

²⁷ Jasen J. Castillo and Alexander B. Downes, “Loyalty, Hedging, or Exit: How Weaker Alliance Partners Respond to the Rise of New Threats,” *Journal of Strategic Studies*, forthcoming (2020), p. 16.

²⁸ Regarding this point in the case of the UK's nuclear armament, see Bell, “Beyond Emboldenment,” pp. 101–3.

²⁹ Quoted in M. Taylor Fravel and Evan S. Medeiros, “China's Search for Assured Retaliation: The Evolution of Chinese Nuclear Strategy and Force Structure,” *International Security*, Vol. 35, No. 2 (2011), p. 50. Similarly, Kier Lieber and Daryl Press identify operational nuclear weapons (e.g. strategic bombers and ballistic missiles) “with sufficient range to reach a potential attacker's territory” as a key element of a minimum deterrence capability. See Keir A. Lieber and Daryl G. Press, *The Myth of the Nuclear Revolution: Power Politics in the Atomic Age* (Ithaca: Cornell University Press, 2020), p. 37.

nuclear acquisition does not immediately deprive the US of its existing leverage over the former.

The sophistication of a new allied proliferator's nuclear weaponry considerably exacerbates the US's predicament, that is to say, as its nuclear clock relentlessly advances over time. Specifically, once a junior ally secures a minimum deterrence capability—thus making possible its independent launch of a nuclear retaliatory attack on the enemy's territory—it tends to display more steadfastly aggressive behaviour towards the enemy.³⁰ More importantly, the junior ally's improved nuclear deterrence capability gains its greater independence of the US within the alliance.³¹ As the senior ally's protection is no longer imperative, a junior ally is less inclined to compromise its goals in return for protection. Consequently, the junior ally's actions become more contrary to US national interests, thus creating persistent within-alliance conflicts. In the worst-case scenario, an ebullient junior ally's unilateralism may drag the US into an unwanted (nuclear) war that has no bearing on the latter's core interests.³² The widening chasm between the two sides, meanwhile, weakens the alliance's aggregated power and robust deterrence against the common enemy.³³ The expansion and diversification of an ally's nuclear arsenals and delivery platforms, moreover, could adversely affect the US's strategic nuclear forces. For example, a junior ally could proactively adopt and utilise its intensifying nuclear forces for deterrence and defence missions. Generally speaking, upon achieving nuclear sophistication, a country tends to develop and adopt an independent nuclear strategy and nuclear operational planning optimised for its particular nuclear forces. Given this dynamic within the US alliance, the growing sophistication of a junior ally's nuclear weaponry implies an ever greater likelihood that its nuclear strike and war-fighting planning will conflict with those of the US. Such a nuclear disjuncture could weaken the alliance's peacetime nuclear deterrence and impede effective joint military operations, due, for example, to duplication and/or omission of nuclear targeting, the risk of an allied fratricide attack, the absence of joint operational planning, or poor interoperability and communication.³⁴

For the US, the fundamental solution is either the complete denuclearisation or significant reverse of a junior ally's nuclear programme. However, having acquired more powerful and sophisticated nuclear weapons, and given that they are the fruits of persistent, long-term efforts, not to mention input of considerable resources, that a junior ally would voluntarily abandon them is highly unlikely. To reverse a junior ally's nuclear acquisition, the US might consider a stick policy (e.g. diplomatic condemnation or economic sanctions). However, such an approach is likely to be futile, as is the coercive approach, which could also backfire, prompting at best the junior ally's further estrangement from the US and at worst its détente and realignment with an enemy.³⁵ Under this circumstance, advanced nuclear assistance may be a wise post-proliferation strategy: Strategic employment of nuclear assistance to induce the ally to re-establish close ties and reshape its security and nuclear policies to bring them into line with those of the US.

In light of this motive, one might wonder why the US does not provide nuclear assistance immediately after a junior ally's nuclear acquisition, rather than after that ally has secured a

³⁰ Bell, "Beyond Emboldenment."

³¹ Ibid.

³² Francis J. Gavin, "Strategies of Inhibition: U.S. Grand Strategy, the Nuclear Revolution, and Nonproliferation," *International Security*, Vol. 40, No. 1 (2015), p. 21; Eliza Gheorghe, "Balance of Power Redux: Nuclear Alliances and the Logic of Extended Deterrence," *The Chinese Journal of International Politics*, Vol. 15, No. 1 (2022), pp. 90–5.

³³ Ole R. Holsti, P. Terrence Hopmann, and John D. Sullivan, *Unity and Disintegration in International Alliances: Comparative Studies* (New York: John Wiley & Sons, Inc., 1973); Thomas J. Christensen, *Worse than a Monolith: Alliance Politics and Problems of Coercive Diplomacy in Asia* (Princeton: Princeton University Press, 2011).

³⁴ For details of the problem of fratricide, see 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 (2017), pp. 21–2.

³⁵ A military strike is not regarded as a credible and therefore feasible option to deal with an ally's nuclear proliferations. See Feaver and Niou, "Managing Nuclear Proliferation," p. 215.

minimum deterrence capability. That is to say, proactive nuclear assistance might allow the US to nip a new allied proliferator's unilateralism in the bud. However, this approach may be extremely costly. The hasty use of positive inducements, namely, technical assistance, could send the unintended message to other allied nuclear aspirants that their nuclear ambitions may soon also be fulfilled, thus precipitating a cascade of nuclear proliferation. For this reason, the US initially refrains from nuclear assistance, rather distancing itself from the ally's nascent nuclear arsenal for the time being.³⁶

Another question that arises about the timing of nuclear assistance is: Why does the US employ a minimum deterrence capability as a key threshold for nuclear assistance instead of a *second-strike capability*—also an often-mentioned requirement of nuclear deterrence? In other words, a junior ally may be emboldened when it “ensure[s] that some portion of the force would almost certainly survive an enemy first strike” and not when “it is merely possible or plausible.”³⁷ In essence, this relates to the question of exactly how much nuclear capability states need to deter aggression, one that has sparked heated academic debate, but weighing in on it is beyond the scope of this research.³⁸ It is notable, however, that scholars engaging in the debate are generally agreed that developing a second-strike capability requires more time and resources than does a minimum deterrence capability.³⁹ Given this point on the continuum of nuclear sophistication, the two capabilities are not alternatives to one another but rather in a relationship where one precedes the other. In this sense, it is rational to conclude that although securing a minimum deterrence capability initiates a junior ally's unilateral acts, obtaining a second-strike capability accelerates that ally's unilateralism from creeping to rampant. That is, once a junior ally gains possession of a second-strike capability, it may be too late for the US to rein it in with the carrot of nuclear assistance.⁴⁰

How, then, does advanced nuclear assistance empower the US achievement of its desired result? Fundamentally, the act of sharing advanced nuclear knowledge is a costly behaviour. The US domestic laws and export control regulations strictly prohibit the transfer to other countries, close allies included, of advanced nuclear technology. Thus, the US government must go through multiple strict executive and legislative review processes to obtain the domestic approvals necessary for technology transfers.⁴¹ Importantly, as they contain highly sensitive military knowledge directly associated with the US national security, advanced nuclear technologies are subject to far more stringent and rigorous investigation processes than are civilian and sensitive nuclear ones. Convincing a myriad of domestic investigation agencies that the proposed nuclear assistance is integral to serving the US national interests, therefore, requires much time and effort.⁴² Indeed, any attempt by the US government to circumvent the rigid domestic review process and secretly provide atomic assistance could trigger a tremendous internal backlash. In other words, the established fact that advanced nuclear assistance entails significant sunk and potential costs is sufficient to convince the junior ally that American leaders are firmly determined and committed to re-establishing

³⁶ For example, in a message sent to UK Prime Minister Macmillan 15 months after France's first nuclear test, President Kennedy wrote: “After careful review of the problem, I have come to the conclusion that it would be undesirable to assist France's efforts to create a nuclear weapons capability. ... If we were now to provide aid to France, and thus signify a major reversal in our opposition to Nth country programs, the likelihood that the [West] German would eventually wish to acquire a nuclear weapons capability would be significantly increased.” See US Department of State, “Department of State Cable 5245 to Embassy United Kingdom, Message from President Kennedy to Prime Minister Macmillan,” 8 May, 1961, Wilson Center Digital Archive [WCDA], <http://digitalarchive.wilsoncenter.org/document/111184>.

³⁷ Liber and Press, *The Myth of the Nuclear Revolution*, p. 37.

³⁸ *Ibid.*, pp. 31–41.

³⁹ *Ibid.*, pp. 36–9.

⁴⁰ This perspective is consistent with Bell's study of nuclear emboldenment in alliance politics, and it is empirically supported by two empirical cases examined here. See Bell, “Beyond Emboldenment.”

⁴¹ Ian F. Fergusson and Paul K. Kerr, “The U.S. Export Control System and the Export Control Reform Initiative,” Congressional Research Service, 28 January, 2020, <https://fas.org/sgp/crs/natsec/R41916.pdf>.

⁴² Eric Ridge, “Completing the Transatlantic Nuclear Bridge: A U.S. View,” in Jenifer Mackby and Paul Cornish, eds., *U.S.-UK Nuclear Cooperation after 50 Years* (Washington: CSIS Press, 2008), pp. 60–71.

close security ties. The “costly signal” of resolve thus reassures the junior ally that the US will not exploit (and thereby endanger) the nuclear partnership, thus leading that ally to forge a solid advanced nuclear alliance with the US.⁴³

Advanced nuclear assistance, moreover, generates the concomitant necessity for tight-knit communication and interaction between the two sides through diverse channels—ranging from top leaders, to the ministerial level, to diverse working-level groups (senior/junior officers, military officials, scientists, and engineers).⁴⁴ These multilayered interactions set the stage for coordination by enabling each side to understand the other’s points of view and to mediate any differences in their national preferences. Notably, advanced nuclear assistance entails exchanges between a donor and a recipient of highly sensitive information on nuclear weapons. For the US to provide tailor-made assistance, therefore, the junior ally must first provide details about its nuclear weapon systems and the technical problems it faces, and the US, too, must be transparent about the details of its sophisticated technology. Exchanging and sharing advanced nuclear secrets, therefore, cultivates a high level of mutual trust and establishes a strong rapport between allies.⁴⁵ This special relationship lays the foundations for greater alliance coordination and synchronisation when it comes to broader security issues, such as tactical/strategic nuclear operations planning and targeting doctrines, as well as general diplomacy and military matters. That is to say, the US atomic assistance generates spillover effects into diverse security matters beyond technical cooperation issues *per se*.

