Nuclear Strategy, Nonproliferation, and the Causes of Foreign Nuclear Deployments

Matthew Fuhrmann\textsuperscript{1} and Todd S. Sechser\textsuperscript{2}

Abstract
Why do countries deploy nuclear weapons abroad? Since 1945, more than twenty states have hosted foreign nuclear weapons on their territory, and five countries continue to do so today. These deployments have important consequences for international security, yet there is little systematic research about the factors that drive them. In this article, we develop three broad theoretical frameworks to explain why foreign nuclear deployments occur. Using a new data set of foreign nuclear deployments between 1945 and 2000, we find that two factors weigh heavily in driving these deployments: the protection of allies and the projection of military power. Nonproliferation motives, however, appear to play little role. The results carry important implications for our understanding of the causes of proliferation and the sources of nuclear posture.

Keywords
nuclear proliferation, military deployments, alliances, deterrence, military strategy

In July 1962, Soviet Premier Nikita Khrushchev struck a deal with Fidel Castro to deploy nuclear-armed ballistic missiles on the island of Cuba. Over the next three months, the Soviets commenced work on nine launch sites, hoping to complete...
construction before the United States could discover them. In early September, Soviet SS-4 missiles began arriving in Cuba. However, US intelligence detected the bases before they could be completed, prompting the most serious nuclear standoff in history. After thirteen tense days in October, the Soviets agreed to remove their missiles in exchange for the withdrawal of US nuclear missiles deployed in Turkey and southern Italy. The most significant crisis of the nuclear age was thus triggered—and resolved—by foreign-deployed nuclear weapons.

Why would the Soviet Union—or any other country—deploy nuclear weapons abroad? Indeed, US officials in 1962 were perplexed by Khrushchev’s decision: “it’s a goddamn mystery to me,” exclaimed President John F. Kennedy at the outset of the crisis (Allison and Zelikow 1999, 81). Yet on two dozen occasions since 1945, the Soviet Union, United States, or Great Britain deployed nuclear weapons abroad. Five of these deployments are ongoing today, and some US policy makers have argued for new nuclear deployments to deter aggression against US allies (Agence France-Presse [AFP] 2012).

Classic studies of nuclear doctrine highlighted the importance of foreign nuclear deployments (e.g., Wohlstetter 1961; Schelling 1966, 109-116; Jervis 1984, 88-92; Mearsheimer 1984; Allison and Zelikow 1999). However, there is little scholarship on the reasons states choose to undertake these deployments. This study uses new quantitative data to assess the factors that drive nuclear states to deploy nuclear weapons abroad—and the factors that prompt host states to accept them. We focus on three interrelated questions. First, why do states deploy their nuclear weapons to some countries, but not others? Relatedly, why do states deploy nuclear weapons to only some of their allies? Second, why do some states—but not others—agree to host another state’s nuclear weapons? Third, are foreign nuclear deployments driven by the same factors that drive indigenous nuclear proliferation or do they follow a different logic? Answers to these questions would provide new insights into the reasons states both seek and share nuclear weapons technology.

In this article, we develop and test three theoretical models for understanding the strategic logic of foreign nuclear deployments. First, an extended deterrence model argues that states primarily deploy nuclear weapons to protect their allies from third-party aggression. A second model sees nuclear deployments as instruments of nonproliferation, intended to persuade the host state that it can achieve security without building its own nuclear arsenal. In this view, nuclear deployments occur when a patron’s nonproliferation interests and a host’s security interests intersect. Third, a power projection model argues that states deploy nuclear weapons to countries that offer particular geographic advantages, such as proximity to a patron’s rivals. Foreign nuclear deployments, according to this perspective, are driven mainly by the security interests of the patron and may provide little direct value to the host.

Each of these theoretical explanations is intuitive, but the degree to which the historical record supports them is unclear. The US deployments to its North Atlantic Treaty Organization (NATO) allies, for instance, were intended largely to bolster extended deterrence, but Washington also deployed weapons to nonallies (e.g.,
Morocco and Spain), and many US protégés never received American atomic weaponry (e.g., Australia and Norway). The salience of the extended deterrence model is therefore uncertain in the absence of rigorous empirical analysis. To assess the relative explanatory power of each theory across the universe of historical cases, we test the three models using a new data set on foreign nuclear deployments from 1945 to 2000.

It is important to note that the theoretical perspectives we develop are not necessarily mutually exclusive. The literature on indigenous nuclear proliferation emphasizes that states often have multiple simultaneous motives for building nuclear weapons (Sagan 1996/1997; Fuhrmann 2012), and the same is likely to be true with respect to foreign nuclear deployments. Even within states, different decision makers often have very different reasons for supporting identical policies. Our objective in this article therefore is not to determine which of these theories are “true” or “false,” since each model likely explains some cases but not others. Rather, our purpose is to determine how well each theory explains the historical pattern of foreign nuclear deployments vis-à-vis the other models.

Our analysis finds strong support for the extended deterrence model. Nuclear deployments are substantially more likely to occur among allies than nonallies. Further, having a shared enemy increases the likelihood that two states will arrange a nuclear deployment to protect the host from possible aggression. We also find some support for the power projection model. Host states located in close proximity to a nuclear power’s rival are much more likely to have nuclear weapons stationed on their soil, relative to countries that are located far from a deployer’s enemies. While the possession of intercontinental ballistic missiles (ICBMs) reduces the probability that states will forward deploy nuclear weapons, it is notable that numerous deployments continued after the Soviet Union and the United States acquired long-range missiles. Promoting nonproliferation does not appear to be a major motive for stationing nuclear weapons abroad: states that are actively exploring nuclear acquisition are actually less likely than other states to host foreign weapons.

We reach similar conclusions when addressing a related question: why do states deploy nuclear forces to some of their allies but not others? When we restrict our analysis to alliances only, we find that countries are more likely to deploy nuclear weapons to allies with whom they share a common rival. This result further underscores the explanatory power of the extended deterrence model, demonstrating that nuclear deployments are likely to be directed toward allies that are most vulnerable to attack. However, allies that are at risk for proliferating are not more likely than other allies to host their patron’s nuclear weapons, casting further doubt on the nonproliferation model.

The article proceeds in six parts. First, we explain in more detail why the study of foreign nuclear deployments is relevant for international relations research. Second, we develop three distinct, but not necessarily competing, theoretical perspectives on the causes of foreign nuclear deployments. Third, we describe our data set of extraterritorial nuclear deployments, which covers the universe of such cases from 1945 to 2000. The fourth section discusses our research design. Fifth, we present
statistical findings using logit models designed to estimate the probability of foreign nuclear deployments. The final section provides our conclusions.

**Importance of Foreign Nuclear Deployments**

Understanding the foreign deployment of nuclear weapons is relevant to several areas of research in international relations. First, a vast body of scholarship—including the contributions in this issue (Gartzke and Kroenig 2014; Brown and Kaplow 2014; Bleek and Lorber 2014; Gartzke, Kaplow, and Mehta 2014; Horowitz and Narang 2014)—seeks to understand the factors that propel states to acquire nuclear weapons. These studies highlight a variety of international, domestic, bureaucratic, and even psychological motivations for nuclear proliferation, as well as supply-side factors that enable (or prevent) the spread of nuclear technology. What these studies rarely mention, however, is that it is actually more common for states to “acquire” a nuclear capability by hosting weapons owned by another country. Since the dawn of the nuclear age, just ten states have constructed nuclear weapons of their own, whereas more than twenty countries have hosted another state’s nuclear weapons on their territory. Some have argued that foreign nuclear deployments can serve as partial substitutes for indigenous nuclear arsenals, implying that they have similar political and strategic effects. We know surprisingly little, though, about why states forward deploy nuclear weapons and how they relate to indigenous arsenals. By focusing exclusively on the spread of indigenous nuclear capabilities, the literature on nuclear proliferation has overlooked a potentially important piece of the proliferation puzzle.

To be sure, hosting nuclear weapons that remain under another state’s control is not the same as possessing one’s own nuclear weapons. However, like indigenous nuclear arsenals, nuclear deployments have potentially important consequences for international security and strategic stability, and are worthy of dedicated study. Foreign nuclear deployments are thought by some to strengthen military deterrence (Mearsheimer 1984), prevent indigenous nuclear proliferation (Reiter forthcoming), and increase the risks of nuclear sabotage and terrorist theft (Sauer and van der Zwaan 2011). This is the first large-N study to systematically evaluate the reasons states seek or authorize foreign nuclear deployments on their territory. Its findings augment existing research by further illuminating the factors that bolster (or dampen) the demand for nuclear weapons in world politics.