The process of advanced nuclear transfer takes the shape of a multiple-round game, rather than a single-shot game. Advanced nuclear technology encompasses a conglomeration of advanced technologies and high-quality human resources from a wide array of disciplines, including nuclear engineering, microelectronics, electronic communications, and computer science.⁴⁶ Owing to its highly elaborated and sophisticated nature, transmitting advanced nuclear technology to a recipient is no simple matter; the two sides must meet on a regular and continuous basis to define, analyse, and evaluate the scope, progress, and outcome of the technology transfer. For example, detailed *ex-ante* assessments must be undertaken of the current development level of the ally’s nuclear weapons, followed by *ex-post* evaluations of whether or not transferred technologies work normally in a junior ally’s weapon systems.⁴⁷ Once begun, advanced nuclear assistance is unlikely to end as a one-time event, rather generating a series of follow-up assistance operations that reflect an ongoing need for maintenance, optimisation, replacement, and/or upgrade of the transferred nuclear technology. Accordingly, advanced nuclear assistance *routinises* interactions and collaborations between allies. Such habits of cooperation and institutionalised behavioural regularities provide ample opportunities to foster agreement and obviate discord, thereby improving allied coordination.⁴⁸ Thus, through atomic assistance, the US induces actions

⁴³ James D. Fearon, “Signaling Foreign Policy Interests: Tying Hands Versus Sinking Costs,” *Journal of Conflict Resolution*, Vol. 41, No. 1 (1997), pp. 68–90; Andrew Kydd, “Trust, Reassurance, and Cooperation,” *International Organization*, Vol. 54, No. 2 (2000), pp. 325–57.

⁴⁴ For example, see Andrew Priest, “In American Hands: Britain, the United States and the Polaris Nuclear Project 1962–1968,” *Contemporary British History*, Vol. 19, No. 3 (2005), pp. 353–76.

⁴⁵ Nancy L. Collins and Lynn Carol Miller, “Self-Disclosure and Liking: A Meta-Analytic Review,” *Psychological Bulletin*, Vol. 116, No. 3 (1994), pp. 457–75; Michael L. Slepian and Katharine H. Greenaway, “The Benefits and Burdens of Keeping Others’ Secrets,” *Journal of Experimental Social Psychology*, Vol. 78 (2018), pp. 220–32.

⁴⁶ John F. Schank, et al., *Sustaining U.S. Nuclear Submarine Design Capabilities* (Santa Monica: Rand Corporation, 2007); David Vergun, “DOD Taking Measures to Protect Nuclear Weapons, Space Assets,” *DOD News*, 15 September, 2021, <https://www.defense.gov/News/News-Stories/Article/Article/2775364/dod-taking-measures-to-protect-nuclear-weapons-space-assets/>; Frank G. Klotz and Alexandra T. Evans, *Modernizing the U.S. Nuclear Triad: The Rationale for a New Intercontinental Ballistic Missile* (Santa Monica: Rand Corporation, 2022).

⁴⁷ For example, see John Baylis, “The 1958 Anglo-American Mutual Defence Agreement: The Search for Nuclear Interdependence,” *Journal of Strategic Studies*, Vol. 31, No. 3 (2008), pp. 453–4.

⁴⁸ Douglas C. North, *Institutions, Institutional Change and Economic Performance* (New York: Cambridge University Press, 1990); Ted Hopf, “The Logic of Habit in International Relations,” *European Journal of International Relations*,

by the recipient that are consistent with Washington's wishes. These points can be distilled into the following hypothesis.

H1: The US will provide advanced nuclear assistance to inhibit a junior nuclear ally's independent actions while inducing greater allied nuclear coordination.

Method

How does the US go about providing advanced nuclear assistance to a junior nuclear ally? Given the strategic motivation for advanced nuclear assistance, maximal maintenance of the donor–recipient relationship would be highly advantageous for Washington. During the time that the technology partnership continues, the US may continuously exert influence over its junior ally's nuclear manoeuvres and strategies/war planning, thus inducing that ally's long-term and stable adherence to American nuclear leadership. Therefore, the US has significant incentive to purposefully control the pace of advanced nuclear transfer. Rather than offering its advanced technologies to a new nuclear ally all at once, therefore, the US transfers those it has at a protracted pace. Frequent delays and deliberate foot-dragging may hence be expected. If Washington realises that ongoing nuclear collaboration does not and will no longer serve its interests, it may abruptly cancel ongoing or planned technology sharing and backtrack on its prior nuclear collaboration commitments. American flip-flopping further slows the pace of advanced nuclear transfer, making it impossible to proceed with the work on an agreed time schedule. Generally speaking, a sudden American turnaround may entail renegotiation of existing technology transfer plans or the negotiation from scratch of new terms for procuring alternative nuclear platforms. In both cases, the assistance process will probably stall or be delayed.

Next, to prevent the recipient from outpacing or overtaking the senior ally's level of nuclear sophistication, the US will avoid any transfer of its most advanced and/or cutting-edge technologies to the junior ally. The scope of advanced nuclear assistance will be restricted to what the supplier classifies as second- or third-tier technologies, which fall short of state-of-the-art technologies. In essence, technical superiority is a source of US leverage over recipient allies. A junior ally's acquisition from the US of superior nuclear technology and advanced nuclear knowledge functions as a *quid pro quo* for the former's synchronisation with the US nuclear strategy and foreign/military policies. Accordingly, as far as the US is concerned, the recipient's nuclear assets should remain inferior to those of the supplier. This arrangement motivates a junior ally to continue its advanced nuclear cooperation with the US. However, a junior recipient ally that no longer perceives the US as having anything attractive to offer, however, might decide to discontinue the technology partnership. Limiting the scope of advanced nuclear assistance may involve (1) transferring only lower-stage technology or (2) providing less-sophisticated models and variants of the same-stage technology.⁴⁹ This discussion can be distilled into the following hypothesis.

H2: The US will provide advanced nuclear assistance at a protracted pace and in a restricted manner.

Alternative Explanations

As noted in the “Existing Literature on Nuclear Assistance” section, no extant studies provide obvious answers to the question of why and how the USA provides advanced nuclear

Vol. 16, No. 4 (2010), pp. 539–61; Ruike Xu, “Institutionalization, Path Dependence and the Persistence of the Anglo-American Special Relationship,” *International Affairs*, Vol. 92, No. 5 (2016), pp. 1207–28.

⁴⁹ An empirical example of the latter scenario is the US's selective transfer of MRV technology, excluding MIRV technology, to France. This example is explored below in discussion of the France case.

assistance to its junior nuclear allies. Thus, I derive two alternative explanations from relevant studies: (1) The balance-of-power model (BPM) and (2) the inter-hierarchy dynamics model (IDM), that offer alternative accounts of the motivation for and method of US's advanced nuclear assistance.

First, the core claim of the BPM in international politics is that even distribution of power among states promotes stability.⁵⁰ As regards motivation, the BPM would view the US's advanced nuclear assistance as a tool whereby to augment the ally's weak military power vis-à-vis its superior enemy. Therefore, the BPM predicts that the US will provide atomic assistance to redress the unfavourable balance of power, thereby deterring the superior enemy from invading the ally (BPM H1). Next, as regards methods, the scope and pace of American atomic assistance is conditional upon the distribution of power between a junior ally and that ally's enemy. Therefore, the BPM predicts that when the balance of power is tilted towards the enemy, nuclear assistance will be swift and comprehensive, and that when the balance of power is tilted towards the ally, it will be slow and limited (BPM H2).

Second, to explain the politics of nuclear technology sharing, Jeff Colgan and Nick Miller propose what they call the "inter-hierarchy dynamics" model (IDM).⁵¹ The core argument of the IDM is that inter-hierarchy dynamics, or horizontal relations, between rival dominant states powerfully shape intra-hierarchy dynamics, or vertical relations, between dominant and subordinate states. Simply put, the IDM holds that "[w]hen a dominant state [e.g., the US] perceives a strong threat from its rival [e.g., the Soviet Union] linked to a specific issue domain, it is more likely to compete. When a dominant state perceives a strong threat from subordinate states [junior allies] in the system linked to this specific issue domain, it is more likely to cooperate with its rival dominant state(s)."⁵² Applying this argument to the nuclear issue domain, the IDM offers the following set of predictions regarding advanced nuclear assistance. First, on the issue of motivation, the IDM predicts that advanced nuclear assistance is designed to outbid offers by a rival dominant nuclear state (IDM H1). That is to say, when it confronts intense inter-hierarchy nuclear competition, the US utilises atomic assistance as a propaganda tool to curry favour with its new nuclear allies "by providing more benefits than a rival dominant state."⁵³ Second, regarding the method, the IDM predicts swift and comprehensive nuclear assistance when competition dominates inter-hierarchy relations and slow and limited nuclear assistance when cooperation dominates them (IDM H2).

There are, in addition to these two alternative explanations, other factors that provide competing explanations. They include (1) the Cold War, (2) the Nuclear Non-Proliferation Treaty (NPT), (3) whether a given ally is a formal or informal ally, (4) how important a given ally is to the US, and (5) whether a given ally is a major power. These alternatives are described in [Online Appendix](#), which also provides a preliminary analysis of each one.

Research Design and Case Selection

There have, according to my analysis, been five American allied nuclear dyads, comprising the (1) US–UK; (2) US–France; (3) US–Israel; (4) US–India; and (5) US–Pakistan dyads.⁵⁴ The US advanced nuclear assistance occurred in only three of these. To provide the

⁵⁰ Hans J. Morgenthau, *Politics among Nations: The Struggle for Power and Peace* (New York: Knopf, 1948); Kenneth N. Waltz, *Theory of International Politics* (New York: Random House, 1979).

⁵¹ Jeff D. Colgan and Nicholas L. Miller, "Rival Hierarchies and the Origins of Nuclear Technology Sharing," *International Studies Quarterly*, Vol. 63, No. 2 (2019), pp. 310–21.

⁵² *Ibid.*, p. 313.

⁵³ *Ibid.*, p. 310.

⁵⁴ Detailed explanations of how I collected the universe of cases, the summary statistics, and a preliminary analysis of individual cases, which are not examined in this article, are provided in [Online Appendix](#).

plausibility probe of my argument, this paper examines two of the universe of cases—the US–UK and the US–France dyads. This case selection is justifiable for three reasons. First, in choosing the two cases, this study employs what Jason Seawright and John Gerring call the “diverse case” method.⁵⁵ When, as in this study, the study population size is small, choosing one case from each category enhances the representativeness of those selected by securing “maximum variation along relevant dimensions.”⁵⁶ That is to say, the universe of cases can be divided into two groups in regard to the NPT factor: “pre-NPT cases” and “post-NPT cases.” Pundits and analysts have argued that, as an international institution, the NPT has been highly successful in inhibiting the spread among states of nuclear weapons and nuclear technology.⁵⁷ This implies that the regime’s entry into force in 1970 constituted a critical juncture in the US’s transfer of nuclear weapons technology to other states. The US advanced nuclear assistance to the UK and France *began* in two different periods—in the late 1950s (before the establishment of the NPT) and in the early 1970s (after the establishment of the NPT), respectively. Thus, the cases selected are the best representative of a small population.⁵⁸ Second, the two time periods constitute a *tough test* for my arguments.⁵⁹ The influential institutional factor notwithstanding, if the US had behaved consistently, the validity of my claim, in accordance with my argument in both the pre- and post-NPT cases, would increase substantially. Third, the two cases make possible a thorough hypothesis testing due to their far greater abundance, in comparison with the other three cases, of relevant primary and secondary materials.⁶⁰

US Advanced Nuclear Assistance to the UK

Brief Overview of the Era Prior to Anglo-American Advanced Nuclear Cooperation

During the World War II (WWII), both the US and the UK launched national projects to develop a nuclear weapon. Soon thereafter, they started to cooperate by exchanging information about their nuclear programmes. In August 1943, the two states signed the Quebec Agreement, which stipulated that they exchange their resources in order to develop nuclear weapons as quickly as possible.⁶¹ In keeping with this agreement, British scientists were

⁵⁵ 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 (2008), pp. 300–1.