Second, our study contributes to literature about the sources and consequences of nuclear posture. Scholars have long recognized that nuclear posture—how a state operationalizes its nuclear arsenal—is an important part of the proliferation story (e.g., Wohlstetter 1961; Jervis 1984; Glaser 1990), and a new wave of research on this topic has begun to explore the causes and effects of nuclear posture (e.g., Lewis 2007; Narang 2009, 2013, forthcoming). Gartzke, Kaplow, and Mehta (2014) emphasize that, even after acquiring nuclear weapons, states face important decisions about arsenal size, command structure, launch authority, delivery platforms,
and deployment locations. The deployment of nuclear weapons abroad represents one such posture decision, with potentially significant consequences for international security. Some nuclear states have chosen to forward deploy weapons abroad, while others have opted to retain a strictly homeland-based deterrent. Why states choose one over the other is an important question in the study of nuclear weapons. Our study aims to provide some answers to this question, helping to paint a more complete picture of the sources of nuclear posture decisions.

Three Models in Search of a (Foreign) Bomb

Broadly, foreign nuclear deployments are likely to occur when there is a convergence of interests between a nuclear state and a potential host. In other words, foreign nuclear deployments require both a willing deployer of nuclear weapons and a collaborating host. Explaining foreign nuclear deployments therefore differs from the study of proliferation in that it requires us to explain the motivations of two parties, rather than just one. Under what conditions are the interests of deployers and hosts likely to converge?

The literature on nuclear proliferation offers few direct answers to this question. Indeed, to our knowledge, there are no comprehensive studies of the causes of foreign nuclear deployments. However, the historical record suggests three broad motivations: extended deterrence, nonproliferation, and military power projection. In this section, we develop these theoretical frameworks in richer detail and derive several observable implications.

Extended Deterrence

It is widely believed that self-defense is one of the most important reasons states acquire nuclear weapons. With a nuclear arsenal, states can more effectively deter challenges to their interests because they can threaten to impose nuclear punishment in retaliation for aggression. States may therefore seek to acquire nuclear weapons to counterbalance a nuclear-armed rival or to offset a perceived conventional imbalance.

There are significant potential drawbacks, however, to building one’s own nuclear arsenal. First, a state that initiates a Nuclear program might violate its obligations under the Nuclear Nonproliferation Treaty (NPT), inviting economic sanctions and other punitive measures. Second, an indigenous nuclear program could provoke negative reactions from allies. The discovery of a secret nuclear program in South Korea during the 1970s, for example, prompted the United States to threaten the withdrawal of its forces from the Korean peninsula (Engelhardt 1996). A third drawback is that nuclear programs are expensive, requiring significant investment in exchange for an uncertain outcome. Even when these programs succeed, they do so only after many years of trial and error, whereas the national security threats driving them often require immediate attention.
In light of these potential costs, states may find it preferable to recruit nuclear-armed allies who are willing to commit to their defense. Specifically, having an ally deploy nuclear weapons on one’s territory could be a particularly powerful way for states to reap the benefits of nuclear deterrence without incurring the costs of proliferation. Extraterritorial nuclear deployments could achieve extended deterrence in two ways.

First, nuclear deployments could increase the likelihood that nuclear weapons would be used in a conflict, thereby reducing an aggressor’s chances of winning and increasing its costs for fighting. One way to achieve this effect is to predelegate nuclear launch authority to commanders on the battlefield, who might order their use to avoid being overrun. In the 1950s, for example, President Dwight D. Eisenhower authorized senior military commanders to use nuclear weapons in the defense of US forces abroad “when the urgency of time and circumstances” precluded consultation with the president. While later presidents sought to rein in this authority, some observers (e.g., Bracken 1983) argued that US weapons in Western Europe nonetheless would be transferred to battlefield commanders during a crisis, thus removing political leaders from the decision loop. The logic was that Soviet leaders would be deterred from attacking by the knowledge that their US counterparts had “tied their own hands” to make nuclear escalation probable.