⁵⁶ *Ibid.*, p. 300.

⁵⁷ For example, Joseph S. Nye, “Maintaining a Nonproliferation Regime,” *International Organization*, Vol. 35, No. 1 (1981), pp. 15–38; Andrew J. Coe and Jane Vaynman, “Collusion and the Nuclear Nonproliferation Regime,” *Journal of Politics*, Vol. 77, No. 4 (2015), pp. 983–97.

⁵⁸ An alternative demarcation line between pre- and post-NPT cases is “1 January 1967,” instead of “1 January 1970.” Under the first date, nuclear weapon states were those that produced and detonated a nuclear explosive device before 1967. Because the UK and France detonated their nuclear devices prior to this date and, therefore, prior to the establishment of the NPT, both cases are classified as pre-NPT cases. By contrast, this paper employs “1 January 1970” as the dividing line between pre- and post-NPT cases. Starting in 1970, when the NPT took effect, it substantively regulated signatory states’ behaviours, such as the US’s transfer of nuclear weapons technology to other states. When employing 1970 as a distinction line, a US–France dyad is classified as a post-NPT case. This reflects that the US leadership began to discuss, internally, nuclear assistance to France in late January 1970 at France’s request and consequently that US–France advanced nuclear cooperation started in June 1971. In other words, both events occurred *after* the NPT came into force. See Helmut Sonnenfeldt, “Memorandum from Helmut Sonnenfeldt to Henry A. Kissinger, ‘Memo from Deputy Assistant Secretary of Defense on Assistance to France on Ballistic Missiles,’” WCDA, 23 January, 1970, <https://digitalarchive.wilsoncenter.org/document/110252>. More information about this process is offered further in the France case study, “US Advanced Nuclear Assistance to France.” Additional justifications for the adoption of 1970 as a dividing line are provided in [Online Appendix](#).

⁵⁹ Alexander L. George and Andrew Bennett, *Case Studies and Theory Development in the Social Sciences* (Cambridge: MIT Press, 2005), pp. 120–3.

⁶⁰ Stephen Van Evera, *Guide to Methods for Students of Political Science* (Ithaca: Cornell University Press, 1997), p. 79.

⁶¹ John Baylis, ed., *Anglo-American Relations Since 1939: The Enduring Alliance* (Manchester: Manchester University Press, 1997), p. 8.

allowed to participate in the US's Manhattan Project. In September 1944, the two countries signed the Hyde Park Agreement, which confirmed that nuclear collaboration should continue after the WWII.⁶²

Nuclear cooperation, however, ceased soon after the war ended. The US Congress passed the McMahon Act in 1946 (the Atomic Energy Act of 1946) to prevent "the US from sharing nuclear secrets with other nations, even allies such as the UK."⁶³ The US's decision drew the ire of the British leaders, and the Attlee government decided to develop nuclear weapons independently, which it accomplished in October 1952.⁶⁴ The US maintained a non-cooperative stance towards the British, even after the latter achieved nuclear proliferation. Not satisfied with its nuclearisation, the Churchill government stepped up its efforts to enhance the sophistication of its nascent nuclear weapons. In June 1958, the US Congress amended the McMahon Act to enable the US to share nuclear secrets with the UK. Shortly thereafter, on 3 July 1958, both allies signed the historic US–UK Mutual Defence Agreement (MDA) in Washington, whereby Anglo-American advanced nuclear cooperation officially began.⁶⁵ Starting with the transfer of American nuclear submarine propulsion technology, the US–UK nuclear technology partnership in various areas continues to this day.⁶⁶

Growing UK Independence Backed by Nuclear Sophistication

The UK's nuclear pursuit was, from the start, mainly intended to gain Britain a "seat at the top table" of international negotiations and to be able to "present its own independent deterrent to the Soviet Union to mitigate its reliance on US forces."⁶⁷ However, the UK's nuclear acquisition did not immediately signify its independence of the US. This did not become apparent until 1955—three years after the UK's first nuclear detonation—when "Britain's new Valiant bombers came into service."⁶⁸ The introduction of Valiant bombers demonstrated that London now had the capacity to launch independently a catastrophic retaliatory attack against targets in the Soviet Union; and that it had, in effect, secured a minimum deterrence capability. The UK's independent deterrence capability would soon extend even further. Introduction of the more capable Victor and Vulcan bombers was scheduled in the late 1950s, and the creation of British indigenous hydrogen bombs was imminent.⁶⁹ When the UK's nuclear weapons became capable of serving as a "partial substitute" for the US security umbrella, therefore, the UK acted more independently of its senior ally.⁷⁰

London's unilateral military actions (despite the US opposition) during the Suez crisis of November 1956 exemplified its dramatic shift. Fundamentally speaking, American and British interests in the Middle East differed significantly, largely because the UK had multiple colonies in the region wherefrom it imported significant amounts of oil.⁷¹ Nevertheless, London refrained from acting unilaterally, even though its preferences in the region conflicted

⁶² Ridge, "Completing the Transatlantic Nuclear Bridge," p. 61.

⁶³ Ibid., p. 62.

⁶⁴ "Cooperation, Competition and Testing," The National Archives of the UK, <https://www.nationalarchives.gov.uk/cabinetpapers/themes/co-operation-competition-testing.htm>.

⁶⁵ The full text of the amended McMahon Act (the Atomic Energy Act) is available at <https://www.govinfo.gov/content/pkg/STATUTE-72/pdf/STATUTE-72-Pg276-2.pdf>. The full text of the MDA is available at https://www.cvce.eu/content/publication/2014/6/12/a1ee4c1f-2166-48f3-a886-2711bd647111/publishable_en.pdf.

⁶⁶ John Baylis, *Anglo-American Defence Relations 1939–1980: The Special Relationship* (London: Macmillan, 1981), p. 60. For detailed history of the US–UK nuclear submarine cooperation, see Steve Ludlam, "The Role of Nuclear Submarine Propulsion," in Mackby and Cornish, eds., *U.S.-UK Nuclear Cooperation after 50 Years*, pp. 247–58.

⁶⁷ Bell, *Nuclear Reactions*, pp. 44–6; William Burr, "The British Bomb and the United States - Part One," 13 May, 2021, National Security Archive [NSA], <https://nsarchive.gwu.edu/briefing-book/nuclear-vault/2021-05-13/british-bomb-united-states-part-one>.

⁶⁸ Bell, *Nuclear Reactions*, p. 38.

⁶⁹ Ibid.; Lorna Arnold, *Britain and the H-Bomb* (London: Palgrave, 2001), pp. 151–91, pp. 234–6.

⁷⁰ See Bell, *Nuclear Reactions*, p. 38.

⁷¹ Louise Richardson, *When Allies Differ: Anglo-American Relations during the Suez and Falklands Crises* (New York: St. Martin's Press, 1996).

with those of Washington.⁷² However, London's response to the Suez crisis in Egypt sparked by the Nasser regime's nationalisation of the foreign-owned Suez Canal Company, which occurred after London obtained a minimum deterrence capability against the Soviet Union in 1955, was quite different. Fearing that London's attempt to topple the Nasser regime may incite Soviet military intervention which could trap the US in unwanted (nuclear) warfare, the US firmly opposed Britain's military actions in the region.⁷³ The crisis was peacefully resolved when, under strong US pressure, the UK withdrew its troops from Egypt. However, the Suez crisis made clear to American leaders the need to restrain the UK's growing unilateralism by virtue of its nuclear sophistication.⁷⁴ Washington's response in 1958, therefore, was to provide London with strategic advanced nuclear assistance.

The US's Strategic Motive

Harold Macmillan, the Prime Minister of the UK who spearheaded the negotiations at the time, hailed the signing of the MDA as "the great prize."⁷⁵ Jubilant about the historic milestone, he declared that "Britain's problems in this immensely expensive and complicated area of scientific development of [nuclear] weapons were [are] resolved."⁷⁶ However, the US atomic assistance was driven not merely by an altruistic motive—that of saving the junior ally time and money that would otherwise have been devoted to developing greater nuclear sophistication. It was *more* intended to rein in Britain's political and military independence of the US and induce the coordination of its nuclear weaponry with American nuclear forces.⁷⁷ This motive was reflected in US efforts during the late 1950s to equip British V-bombers with American nuclear weapons, which significantly undermined the UK's independent nuclear deterrent.⁷⁸

However, Washington's strategic motive for atomic assistance became more explicit in the early 1960s, through American leaders' outspoken criticism of the UK's nuclear opportunism and the absence of coordination between the UK and US's nuclear forces. President John F. Kennedy, for example, deplored the British acquisition of an independent nuclear deterrent as an "original sin."⁷⁹ Secretary of Defence under the Kennedy administration Robert McNamara displayed a similar perspective in his speech to the North Atlantic Treaty Organization (NATO) council on 5 May 1962. Directed at British independent nuclear forces, it emphasised the imperativeness of a high degree of coordination in nuclear planning and execution. Secretary McNamara stated:

It is even more important that the Alliance have unity of planning, decision-making, and direction with respect to responses to enemy actions and especially to retaliatory attacks against him. There must not be competing and conflicting strategies in the conduct of nuclear war. We are convinced that a general nuclear war target system is indivisible and if nuclear war should occur, our best hope lies in conducting a centrally controlled campaign

⁷² Bell, *Nuclear Reactions*, pp. 57–63.

⁷³ David A. Nichols, *Eisenhower 1956: The President's Year of Crisis—Suez and the Brink of War* (New York: Simon & Schuster, 2011), p. 244, p. 286.

⁷⁴ Baylis, "Exchanging Nuclear Secrets," p. 39. For further information about the UK's increasing independence of the US, achieved through nuclear sophistication when the Suez crisis occurred, see Bell, *Nuclear Reactions*, pp. 66–73.

⁷⁵ Harold Macmillan, *Riding the Storm, 1956–1959* (London: Macmillan, 1971), p. 323.

⁷⁶ *Ibid.*

⁷⁷ Andrew J. Pierre, *Nuclear Politics: The British Experience with an Independent Strategic Force, 1939–1970* (Oxford: Oxford University Press, 1972).

⁷⁸ For more details, see Justin Bronk, "Britain's 'Independent' V-Bomber Force and US Nuclear Weapons, 1957–1962," *Journal of Strategic Studies*, Vol. 37, No. 6–7 (2014), pp. 974–97.