Second, foreign-deployed nuclear weapons could bolster extended deterrence by signaling that an ally is committed to the host’s defense. The central problem in extended deterrence lies in convincing an adversary that one would, in fact, defend one’s protégé in wartime. But because defending a protégé can be costly, extended deterrent commitments may lack credibility. Foreign-deployed nuclear weapons could help achieve credibility by demonstrating ex ante that an ally is willing to pay costs on behalf of its protégé (Fuhrmann and Sechser in press). Because a less resolved ally might be unwilling to pay the considerable costs of undertaking a foreign nuclear deployment, allies that deploy nuclear weapons abroad therefore might be able to distinguish themselves from less-resolved types. While perfect credibility is probably unattainable in extended deterrence, the act of paying costs on behalf of one’s protégé may at least cause adversaries to revise their credibility estimates upward (Fearon 1997).

From this logic, we can deduce two observable implications of the extended deterrence model. First, if foreign nuclear deployments are motivated mainly by extended deterrence, then we would expect such deployments to be more likely among allies. To the extent that one’s allies represent states that one is willing to defend, then the extended deterrence model expects alliance pairs to be prime candidates for foreign nuclear deployments. This yields the first hypothesis:

**Hypothesis D1:** Foreign nuclear deployments are more likely to occur between states that share defensive alliances.

Formal alliance agreements, however, can take time to cobble together, and often require the approval of domestic political institutions that do not necessarily react quickly to external security conditions. In some cases, nuclear states might want to deploy weapons to certain nonallies for extended deterrence purposes.
Specifically, nuclear powers might seek to protect states with whom they share a common rival. In these cases, both the deployer and the host state may perceive potential benefits from a foreign nuclear deployment, even in the absence of a formal alliance treaty. The Soviet Union, for example, deployed nuclear weapons in Cuba in 1962—thus triggering the Cuban missile crisis—despite having no formal defense pact with Cuba.

**Hypothesis D2:** Foreign nuclear deployments are more likely to occur between states that share a common rival.

The extended deterrence model offers a persuasive explanation for many foreign nuclear deployments, but it is not without limitations. Indeed, in some cases, it fits rather awkwardly with the historical record. For example, in 1977, President Jimmy Carter initiated a plan to withdraw all US nuclear weapons (as well as ground troops) from South Korea. Two years later, the plan was scuttled, and US nuclear weapons remained in South Korea until the end of the cold war. The extended deterrence model would expect that President Carter’s initial decision and subsequent reversal were driven by fluctuations in the level of threat faced by South Korea, which altered calculations about the need for US protection. Yet, this does not square with the historical record: South Korea’s security position neither improved significantly in the mid-1970s nor worsened dramatically after 1977. The extended deterrence model struggles to explain this case, suggesting the need for another theory of foreign nuclear deployments.

**Nonproliferation**

A second model argues that foreign nuclear deployments are often intended to prevent host states from building their own nuclear weapons. This model views foreign nuclear deployments as instruments of nonproliferation, aiming to persuade host states that a foreign nuclear presence is sufficient to meet their security needs. According to this logic, a state’s perceived proliferation risk—rather than its inherent value to a patron—is the primary impetus for a nuclear deployment.

The nonproliferation model sees reassurance as a central goal of foreign nuclear deployments. Whereas the extended deterrence model views adversaries as the primary audience for foreign nuclear deployments, the nonproliferation model emphasizes that the intended audience may actually be the host governments themselves. Deterring adversaries may be a necessary step toward mollifying host states, but deterrence is not the patron’s ultimate goal—it is only a means to the larger end of preventing proliferation.