⁷⁹ Myron A. Greenberg, "Kennedy's Choice: The Skybolt Crisis Revisited," *Naval War College Review*, Vol. 53, No. 4 (2000), p. 147.

against all of the enemy's vital nuclear capabilities. Doing this means carefully choosing targets, pre-planning strikes, coordinating attacks, and assessing results, as well as allocating and directing follow-on attacks from the centre.⁸⁰

A month later, McNamara's rebuke in his so-called "Ann Arbor speech" that "limited nuclear capabilities, operating independently, are dangerous, expensive, ..., and lacking in credibility as a deterrent" clearly alluded to the nuclear aspirations of the US allies Britain and France.⁸¹ Secretary McNamara moreover stressed "the importance of unity of planning, concentration of executive authority, and central direction" under the custody of Washington.⁸² Echoing McNamara's speech, Secretary of State Dean Rusk claimed in a meeting with British Foreign Secretary Alec Douglas-Home that London's independent nuclear force was inconsistent with Washington's interests, stating "the more the UK stressed its independence the more it tended to move in on our independence."⁸³ By referring to "the theoretical problem" with which the US would be faced "if missiles should be fired from the UK at the Soviet Union," Rusk hinted at how worrisome the prospect of British nuclear independence was to the US.⁸⁴ In a similar vein, President Lyndon B. Johnson's briefing book for Prime Minister Harold Wilson's visit to Washington in 1965 states: "The essence of our position is to encourage the British in any action which lowers the status of their independent deterrent."⁸⁵ In sum, US leaders periodically emphasised the UK's close nuclear coordination within the Anglo-American alliance and the consistence of its actions with US national interests. This demonstrates that Washington provided London with advanced nuclear assistance specifically to achieve this goal.

US–UK Nuclear Coordination

The US–UK advanced nuclear partnership was implemented through multilevel close cooperation between diverse groups on both sides. American presidents and British prime ministers communicated directly with each other through summit meetings on the matter of nuclear cooperation. For example, Macmillan requested, in a letter to President Dwight D. Eisenhower, the US's assurance that it would share information on "the essential technique of the weight reduction" of thermonuclear warheads.⁸⁶ American and British officials also frequently sat together to handle issues associated with the nuclear partnership, such as the British purchase of American Polaris submarine-launched ballistic missiles (SLBMs).⁸⁷ Moreover, American scientists and engineers held a series of meetings with British counterparts on the transfer of know-how, information, and knowledge in regard to the manufacture of advanced nuclear weapons.⁸⁵ Similar meetings ensued ex-post to evaluate what had been transferred.⁸⁸ As Andrew Pierre succinctly puts it, the act of sharing nuclear

⁸⁰ Robert S. McNamara, "Speech to NATO Council, Athens," in Philip Bobbitt, Lawrence Freedman, and Gregory F. Treverton, eds., *US Nuclear Strategy: A Reader* (London: Macmillan, 1989), pp. 205–22.

⁸¹ Robert McNamara, "Address by Secretary of Defence McNamara at the University of Michigan [Extract], 16 June 1962," in United States Arms Control and Disarmament Agency, ed., *Documents on Disarmament*, Vol. 1 (Washington: Government Printing Office, 1963), p. 625.

⁸² Ibid.

⁸³ US Department of State, "Memorandum of Conversation, Secretary's European Trip (1962), pp. 18–28. "Role of the UK Nuclear Deterrent," 25 June, 1962, NSA, <https://nsarchive.gwu.edu/sites/default/files/documents/20706383/doc-14-1962-6-25-uk-deterrent.pdf>.

⁸⁴ Ibid.

⁸⁵ Quoted in John Dumbrell, *A Special Relationship: Anglo-American Relations from the Cold War to Iraq* (London: Palgrave Macmillan 2006), p. 176.

⁸⁶ Baylis, "Exchanging Nuclear Secrets," p. 17.

⁸⁷ Ibid.

⁸⁵ Kevin Harrison, "From Independence to Dependence: Blue Streak, Skybolt, Nassau and Polaris," *The RUSI Journal*, Vol. 127, No. 4 (1982), pp. 25–31; Ken Young, "The Skybolt Crisis of 1962: Muddle or Mischief?" *Journal of Strategic Studies*, Vol. 27, No. 4 (2004), pp. 614–35.

⁸⁸ Baylis, "Exchanging Nuclear Secrets."

secrets made for an environment conducive to consolidation of the two allies' mutual trust wherein they "discussed a wider range of military and political topics more frankly with each other."⁸⁹

The technology partnership also paved the way for coordinated Anglo-American nuclear strike plans and joint nuclear targeting. Importantly, the repeal of the McMahon Act removed invisible barriers to close cooperation in the nuclear realm, such as discussions about joint nuclear planning and execution. As the historian Ken Young observes, "wherever the weight of the McMahon Act was felt, intense secrecy prohibited frank exchanges."⁹⁰ In this regard, when V-bombers were introduced to the British Royal Air Force (RAF) in 1955, it became apparent to the American Strategic Air Command (SAC) that "RAF bomber command had an increasingly viable nuclear attack force."⁹¹ Yet, the expansion of the V-bomber force generated coordination problems with SAC. The two bomber commands' conflicting target priorities and uncoordinated strike plans could lead to "wasteful overlapping and dangerous omissions" when carrying out nuclear bombing campaigns against the Soviet Union.⁹² That is, "duplicated targeting by two strike forces raised questions of redundancy and the *fratricide* risk to Allied aircraft [emphasis in original]."⁹³ As the UK's nuclear operational capability continued to grow, joint planning became imperative to the US in order to "settle routes, targets, and timing and to avoid fratricide."⁹⁴ Consequently, the allied nuclear strike coordination committee was set up to address the issues, and by 1 October 1958—three months after the start of Anglo-American advanced nuclear cooperation⁹⁵—a coordinated targeting plan was finally established. As Young puts it, this result signified that "US strategic doctrine had been embraced by the junior ally" along with "a synchronisation of US and British [nuclear] postures."⁹⁷ More specifically, the UK's strategic plans were composed of two distinct parts, namely, target lists for independent and joint action with the US. Both the British national plan and the joint plan adopted in 1962 reflected more fully the US's preferred targeting doctrine—counterforce and city-avoiding targeting—than did those adopted in 1958.⁹⁸

The US transfer of the Polaris missile system to the UK also exemplifies the former's attempt to draw a junior ally closer to its nuclear leadership through advanced nuclear cooperation. The Polaris system was at the core of the Kennedy administration's ambitious proposal to create the multilateral nuclear force (MLF) that would consist of "a fleet of twenty-five surface vessels, each armed with eight Polaris A-3 missiles."⁹⁹ Under the MLF framework, the US would retain "ultimate veto power over the use of the MLF weapons."¹⁰⁰ Apparently, the US intended, through the MLF programme, to place the nuclear forces of European countries, and especially of the UK, under a unitary NATO command—hence, in effect, under American control. President Kennedy stated that "it is through the multilateral concept that we increase the dependence of the European nations on the United States and

⁸⁹ Baylis, "The 1958 Anglo-American Mutual Defence Agreement," pp. 453–4.

⁹⁰ Pierre, *Nuclear Politics*, p. 144.

⁹¹ Ken Young, "A Most Special Relationship: The Origins of Anglo-American Nuclear Strike Planning," *Journal of Cold War Studies*, Vol. 9, No. 2 (2007), p. 9.

⁹² Robert Jackson, *United States Air Force in Britain: Its Aircraft, Bases and Strategy since 1948* (Shrewsbury: AirLife Publishing, 2000), p. 69.

⁹³ Quoted in Young, "A Most Special Relationship," p. 13.

⁹⁴ *Ibid.*, p. 26.

⁹⁵ *Ibid.*, p. 30.

⁹⁷ *Ibid.*, p. 28.

⁹⁸ For more details, see John Baylis, *Ambiguity and Deterrence: British Nuclear Strategy, 1945–1964* (Oxford: Oxford University Press, 1995), pp. 304–5.

⁹⁹ John Baylis and Kristan Stoddart, *The British Nuclear Experience: The Role of Beliefs, Culture, and Identity* (Oxford: Oxford University Press, 2015), p. 104. The MLF was to be "mixed-manned" NATO crews, "with each ship having at least three nationalities." See, *Ibid.*

¹⁰⁰ Stanley R. Sloan, *NATO, the European Union, and the Atlantic Community: The Transatlantic Bargain Challenged* (Oxford: Oxford University Press, 2005), p. 54.

tie these nations closer to us.”¹⁰¹ Secretary McNamara also warned that small independent deterrents, such as the UK’s nuclear force, “not only tended to duplicate targets, but they also complicated matters by increasing the risks of miscalculation,” so sending mixed nuclear signals to the communist bloc.¹⁰² In short, in pursuing the *centralisation* of nuclear command in NATO, the US sought to phase out the British independent nuclear programme “in favour of its participation in a multilateral one.”¹⁰³

With this calculation in mind, in December 1962, Kennedy met with Macmillan in Nassau to discuss the possibility of providing US Polaris missiles to the UK. Under strong US pressure, Britain agreed to import Polaris forces operating as part of NATO’s MLF and to their independent use only when its “supreme national interests” were deemed to be at stake.¹⁰⁴ In April 1963, the Nassau Agreement of 1962 was further formalised as the Polaris Sales Agreement (PSA), whereby the US would supply the UK with Polaris missiles plus associated guidance, navigation, and fire control systems, and the UK would manufacture submarines and warheads.¹⁰⁵ Alongside the MDA, the PSA served as a critical juncture, given that it “enabled Britain’s initial acquisition of the Polaris missiles and the subsequent acquisition of Trident missiles in the 1980s, and has helped it to keep leasing Trident missiles from the US up to the present.”¹⁰⁶ Since then, the imported US advanced nuclear system has been the backbone of the UK’s nuclear deterrent and continued to underpin US–UK advanced nuclear coordination through to the present day.¹⁰⁷

American Flip-Flopping

However, while supplying advanced nuclear assistance, the US decelerated the process—its aim to wield influence over London—for as long as possible. As John Baylis succinctly puts it, “[t]here was a continuing reluctance, even on Eisenhower’s part, to pass on to Britain information of the highest secrecy which Whitehall did not need to know.”¹⁰⁸ In addition, the process of US atomic assistance typically dragged on, and with sparse communication, prompting the UK’s fears of an abrupt suspension, or even cancellation, of the pledged American nuclear aid.¹⁰⁹ Indeed, it was the US’s caprice over atomic assistance that caused the Skybolt crisis, which considerably slowed the pace of US atomic assistance to London.

The Skybolt crisis occurred in 1955, year of the UK’s launch of its Blue Streak project. The Blue Streak nuclear intermediate-range ballistic missile (IRBM) was intended to be introduced in 1963 and fully deployed in 1965.¹¹⁰ The project was designed to replace the V-bomber fleet, which was expected to become vulnerable to Soviet air defences in the 1960s.¹¹¹ However, Blue Streak lost its strategic value during the development process

¹⁰¹ David Mabon, ed., *Foreign Relations of the United States, 1961–1963, Volume VIII, National Security Policy* (Washington: Government Printing Office, 1996), p. 459.

¹⁰² Harrison, “From Independence to Dependence,” p. 29.

¹⁰³ Mabon, ed., *Foreign Relations of the United States, 1961–1963, Volume VIII, National Security Policy*, p. 246.

¹⁰⁴ John F. Kennedy, “Joint Statement Following Discussions with Prime Minister Macmillan—The Nassau Agreement,” The American Presidency Project, 21 December, 1962, <https://www.presidency.ucsb.edu/node/236819>.

¹⁰⁵ For the full text of the PSA, see “Polaris Sales Agreement between the Government of the United States and the United Kingdom,” *International Legal Materials*, Vol. 2, No. 3 (1963), pp. 595–606, <https://www.jstor.org/stable/20689640>.

¹⁰⁶ Xu, “Institutionalization, Path Dependence and the Persistence of the Anglo-American Special Relationship,” p. 1216.

¹⁰⁷ *Ibid.*, pp. 1216–7; Dumbrell, *A Special Relationship*, p. 180.

¹⁰⁸ Baylis, “The 1958 Anglo-American Mutual Defence Agreement,” p. 457.

¹⁰⁹ For example, see Michael Middeke, “Anglo-American Nuclear Weapons Cooperation after the Nassau Conference: The British Policy of Interdependence,” *Journal of Cold War Studies*, Vol. 2, No. 2 (2000), pp. 75–6.

¹¹⁰ Benjamin Cole, “Soft Technology and Technology Transfer: Lessons from British Missile Development,” *The Nonproliferation Review*, Vol. 6, No. 1 (1998), p. 57.

¹¹¹ At the time, the UK nuclear deterrent relied solely on V-bombers. See, Benjamin Cole, “Soft Technology and Technology Transfer: Lessons from British Missile Development,” *The Nonproliferation Review*, Vol. 6, No. 1 (1998), p. 57.

due to its projected liquid-fuelled engine and soft missile silo, more specifically, because it would take “at least twenty minutes to fuel-up.”¹¹² Given Moscow’s rapidly expanding arsenal since the early 1960s of ballistic missiles, the British Blue Streak would all too soon become vulnerable to a Soviet pre-emptive strike.¹¹³ Another challenge for Britain was that of the skyrocketing development costs of its indigenous IRBM project. The US then dangled the American Skybolt air-launched ballistic missiles—which were still under development, and whose initial deployment was planned for 1964—before the UK, as an alternative to Blue Streak.¹¹⁴ Taking the US’s offer in good faith, the UK boldly scrapped the Blue Streak project, on the grounds that importing Skybolt would be a cheaper and much more effective means of maintaining its independent nuclear deterrent.¹¹⁵ Accordingly, in 1960, London agreed to purchase 144 Skybolt missiles, with which it intended to equip its V-bombers.¹¹⁶ As part of its adoption of Skybolt, London undertook follow-up measures to modify the V-bomber fleet and extend its service life.¹¹⁷

After President Kennedy took office, however, critics in Washington expressed scepticism about the Skybolt project. Their doubt derived from the programme’s slow progress and growing development costs. What is more, in light of the rapid progress of the Minuteman and Polaris Missiles—the new American delivery platforms—the US leadership became “increasingly convinced of the irrelevance to America’s security of [Skybolt] air launched ballistic missiles.”¹¹⁸ In spite of London’s unequivocal support for the project and warnings of the harm that Washington’s abrupt about-face could inflict on Anglo-American relations, the Kennedy administration nevertheless unilaterally cancelled the Skybolt project.¹¹⁹ This sudden reversal was closely linked to Washington’s negative perception of London’s independent nuclear deterrent capability. Three months after his inauguration, President Kennedy issued the National Security Action Memorandum, which laid out the basic principles of the US military policy towards the North Atlantic alliance (NATO) and the Atlantic Nations. The memorandum stated that “over the long run, it would be desirable if the British decided to phase out of the nuclear deterrent business. If the development of Skybolt is not warranted for US purposes alone, the US should not prolong the life of the [British] V-Bomber force by this [Skybolt] or other means.”¹²⁰ A year later, Secretary Rusk reiterated that “US decisions relative to Skybolt should be made on the basis solely of US interest in this missile for our own forces.”¹²¹ To assuage London’s anger, Washington offered as an

¹¹² Harrison, “From Independence to Dependence,” p. 27.

¹¹³ Notably, since 1960, the Soviet Union’s ballistic missiles that could reach the UK (e.g. SS-5 (Skean)) had been rapidly increasing both qualitatively and quantitatively. See, Central Intelligence Agency (CIA), “Strength and Deployment of Soviet Long Range Ballistic Missile Forces,” CIA Freedom of Information Act Electronic Reading Room [CIAERR]; National Security Agency, “The Soviet Land-Based Ballistic Missile Program, 1945–1972: An Historical Overview,” [undated, circa the late 1970s], National Archives and Declassification, <https://www.archives.gov/files/declassification/isca/pdfs/2010-005-doc2.pdf>, p. 16, pp. 58–62.

¹¹⁴ Harrison, “From Independence to Dependence,” p. 27; Federation of American Scientists, “GAM-87 Skybolt,” 26 May, 1997, <https://nuke.fas.org/guide/usa/bomber/gam-87.htm>.

¹¹⁵ That is, the essence of the Skybolt arrangement was that “the US would pay for all the research and development costs of the missile. All the British had to pay for was the warhead, buying the missile at cost-price.” See, Harrison, “From Independence to Dependence,” p. 27.

¹¹⁶ Steve Weintz, “Nuclear Diplomacy Delivered Polaris Submarines to the Royal Navy,” *The National Interest*, 28 December, 2021, <https://nationalinterest.org/blog/reboot/nuclear-diplomacy-delivered-polaris-submarines-royal-navy-198332>.

¹¹⁷ Charles S. Sampson and James E. Miller, eds., *Foreign Relations of the United States, 1961–1963, Volume XIII, Western Europe and Canada* (Washington: Government Printing Office, 1994), pp. 1106–7.

¹¹⁸ Harrison, “From Independence to Dependence,” p. 28.

¹¹⁹ For more information about the path toward the Skybolt cancellation, see, Richard Neustadt, *Report to JFK: The Skybolt Crisis in Perspective* (Ithaca: Cornell University Press, 1999); Matthew Jones, “Prelude to the Skybolt Crisis: The Kennedy Administration’s Approach to British and French Strategic Nuclear Policies in 1962,” *Journal of Cold War Studies*, Vol. 21, No. 2 (2019), pp. 58–109.

¹²⁰ Sampson and Miller, eds., *Foreign Relations of the United States, 1961–1963*, p. 289.

¹²¹ Sampson and Miller, eds., *Foreign Relations of the United States, 1961–1963*, p. 1079.

alternative its Polaris SLBM system. London could not but acknowledge that “the only sole serious alternative to Skybolt was [submarine-borne] Polaris.”¹²² Indeed, “with the industrial capacity for large, long-range missiles suitable for an SLBM having been abandoned following the cancellation of Blue Streak...,” “the start-up costs, timescale, and technical considerations ruled out restarting an indigenous large UK missile programme.”¹²³ Eventually, therefore, the UK accepted the Polaris offer. The subsequent sequence of events was highly advantageous to the US. The American offer to import the Polaris system delayed London’s deployment of a new nuclear platform. The US, moreover, repeatedly postponed concluding the PSA, so giving rise to British leaders’ fears that the US might once more change its position.¹²⁴ Having signed the PSA, the UK had then to engage in the time-consuming process of manufacturing new warheads to be fitted to the Polaris missile launcher and to new submarines capable of firing the nuclear-tipped SLBMs.¹²⁵ The imported Polaris system eventually entered service in 1968, five years after the planned date of Britain’s initial Blue Streak deployment, and four years after that of the initial Skybolt deployment.¹²⁶

US Advanced Nuclear Assistance to France

Brief Background to the Era Preceding Franco-American Advanced Nuclear Cooperation

France’s nuclear project was launched in October 1945 by Charles de Gaulle, then Chairman of the Provisional Government. That same month, de Gaulle created the French Atomic Energy Commission (Commissariat à l’énergie atomique) as an initial step towards nuclear research and development. In its early stages—when de Gaulle was out of power (1946–58)—the focus of French nuclear research was on peaceful uses (e.g. industrial development and the production of nuclear energy) rather than the development of nuclear weapons.¹²⁷ It was the Suez humiliation of 1956 that pushed French leaders to develop nuclear weapons. Upon de Gaulle’s return to power in 1958, Paris’s nuclear drive gained a decisive impetus.¹²⁸ He viewed nuclear weapons as “a dramatic symbol of French independence and was thus needed for France to continue to be seen, by itself and others, as a great power.”¹²⁹ In February 1960, France conducted its first nuclear test, thus becoming the world’s fourth nuclear weapon state. However, American leaders were initially non-cooperative with the France’s nuclear pursuit.¹³⁰ Washington remained aloof from Paris even after the latter’s successful nuclear proliferation and did nothing to help upgrade the fledgling nuclear programme.¹³¹ By the end of the 1960s, however, the US’s stance had changed. The Richard Nixon administration approached the Pompidou government, seeking a secret agreement for advanced nuclear cooperation that officially began

¹²² Quoted in Young, “The Skybolt Crisis of 1962,” p. 627. Also see *ibid.*, pp. 625–8.

¹²³ Baylis and Stoddart, *The British Nuclear Experience*, p. 154.

¹²⁴ Middeke, “Anglo-American Nuclear Weapons Cooperation after the Nassau Conference,” pp. 75–6.

¹²⁵ “Polaris Sales Agreement between the Government of the United States and the United Kingdom.”

¹²⁶ Priest, “In American Hands”; Cole, “Soft Technology and Technology Transfer,” p. 57; GlobalSecurity.org, “GAM-87 Skybolt,” <https://www.globalsecurity.org/wmd/systems/gam-87.htm>.

¹²⁷ CIA, “The French Nuclear Weapon Program,” NSA, 27 March, 1964, <https://nsarchive2.gwu.edu/NSAEBB/NSAEBB184/FR20.pdf>.

¹²⁸ Ullman, “The Covert French Connection,” p. 5.

¹²⁹ Sagan, “Why Do States Build Nuclear Weapons?” p. 79.

¹³⁰ US Department of State, “Memorandum of Conversation between John Foster Dulles and Selwyn Lloyd, ‘Atomic Energy Items: (1) French Request (2) Test Limitation,’” WCDA, 23 March, 1957, <https://digitalarchive.wilsoncenter.org/document/110063>.