The nonproliferation model helps make sense of nuclear deployments that do not neatly fit the extended deterrence framework. The case of South Korea in the 1970s, for example, seems to strongly support the nonproliferation model. The central question in this case is why the United States elected to retain nuclear weapons in South Korea, just two years after deciding to withdraw them. The extended deterrence model...
has little to say here, since South Korea’s security situation hardly changed during the period between the withdrawal decision and its reversal. However, one critical factor did change after 1977: South Korea transmitted veiled warnings to the United States that it would build its own nuclear weapons if US forces were withdrawn. This threat was particularly credible, given that the United States had uncovered a secret South Korean nuclear program only three years earlier. The Carter administration viewed this possibility as a major threat to its nonproliferation agenda—particularly since South Korea had just ratified the NPT in 1975—and eventually reversed its decision in hopes of dissuading South Korea from going nuclear.13

The US deployment of nuclear weapons in West Germany in the mid-1950s also lends support to the nonproliferation model. At first, this appears to be an easy case for the extended deterrence model: it seems natural that the United States would deploy nuclear weapons on West German soil, since the United States sought to deter a Soviet invasion of Western Europe and protect West Berlin during the cold war. However, a US deployment was not the only means for West Germany to achieve security: instead, the Germans could have constructed their own indigenous nuclear deterrent, which might have been even more credible than the American arsenal. Indeed, German leaders expressed interest in a domestic nuclear program on several occasions, and initially balked at signing the NPT. But the nonproliferation model argues that a key reason West Germany did not acquire nuclear weapons was that the United States placed nuclear forces on its territory (e.g., Mearsheimer 1990). With part of the US arsenal stationed directly on its soil, the theory holds, West German leaders were willing to forswear an independent deterrent. This is not to say that the US deployment alleviated all of West Germany’s concerns: throughout the cold war, German leaders anxiously wondered whether the United States would indeed risk its own nuclear destruction to defend an ally. However, the foreign nuclear presence, combined with the likely costs of proliferation, was sufficient to steer West German leaders away from the indigenous nuclear option (Paul 2000).

The basic expectation of the nonproliferation model is that states seen as proliferation risks are more likely to receive foreign nuclear deployments. In these cases, nuclear deployments are designed to satisfy both the patron’s interest in preventing proliferation and the host’s concerns about its security. Assessing a state’s likelihood of proliferating, of course, is notoriously difficult. However, one can envision that states which have either authorized the exploration of nuclear weapons or conducted nuclear research under the aegis of defense agencies would be seen as particularly acute risks (Singh and Way 2004). This yields the following testable implication:

**Hypothesis N1:** Foreign nuclear deployments are more likely to occur when a potential host state is engaged in nuclear “exploration.”

The nonproliferation model contains important insights about events that the extended deterrence model struggles to explain, but it also has significant
limitations. Most importantly, it cannot explain foreign nuclear deployments to countries that have never shown any inclination—or ability—to build nuclear weapons. For example, the models described earlier cannot explain why the United States deployed nuclear weapons to both Morocco and the Philippines during the cold war, since these countries were neither at risk of attack nor likely to proliferate. To shed light on these cases, we therefore turn to a third model.

**Power Projection**

A final model holds that states forward deploy nuclear forces to augment their ability to reach faraway targets with their nuclear arsenals. According to this perspective, nuclear powers make decisions about deployments largely based on the geographic location of a potential host. Deploying states seek to exploit the host’s position on the map to promote their own strategic interests—not to protect the host or alter its national policies. In this view, supply-side factors driven largely by military necessities are more important than the host’s need for a nuclear deterrent.

Nuclear weapons play an important role in the defense strategies of major powers that possess them. But the deterrence benefits of these weapons may be limited if states lack the capacity to use them against potential adversaries. The United States, for example, lacked the ability to hit key targets in the Soviet Union in the early 1950s, since it had not yet deployed ICBMs and the range of US bombers was insufficient to reach most Soviet targets from the continental United States. In the event of a Soviet invasion of Europe during this period, America’s ability to retaliate with nuclear weapons therefore would have been minimal.

Forward deployments can help nuclear powers solve this problem. Stationing nuclear forces abroad could provide states with the capacity to strike targets in distant lands, a capability that they might otherwise lack. To improve its ability to strike the Soviet homeland, for example, the United States introduced nuclear weapons in Morocco in 1954. These forces were meant to augment an allied attack across the Mediterranean in the event of a Soviet blitzkrieg into Western Europe (Wright 1983, 72). British nuclear deployments to Southeast Asia beginning in the early 1960s also provide a fitting illustration of this motive. During this period, Britain feared that it could not defend its South East Asia Treaty Organization (SEATO) allies in a war against China because its “V-bombers”—the Valiant, Vulcan, and Victor aircraft—did not have the range to deliver nuclear forces to the region if they were launched from Europe. To address this issue, Prime Minister Harold Macmillian authorized the deployment of nuclear-capable bombers to Singapore, which was part of Malaysia at the time. Astonishingly, Malaysian prime minister Tunku Abdul Rahman was not even informed of the deployment, underscoring that the objective of the deployment was neither to protect Malaysia (which was not even a member of SEATO) nor to dissuade it from building nuclear weapons.