¹³¹ “Department of State Cable 5245 to Embassy United Kingdom, Message from President Kennedy to Prime Minister Macmillan.”

in 1971.¹³² Notably, Washington secretly provided atomic aid to France through a so-called “negative guidance” mechanism, or the “twenty questions” method of circumventing domestic laws that banned advanced nuclear assistance to other states.¹³³ Through that procedure, French scientists asked their American counterparts for advice on and confirmation regarding the tentative technical steps they were taking. Close nuclear ties between the two states reportedly lasted at least until the Reagan administration.¹³⁴

France’s Growing Independence Due to Nuclear Sophistication

France’s nuclear armament led the country to distance itself from the US and to pursue an autonomous stance in both its foreign and defence positions. French nuclear armament was embodied in two ways: “greater strategic independence from its sponsor, the United States, and greater leverage vis-à-vis its adversary, the Soviet Union.”¹³⁵ That is to say, de Gaulle “steered France away from NATO and engaged in détente with the Soviet Union,” employing its rapprochement with Moscow as a countermeasure against US leadership.¹³⁶ France’s nuclear acquisition, however, did not immediately facilitate its independence of the US. France’s nuclear arsenal still nascent and, therefore, immature; initially, the value of the US security umbrella remained significant for Paris. However, as France’s home-grown nuclear forces grew more sophisticated, so too did its nuclear independence. In 1963, three years after its nuclear acquisition, Paris signed the Elysee Treaty with Bonn in a bid to create a European counterweight to the US’s dominance of Europe.¹³⁷ France’s Mirage IV strategic bombers—equipped with a “first-generation” nuclear delivery system capable of reaching the Soviet Union—entered into service in October 1964.¹³⁸ France was now independently capable of launching a nuclear attack against the Soviet Union. In 1965, de Gaulle duly announced his country’s full withdrawal from the NATO military command, demanding the complete dismantlement of US forces and military installations on French soil.¹³⁹ France furthermore developed thermonuclear techniques geared to ramping up its efforts to strengthen the destructive power of its immature nuclear warheads.¹⁴⁰ In 1968, France successfully exploded its first thermonuclear device, whose estimated yield was 2.3 megatons.¹⁴¹ Washington’s strategic turnaround rapidly ensued.

US’s Strategic Calculus

Concerned about France’s unilateralism and the widening chasm between US/NATO nuclear forces and the French *force de frappe*, the Nixon administration adopted a more realistic

¹³² William Burr, “U.S. Secret Assistance to the French Nuclear Program, 1969–1975: From ‘Fourth Country’ to Strategic Partner,” 2011, Wilson Center, <https://www.wilsoncenter.org/publication/us-secret-assistance-to-the-french-nuclear-program-1969-1975-fourth-country-to-strategic>.

¹³³ Ullman, “The Covert French Connection,” pp. 9–10.

¹³⁴ Charles Mohr, “U.S. Secretly Helped France Develop Nuclear Weapons, an Expert Writes,” *New York Times*, 28 May, 1989, <https://www.nytimes.com/1989/05/28/world/us-secretly-helped-france-develop-nuclear-weapons-an-expert-writes.html>; Jeffrey Lewis and Bruno Tertrais, *US-French Nuclear Cooperation: Its Past, Present and Future* (Paris: Fondation pour la Recherche Stratégique, 2015).

¹³⁵ Nicholas D. Anderson, Alexandre Debs, and Nuno P. Monteiro, “General Nuclear Compellence: The State, Allies, and Adversaries,” *Strategic Studies Quarterly*, Vol. 13, No. 3 (2019), p. 100.

¹³⁶ *Ibid.*, p. 101.

¹³⁷ Stephen A. Kocs, *Autonomy or Power? The Franco-German Relationship and Europe’s Strategic Choices, 1955–1995* (New York: Praeger, 1995); Benedikt Schoenborn, “Chancellor Erhard’s Silent Rejection of de Gaulle’s Plans: The Example of Monetary Union,” *Cold War History*, Vol. 14, No. 3 (2014), pp. 377–402.

¹³⁸ CIA, “French Development of Nuclear Weapons Delivery Systems,” NSA, 14 July, 1964, <https://nsarchive2.gwu.edu/NSAEBB/NSAEBB184/FR22.pdf>.

¹³⁹ Anderson, Debs, and Monteiro, “General Nuclear Compellence,” p. 102.

¹⁴⁰ CIA, “The French Advanced Weapons Program,” NSA, 18 November, 1964, <https://nsarchive2.gwu.edu/NSAEBB/NSAEBB184/FR23.pdf>.

¹⁴¹ CIA, “The President’s Daily Brief,” CIAERR, 26 August, 1968, https://www.cia.gov/readingroom/docs/DOC_0005976323.pdf.

view of the situation. Secretary of Defence Melvin R. Laird stated that the French “eventually would be successful” in developing sophisticated indigenous nuclear delivery platforms “even without aid from us [the US].”¹⁴² Against this backdrop, the Nixon administration concluded that providing France with advanced nuclear assistance was the only way of restraining the latter’s unilateralism and enhancing allied nuclear coordination. With this calculus in mind, Washington strategically abandoned its non-cooperative stance and decided to help France advance its nuclear sophistication. In a February 1970 summit meeting with French President Georges Pompidou, President Richard Nixon hinted that, down the road, the “nuclear question” could be the topic for talks on cooperation between the two states.¹⁴³ Nixon told Pompidou that “[a]s the French acquired tactical nuclear weapons and increased their strategic capability by the construction of their submarines, the nuclear question could come up again and could be a subject of talks on cooperation.”¹⁴⁴ Nixon went on to opine that “it was important and desirable” for the two sides to “find positions of common action on given assumptions” regarding the nuclear matter.¹⁴⁵ He stressed that ex-ante joint contingency planning would be invaluable, given that, in the event of a conflict with the Soviet Union, both states would end up getting involved.¹⁴⁶ Shortly after the summit meeting, Nixon issued National Security Study Memorandum (NSSM) 100, which directed governmental agencies to conduct a policy review of advanced nuclear assistance to France. The interagency response to NSSM 100 provided justifications for the provisioning of nuclear aid to France, echoing Nixon’s perspective that:

Impending availability of tactical nuclear weapons under French command and control raises the need for cooperation in nuclear planning. ... However, we lack details as to the present state of French official doctrine. In order to avoid conflict with the utilisation of similar [nuclear] weapons by NATO forces, coordination is desirable at both the military and political levels. ... From our standpoint, as French IRBMs and SLBMs are deployed, the completely independent use of the French force could cause potential problems for us. Joint planning and coordination would reduce uncertainties, even on a contingency basis for wartime.¹⁴⁷

The interagency report, moreover, underlined the positive spin-off effects of the technical partnership for allied relations, stating that “[c]loser relations between French and American nuclear specialists (both military and scientific) could thereby be fostered, which might contribute to broader military and political cooperation.”¹⁴⁸ Finally, in June 1971, American representatives signed an agreement with the French in Paris, at which point US advanced nuclear assistance to France officially began.¹⁴⁹

¹⁴² Melvin R. Laird, “Memorandum from Melvin R. Laird to Henry A. Kissinger, ‘Assistance to the French Ballistic Missile Program,’” WCDA, 14 July, 1970, <https://digitalarchive.wilsoncenter.org/document/113689>.

¹⁴³ US National Security Council, “Memorandum of Conversation, Nixon and Pompidou,” WCDA, 24 February, 1970, <https://digitalarchive.wilsoncenter.org/document/113679>.

¹⁴⁴ Ibid.

¹⁴⁵ Ibid.

¹⁴⁶ Ibid.

¹⁴⁷ US National Security Council, “Report of the National Security Council Staff, ‘NSSM 100–Military Cooperation with France (Analytical Summary),’” WCDA, December, 1970, <https://digitalarchive.wilsoncenter.org/document/113792>.

¹⁴⁸ Ibid.

¹⁴⁹ Melvin R. Laird “Letter from Melvin R. Laird to Henry A. Kissinger, ‘Summary of Agreement for US Assistance to French Missile Program,’” WCDA, 29 July, 1971, <https://digitalarchive.wilsoncenter.org/document/112255>. In a similar vein, two years after the start of Franco-American advanced nuclear cooperation, National Security Advisor Henry A. Kissinger reaffirmed to French Defence Minister Robert Galley the imperative of nuclear coordination, declaring that a French nuclear force should remain “effective and above all that it does not become irrelevant” to American nuclear employment. The White House, “Memorandum of Conversation with Robert Galley,” WCDA, 27 July, 1973, <https://digitalarchive.wilsoncenter.org/document/113223>.

France's *de Facto* Reintegration into the NATO Military Command

As Washington desired, advanced nuclear assistance bound France closer to the US, leading to the junior ally's *de facto* reintegration into NATO's military command.¹⁵⁰ In return for receiving advanced nuclear technologies, French leaders agreed to coordinate their nuclear target plans much more closely with those of NATO/the USA.¹⁵¹ The two sides' exchange of the proposed target lists led to precise target coordination, thus considerably dispelling American concerns about the potential problem of "fratricide" during conflict with the Soviet Union.¹⁵² Going further, the two sides established new bilateral procedures for "mutual consultations and information designed to ensure the efficiency and security of strikes" and for setting up "principles to avoid redundant and/or fratricide strikes, as well as excessive military or civilian collateral damage."¹⁵³ Franco-American advanced nuclear cooperation gave birth, furthermore, to a *de facto* restoration of joint war planning. "French and NATO planners worked out arrangements whereby if Paris judged war to be near, French ground forces would take up positions in central Germany and fall directly under NATO commanders there. Operational coordination of French tactical air forces and NATO air forces in central Europe became considerably tighter," according to Richard Ullman.¹⁵⁴ Specifically, "selected French airfields were earmarked and surveyed to serve as potential dispersion bases for NATO's airborne early-warning system."¹⁵⁵ The US, moreover, gained "access to French seaports, airports, pipelines, railways, and highways" in the case of war.¹⁵⁶ In this regard, an American senior officer stated that, should deterrence fail, "they [French forces] are going to be in the chain of [NATO] command."¹⁵⁷

The relationship between France and NATO's military command was, from the start of Franco-American advanced nuclear cooperation, "never as distant as Gaullist rhetoric implied."¹⁵⁸ Successive French chiefs of staff and American Supreme Allied Commanders of NATO "kept open lines of communication and worked quietly to assure that even though France was not a member of the alliance's integrated military organisation, its forces could effectively participate in the defence of the West."¹⁵⁹ More generally, nuclear cooperation induced the two countries to engage in frequent communications on a regular basis.¹⁶⁰ In a memorandum to President Nixon, Secretary Laird stated that "one of the important by-products" of nuclear cooperation between the Department of Defence (DOD) and the French Ministry of Defence on the strategic missile programme was "the development of a pattern of contacts and confident dealings that should be an important asset in moving further in defence cooperation."¹⁶¹ Shortly thereafter, the DOD evaluated the ongoing Franco-American advanced nuclear cooperation as follows:

Numerous meetings have been held between US and French officials in both Paris and Washington, and the French have been very forthcoming in providing information about and access to their systems. US officials have visited both French laboratories and test sites.

¹⁵⁰ Ullman, "The Covert French Connection."

¹⁵¹ Lewis and Tertrais, *US-French Nuclear Cooperation*, p. 12.

¹⁵² Ullman, "The Covert French Connection," p. 25.

¹⁵³ Lewis and Tertrais, *US-French Nuclear Cooperation*, p. 12.

¹⁵⁴ Ullman, "The Covert French Connection," pp. 22–3.

¹⁵⁵ *Ibid.*, p. 23.

¹⁵⁶ *Ibid.*

¹⁵⁷ *Ibid.*

¹⁵⁸ *Ibid.*, p. 21.

¹⁵⁹ *Ibid.*

¹⁶⁰ *Ibid.*, pp. 17–9.

¹⁶¹ Helmut Sonnenfeldt, "Memorandum from Helmut Sonnenfeldt to Henry A. Kissinger, 'Missile Assistance to France—New NSSM,'" WCDA, 3 February, 1973, <https://digitalarchive.wilsoncenter.org/document/112425>; Kathleen B. Rasmussen, ed., *Foreign Relations of the United States, 1969–1976, Volume E–15, Part 2, Documents on Western Europe, 1973–1976* (Washington: Government Printing Office, 2014), p. 931.

Relations between the two defence establishments have been extremely cordial at both the senior and the working level.¹⁶²

In sum, the US advanced nuclear assistance to France put the brakes on Paris's centrifugal movements while strengthening allied nuclear coordination and synchronisation.

American Foot-Dragging

Given Washington's motivation for offering atomic aid to Paris, the US had little reason to transfer advanced nuclear secrets promptly to its new ally. Instead, by *doling out* advanced nuclear knowledge, the US was able to exert influence over Paris's nuclear and foreign policies for an extended period of time. National Security Advisor Henry A. Kissinger noted, at an internal high-level meeting in 1973, the need to control the pace of ongoing atomic assistance to the French, emphasising that the USA should assist, but not give, Paris too much.¹⁶³ Concerned that the US may too quickly lose leverage over the French, Kissinger stressed to his colleagues the US need to "whet their appetites" while not giving them "anything but tidbits."¹⁶⁴ With this stratagem in mind, he instructed John Foster Jr., who led working-level talks with France on matters of nuclear collaboration, to give talks with the French the appearance of making progress, stating that "[w]hat we would like with France is what looks like a step forward but doesn't give them anything yet."¹⁶⁵ Kissinger continued, "Don't say 'if we were going to help' or 'we are going to help.' Just give them the impression ... We must be fully cold-blooded."¹⁶⁶ Similarly, when strategising for a forthcoming meeting on nuclear matters with French Defence Minister Robert Galley, Kissinger remarked that "what we want is something which could makes Galley drool but doesn't give him anything but something to study for a while."¹⁶⁷ Consequently, US assistance to France progressed at a slow pace that fell far short of France's expectations. French President Valerie Giscard d'Estaing alluded, in an August 1975 summit meeting, to his country's discontent at the "very slow" pace of US technology transfer.¹⁶⁸ Acknowledging that there was indeed "foot-dragging," Kissinger glossed over the delay, attributing it to bureaucratic resistance to the assistance.¹⁶⁹

As regards the scope of cooperation, the US transferred only select knowledge and in a limited manner. The National Security Decision Memorandum (NSDM) 103, which laid down the ground rules for advanced nuclear cooperation with France, stipulated "limited assistance" in the French ballistic missile programme without including "a distinct new capability in such areas as guidance systems, missile accuracy, and re-entry vehicle hardening."¹⁷⁰ That is to say, the US would help France to improve its "existing missiles," but not in the latter's development of a new generation of them.¹⁷¹ These NSDM 103 guidelines became enshrined in the 1971 US–France agreement for nuclear collaboration. However, the 1971 agreement did not satisfy Paris's appetite for nuclear sophistication. Recognising

¹⁶² Elliot Richardson, "Memorandum for the Assistant to the President for National Security Affairs, 'Response to NSSM 175,'" WCDA, 11 May, 1973, <https://digitalarchive.wilsoncenter.org/document/112434>.

¹⁶³ The White House, "Memorandum of Conversation, 'Visit of French Defense Minister Galley; Strategic Programs,'" WCDA, 17 August, 1973, <https://digitalarchive.wilsoncenter.org/document/113226>.

¹⁶⁴ Ibid.

¹⁶⁵ Ibid.

¹⁶⁶ Ibid.

¹⁶⁷ The White House, "Memorandum of Conversation, 'French Nuclear Discussion,'" WCDA, 9 August, 1973, <https://digitalarchive.wilsoncenter.org/document/113224>.

¹⁶⁸ The White House, "Memorandum of Conversation, 'Economic Policy/Cyprus; French Nuclear Programs; Energy,'" WCDA, 1 August, 1975, <https://digitalarchive.wilsoncenter.org/document/112433>.

¹⁶⁹ Ibid.

¹⁷⁰ The White House, "Memorandum from Henry A. Kissinger to President Nixon, 'Military Cooperation with France,'" WCDA, 25 March, 1971, <https://digitalarchive.wilsoncenter.org/document/112246>.

¹⁷¹ William Burr, "The French Bomb, with Secret U.S. Help," NSA, 26 May, 2011, <https://nsarchive2.gwu.edu/nukevault/ebb346/>.

the significant value of American technical aid—in saving “time and money” on France’s nuclear sophistication—French leaders sounded out the possibility of expanding ongoing assistance into new areas, including hardening of ballistic missiles, penetration aids, reduced size/weight of booster triggers, and low weighted tactical nuclear warheads.¹⁷²

Washington’s response to French requests for expanded assistance was to procrastinate for a couple of years, during which Paris continued to press Washington for more expansive assistance. Finally, in June 1975, President Gerald Ford authorised an extension of the existing assistance programme to help France develop a new generation of SLBMs and so improve its ballistic missile forces.¹⁷³ However, Ford banned the dissemination to France of “restricted data”¹⁷⁴ and also turned down French President Giscard d’Estaing’s request for American assistance in the French multiple independently targetable re-entry vehicle (MIRV) system.¹⁷⁵ Instead, Washington gave Paris a less-sophisticated technology: MRVs (multiple warheads) aimed at a *single* target.¹⁷⁶ In short, the US deliberately slowed the pace of atomic assistance, while limiting its scope, in order to exert leverage over France for as long as possible.

Evaluating Alternative Explanations

Here, two alternative explanations of why and how the US provides junior allies with advanced nuclear assistance are succinctly evaluated through reference to the historical record. The UK case provides weak support for the first alternative explanation (BPM). As regards BPM H1, when, in 1952 and during the years that followed, Britain developed nuclear weapons, the Soviet Union possessed overwhelming conventional and/or nuclear superiority over the UK.¹⁷⁷ BPM H1 would have been supported if, shortly after London’s nuclearisation, Washington had rapidly bolstered London’s nascent nuclear arsenal vis-à-vis Moscow by sharing its advanced nuclear technologies. Surprisingly, however, even after the Soviet *Sputnik* shock of October 1957, US leadership remained divided over whether or not to engage in advanced nuclear cooperation with the UK.¹⁷⁸ The US’s six-year status quo after the UK’s nuclear acquisition, therefore, is not consistent with BPM H1. In contrast to BPM H2, America’s unilateral flip-flopping and procrastination hardly qualified as swift, full-scale nuclear assistance to its new nuclear ally. This, therefore, invalidates BPM H2.

The France case also poorly supports BPM. Regarding BPM H1, when, in 1960 and the years that followed, France developed nuclear weapons, Soviet military forces easily outgunned and outnumbered those of France.¹⁷⁹ Nevertheless, for almost a decade after

¹⁷² Richardson, “Memorandum for the Assistant to the President for National Security Affairs, ‘Response to NSSM 175’”; The White House, “Memorandum of Conversation with Robert Galley,” WCDA, 31 August, 1973, <http://digitalarchive.wilsoncenter.org/document/113231>; Helmut Sonnenfeldt, “Memorandum from Helmut Sonnenfeldt to Henry A. Kissinger, ‘Nuclear Cooperation with France—Gallery—Schlesinger Meeting September 25, 1973’” WCDA, 24 September, 1973, <https://digitalarchive.wilsoncenter.org/document/113238>.

¹⁷³ Gerald Ford, “President Ford to Secretary of Defense, ‘Missile Cooperation with France,’” WCDA, 23 June, 1975, <https://digitalarchive.wilsoncenter.org/document/112424>.

¹⁷⁴ *Ibid.*

¹⁷⁵ National Security Council, “Memorandum of Conversation between Roger C. Molander and M. Conze, ‘Meeting with M. Conze of France, 24 November 1975,’” WCDA, 25 November, 1975, <https://digitalarchive.wilsoncenter.org/document/112435>.

¹⁷⁶ *Ibid.*; “President Ford to Secretary of Defense, ‘Missile Cooperation with France.’”

¹⁷⁷ For example, see “Most Likely Period for Initiation of Hostilities Between the U.S.S.R. and the Western Powers,” 22 August, 1950, in *Records of the Joint Chiefs of Staff*, pt. 2, 1946–1953, The Soviet Union (Washington: University Publications of America, Inc., 1979), reel 3, slide pp. 361–402.

¹⁷⁸ Members of Joint Committee on Atomic Energy were particularly opposed to nuclear cooperation with the UK. Baylis, “Exchanging nuclear secrets,” pp. 41–8.

¹⁷⁹ For example, see *The Military Balance 1961–62* (London: Institute for Strategic Studies, 1961); *The Military Balance 1962–63* (London: Institute for Strategic Studies, 1962).

France's nuclear acquisition, the US disregarded the former's embryonic nuclear arsenal vis-à-vis Soviet robust nuclear forces.¹⁸⁰ This thus discredits BPM H1. Moreover, despite the expectation of H2, the US did not vigorously assist the French nuclear programme. The US policy of deliberately slowing the process of advanced nuclear cooperation with France thus invalidates BPM H2.

As to the second alternative explanation (IDM), the UK case provides weak support for the IDM. In that regard, there is no empirical evidence of Washington's initiation of advanced nuclear assistance to outbid Moscow under conditions of intense inter-hierarchical competition. Although Colgan and Miller prove that the US did transfer *civilian* nuclear technology (e.g. atomic reactor technology for electricity production) to the UK in order to outbid the Soviet Union, they do not directly demonstrate that their argument applies also to the US advanced nuclear assistance to London, which began around the same time.¹⁸¹ This hence discredits IDM H1. Regarding IDM H2, inter-hierarchy nuclear competition dominated the relationship between the US and the Soviet Union during the 1950s and early 1960s.¹⁸² Despite intense inter-hierarchy nuclear competition at the time, however, the US was erratic and procrastinated in assisting Britain, thus invalidating IDM H2.

The France case partially supports the IDM. Regarding IDM H1, compared to the 1950s and early 1960s, the degree of military tensions between the US and the Soviet Union—the dominant nuclear power rivals—during the late 1960s and the 1970s significantly relaxed. Notably, the two dominant states achieved unprecedented inter-hierarchy cooperation in the nuclear domain during the détente period, underlined by the establishment of the NPT, joint efforts to prevent South Africa's nuclear test, and the signing of the Strategic Arms Limitation Talks and Anti-Ballistic Missile Treaties.¹⁸³ In Colgan and Miller's words, hierarchical bargains explicitly shifted *against* subordinate states, such as France. Therefore, the US had scant incentive to outbid the Soviet Union by offering advanced nuclear assistance to new American nuclear allies. This discredits IDM H1. By contrast, however, the France case supports IDM H2. Consistent with IDM H2's expectation, the US provided limited, leisurely paced atomic assistance to France while enjoying high-level inter-hierarchical cooperation with the Soviet Union on nuclear matters.