Geographic considerations could motivate states to forward deploy nuclear forces even if their delivery systems already allow them to use nuclear weapons virtually
anywhere in the world. Indeed, both the Soviet Union and the United States continued to forward deploy nuclear forces well after they acquired ICBMs. They did so, in part, because foreign deployments provided them with the capability to hit targets abroad more promptly (due to shorter flight times) and more accurately. This, they believed, facilitated their ability to punish the enemy in the event of war and potentially stymie invading forces.

Three observable implications follow from the power projection model. First, if states forward deploy nuclear weapons to increase their ability to hit faraway targets, then countries located far from the nuclear power should make more attractive hosts. For example, stationing nuclear forces in the Caribbean would not have substantially improved America’s ability to strike targets around the world. Deploying forces in more distant countries such as Morocco, however, substantially increased the reach of the American nuclear arsenal during the 1950s.

**Hypothesis P1:** Foreign nuclear deployments are more likely to occur between states located far from one another.

The power projection model also implies that the distance between a potential host and a patron’s rivals should factor into deployment decisions. In particular, states located near a nuclear power’s adversaries should make especially attractive hosts since their location would enable the nuclear power to promptly hit targets in a rival’s homeland in the event of war. Singapore was an attractive host for Britain, for instance, because it was located relatively close to China. This leads to the second implication:

**Hypothesis P2:** Foreign nuclear deployments are more likely to occur when a potential host is located in close proximity to the deployer’s adversaries.

An ICBM capability could mitigate the need to station nuclear forces abroad by allowing a state to strike faraway targets from domestic launch points. If power projection is a goal of foreign nuclear deployments, therefore, states may be less likely to station nuclear forces abroad if they possess long-range missiles. At the same time, ICBMs may not completely obviate the need to place nuclear weapons abroad. The Soviet Union, for instance, introduced nuclear weapons in Cuba in 1962—three years after it developed long-range missiles (Early 2011). An ICBM capability thus reduces the strategic need to forward deploy a nuclear arsenal, on average, although long-range missile possessors may still deploy some of their forces abroad.

**Hypothesis P3:** Foreign nuclear deployments are less likely to occur when a potential deployer possesses ICBMs.

**Alliances as Necessary Conditions for Nuclear Deployments**

The three previously developed models implicitly assume that nuclear deployments may occur even if the deployer and the host are not allies. However, in some cases,
an alliance may be necessary for deployments to occur. One might argue, for instance, that the United States would deploy its nuclear forces to deter proliferation only if the potential proliferator was an ally. We address this concern by testing all three of our models in a limited sample of allied dyads only. This allows us to consider a related research question: Why do nuclear states deploy weapons to some allies and not others? As we show in the following, the empirical results are similar. Theories that generally explain foreign nuclear deployments, therefore, also help us understand intra-alliance variation in deployments.

Data Set: Foreign Nuclear Deployments

A comprehensive data set of foreign nuclear deployments was not publicly available prior to this study. However, newly available information has allowed us to assemble, for the first time, a comprehensive list of nuclear deployments. To identify these cases, we consulted a variety of sources, including previously classified documents and historical studies of nuclear proliferation and nuclear strategy. In this section, we describe our data set in greater detail, focusing on our definition of nuclear deployments, the coding procedures we employed, and the historical cases we identified.