Conclusion

This article demonstrates why and how the US provided advanced nuclear assistance to its junior nuclear allies, the UK and France. After the two nations developed nuclear weapons,

¹⁸⁰ Admittedly, in December 1962—34 months after France's nuclear acquisition—Kennedy offered to transfer American advanced nuclear assets to Paris. However, de Gaulle declined the US offer because he feared losing his country's nuclear autonomy. See, Timothy P. McDonnell, "Figuring It Out the Hard Way: America, France, and the Challenges of Allied Pursuit of Nuclear Weapons, 1958–63," *The Nonproliferation Review*, Vol. 27, No. 1–3 (2020), pp. 158–9. Except for Kennedy's deviant movement, the US, by and large, took a negative stance on nuclear collaboration with France until 1971. Notably, Kennedy's offer to France was also a radical departure from his original negative attitude toward nuclear assistance to France, as shown in Footnote 36. Regarding Kennedy's new position, McDonnell demonstrates that there was "considerable prior evolution in his [Kennedy's] beliefs about the significance of the small French nuclear program [in the meantime]." *Ibid.*, p. 158.

¹⁸¹ According to Colgan and Miller, another motive for US civilian nuclear assistance to the UK was to "stay ahead" of the UK, which was a leader in the field of civilian nuclear reactor technology. See Colgan and Miller, "Rival Hierarchies and the Origins of Nuclear Technology Sharing," pp. 315–6.

¹⁸² For example, the Soviet launch of *Sputnik* (1957), the Cuban missile crisis (1962), and the "missile gap" debate (late 1950–early 1960s) exemplify the intense inter-hierarchical competition in the nuclear domain that occurred during this period.

¹⁸³ Emanuel Adler, "The Emergence of Cooperation: National Epistemic Communities and the International Evolution of the Idea of Nuclear Arms Control," *International Organization*, Vol. 46, No. 1 (1992), pp. 101–45; William C. Potter and Sarah Bidgood, eds., *Once and Future Partners: The United States, Russia, and Nuclear Non-proliferation* (London: Routledge, 2018).

the US became concerned about their growing independence and unilateralism, the latter of which motivated the US leadership to clamp down on these new nuclear allies, meanwhile enhancing coordination of the latter's nuclear forces with those of the US. At the same time, the US purposefully controlled the speed and scope of technology transfers in order to exert influence over the recipient junior allies for as long as possible.

This study suggests three avenues for future study. First, certain factors not considered in this study could influence US actions in regard to advanced nuclear assistance. For example, existing studies show that specific American leaders, as well as a particular US administration's deviant foreign policy, played pivotal roles in launching the US advanced nuclear partnership with the UK and France, respectively.¹⁸⁴ Other studies suggest that US economic conditions—specifically balance-of-payments issues—also affected Washington's advanced nuclear technology transfer decisions.¹⁸⁵ Future scholarship should investigate whether and how these factors influenced US atomic assistance to its junior nuclear allies.

Second, although this study focuses exclusively on cases where the US provided advanced nuclear assistance, future scholarship should pay attention to those wherein it did not. Rather than indiscriminately offering advanced nuclear assistance to all its nuclear allies, the US has done so selectively and only to certain allies. My preliminary analysis shows that the US has provided atomic aid to three nuclear allies—the UK, France, and Israel—but not to two others—India and Pakistan.¹⁸⁶ This raises the following questions: Under what conditions does the US provide advanced nuclear assistance? To whom does the US provide advanced nuclear assistance? And to whom does it not? A plausible answer to these questions may be that the US offers atomic assistance only in cases where the confidentiality of transferred advanced nuclear technology is guaranteed. That is to say, the US is likely to refrain from sharing advanced nuclear secrets with a junior nuclear ally when there is a significant risk of *technology leakage*. Advanced nuclear technology is built on extensive top-secret nuclear knowledge and information. If the nuclear technology transferred should fall into enemy or terrorist hands, the benefits of nuclear assistance (a recipient ally's restrained actions and enhanced nuclear coordination) would be far outweighed by its costs. Thus, when a patron decides whether or not to provide nuclear assistance, it will carefully examine a would-be recipient ally's ability to protect transferred nuclear secrets. A relevant dataset estimates that three recipient allies of the US advanced nuclear assistance (the UK, France, and Israel) are far more capable of protecting nuclear materials and facilities against theft and sabotage than are the two non-recipient allies (India and Pakistan).¹⁸⁷

Third, future studies should examine whether or not the arguments presented here also apply to other senior nuclear allies, such as the Soviet Union/Russia and China. For example, when offering nuclear assistance, do China and the US employ different methods of managing alliances? Or different cost-benefit calculations? And do they tolerate different degrees of ally autonomy? If so, how do these differences affect outcomes? Although acquiring the data needed to answer these questions could be challenging, addressing them is nevertheless worthwhile.

This study has important policy implications for China's potential response to North Korea's ongoing nuclear sophistication. Since acquiring nuclear weapons in 2006, North Korea has further developed, expanded, and diversified both its indigenous nuclear weapons

¹⁸⁴ For previous work that highlights Eisenhower's leading role in the UK case, see, Baylis, "Exchanging Nuclear Secrets." For previous work that identifies Nixon and Kissinger's deviant non-proliferation policy concerning the France case, see Francis J. Gavin, *Nuclear Statecraft: History and Strategy in America's Atomic Age* (Ithaca: Cornell University Press, 2012), pp. 116–9.

¹⁸⁵ For example, see McDonnell, "Figuring It Out the Hard Way."

¹⁸⁶ More details of how I code these cases are offered in [Online Appendix](#).

¹⁸⁷ This dataset, called "the NTI (Nuclear Threat Initiative) Nuclear Security Index," is available at <https://www.ntiindex.org/>. The abridged version of the dataset is offered in [Online Appendix](#).

and delivery platforms.¹⁸⁸ Pyongyang's increasing nuclear sophistication generated its more hostile and reckless behaviour vis-à-vis its enemies, culminating in the 2017 US–North Korea nuclear crisis. Although the inter-Korean and Trump–Kim summit meetings dramatically defused the hair-trigger nuclear crisis, Chinese leaders were reportedly worried about Pyongyang's nuclear unilateralism and unexpectedly rapid rapprochement with the US and South Korea.¹⁸⁹ China, however, has wisely refrained from helping North Korea's enhancement of its nuclear sophistication.¹⁹⁰ However, it remains to be seen whether or not China will maintain an aloof posture towards Pyongyang at such a time when North Korea obtains a full-fledged minimum deterrence capability against the US by developing intercontinental ballistic missiles (ICBMs) capable of delivering nuclear warheads to the US mainland. If, after achieving this technical milestone, Pyongyang's unilateralism grows out of control, Beijing might then consider the nuclear assistance option aimed at reining Pyongyang in.

Importantly, senior nuclear allies' offering of advanced nuclear assistance to junior nuclear allies could eventually harm global non-proliferation efforts. Such opportunistic behaviour may, for example, foment nuclear ambitions in other non-nuclear states by creating the mistaken impression that as long as they resolutely stand up to international opposition, their nuclear pursuits might also pay off. Simply put, efforts to prevent horizontal proliferation cannot fully succeed unless nuclear powers voluntarily refrain from helping their nuclear allies to achieve vertical proliferation. In this sense, Beijing's continuing efforts to distance itself from Pyongyang's vertical proliferation drive are crucial to preventing further horizontal proliferation in the region. China–North Korea nuclear ties could otherwise backfire, thus triggering nuclear ambitions in South Korea and Japan—an outcome that is at odds with the policy goals of both the US and China.¹⁹¹

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¹⁸⁸ Office of the Secretary of Defence, *Military and Security Developments Involving the Democratic People's Republic of Korea 2017: Report to Congress* (Washington: Department of Defence, 2017); Hans M. Kristensen and Matt Korda, "North Korean Nuclear Weapons, 2021," *Bulletin of the Atomic Scientists*, Vol. 77, No. 4 (2021), pp. 222–36.

¹⁸⁹ Xiao Ren, "Managing Volatile Asymmetry: China's Emergence from the Korean Dilemma," *The British Journal of Politics and International Relations*, Vol. 23, No. 2 (2021), p. 346; Yun Sun, "The US–DPRK Summit: Assessing Chinese Anxieties," *38 North*, 27 March, 2018, <https://www.38north.org/2018/03/yusun032718/>.

¹⁹⁰ Some analysts suspect that China is currently providing advanced nuclear assistance to North Korea. They argue that the Chinese government is now playing a "double game," opposing North Korean nuclear progress outwardly but supporting it behind the scenes by covertly transferring technologies and components relevant to ICBM technologies. They also suspect that Beijing turns a blind eye when items are illegally transferred to Pyongyang through private channels. See Joel Wuthnow, "Is China Playing a Double Game?," *The Diplomat*, 19 April, 2012, <https://thediplomat.com/2012/04/is-china-playing-a-double-game/>; Joby Warrick, "Kim Jong Un's Rockets Are Getting an Important Boost—from China," *The Washington Post*, 13 April, 2017, https://www.washingtonpost.com/world/national-security/kim-jong-uns-rockets-are-getting-an-important-boost-from-china/2017/04/12/4893b0be-1a43-11e7-bcc2-7d1a0973e7b2_story.html; Anders Corr, "Chinese Involvement in North Korea's Nuclear Missile Program: From Trucks to Warheads," *Forbes*, 5 July, 2017, <https://www.forbes.com/sites/anderscorr/2017/07/05/chinese-involvement-in-north-koreas-nuclear-missile-program-from-warheads-to-trucks/?sh=4b1f2a516f2f>. These claims are problematic because they refer only to contextual and indirect evidence of a China–North Korea nuclear connection. For example, some experts believe the existence of a communist nuclear connection because of the resemblance of a mobile long-range ballistic missile launcher displayed by North Korea during a military parade to a Chinese model. For example, see Wuthnow, "Is China Playing a Double Game?"; Shaun Waterman, "Analysts: China Broke Sanctions If N. Korea Using Its Missile Launcher," *The Washington Times*, 16 April, 2012, <https://www.washingtontimes.com/news/2012/apr/16/experts-china-likely-gave-n-korea-illegal-missile/>.

¹⁹¹ Currently, the US sets non-proliferation in East Asia as a policy goal. For a contrasting voice on the policy, see Jennifer Lind and Daryl G. Press, "Five Futures for a Troubled Alliance," *Korean Journal of Defense Analysis*, Vol. 33, No. 3 (2021), pp. 357–80.

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Supplementary data

[Supplementary data](#) are available at The *Chinese Journal of International Politics* online.

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