Our data set includes all known cases between 1945 and 2000 in which a state intentionally stationed nuclear forces on the sovereign territory of another country. This definition excludes four types of cases. First, we exclude the “inadvertent” Soviet nuclear deployments in Belarus, Kazakhstan, and Ukraine in the immediate aftermath of the cold war. These three states inherited atomic weapons from Moscow after the Soviet Union collapsed in December 1991, and the forces were eventually returned to Russia in the mid-1990s. Second, the United States has occasionally stationed “nonnuclear” bombs abroad, meaning that the weapon did not include the fissile core (consisting of either plutonium or weapons grade highly enriched uranium). These cases—which included US deployments to Cuba, France, and Japan—are excluded from our data set because they are not technically nuclear weapons. Third, we do not count cases where a nuclear power stationed forces on “foreign” territory over which it held sovereign control (e.g., the US nuclear deployment to Okinawa prior to 1972). Finally, we exclude sea-based nuclear deployments from our analysis because there is no clear host country for weapons stationed at sea.

Table 1 lists the foreign nuclear deployments we identified. As the table reveals, three different countries—Britain, the Soviet Union, and the United States—forward-deployed nuclear forces to twenty-three different host countries between 1945 and 2000 (West Germany hosted bombs from two different countries). Some of the deployments listed in Table 1 have been known for some time, while others may come as a surprise. A casual glance at Table 1 finds some support for each of the three models. Statistical analysis can help us determine whether robust empirical patterns emerge from this seemingly diverse set of cases.
Operationalization of Variables

We construct a dichotomous dependent variable (*Foreign nuclear deployment*) that is coded 1 if a nuclear state stationed nuclear weapons on the territory of the host country in a given year and 0 if not.\(^\text{18}\) This variable therefore codes both new and ongoing deployments identically. The reason for doing so is that nuclear deployments can be reversed at any time. Indeed, as Table 1 illustrates, nuclear weapons were eventually withdrawn from forward-deployed locations in the vast majority of the cases in our data set. A comprehensive test of the three models developed in this article should therefore account for the introduction of forward-deployed nuclear weapons, as well as the decision to keep forces abroad once a deployment has occurred. However, we also create two alternate dependent variables to address potential objections to this coding scheme. First, an alternate dependent variable measures the initiation of foreign nuclear deployments only, dropping observations after the first year a deployment occurs. A second dependent variable, which is based on a more lenient definition, includes three of the excluded deployment types.

<table>
<thead>
<tr>
<th>Nuclear weapons state</th>
<th>Host country</th>
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<tbody>
<tr>
<td>Britain</td>
<td>Cyprus</td>
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<td>Britain</td>
<td>Malaysia</td>
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<td>Singapore</td>
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<td>Britain</td>
<td>(West) Germany</td>
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<td>Soviet Union</td>
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<td>Soviet Union</td>
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<tr>
<td>United States</td>
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<td>1955–2000</td>
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*Note: Data are right censored.*

### Table 1. The Foreign Deployment of Nuclear Weapons, 1945–2000.

We construct a dichotomous dependent variable (*Foreign nuclear deployment*) that is coded 1 if a nuclear state stationed nuclear weapons on the territory of the host country in a given year and 0 if not.\(^\text{18}\) This variable therefore codes both new and ongoing deployments identically. The reason for doing so is that nuclear deployments can be reversed at any time. Indeed, as Table 1 illustrates, nuclear weapons were eventually withdrawn from forward-deployed locations in the vast majority of the cases in our data set. A comprehensive test of the three models developed in this article should therefore account for the introduction of forward-deployed nuclear weapons, as well as the decision to keep forces abroad once a deployment has occurred. However, we also create two alternate dependent variables to address potential objections to this coding scheme. First, an alternate dependent variable measures the initiation of foreign nuclear deployments only, dropping observations after the first year a deployment occurs. A second dependent variable, which is based on a more lenient definition, includes three of the excluded deployment types.

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<tr>
<td>Soviet Union</td>
<td>Czechoslovakia</td>
<td>1969–1990</td>
</tr>
<tr>
<td>Soviet Union</td>
<td>East Germany</td>
<td>1958–1991</td>
</tr>
<tr>
<td>Soviet Union</td>
<td>Mongolia</td>
<td>1967–1992</td>
</tr>
<tr>
<td>Soviet Union</td>
<td>Poland</td>
<td>1967–1990</td>
</tr>
<tr>
<td>United States</td>
<td>Belgium</td>
<td>1963–2000</td>
</tr>
<tr>
<td>United States</td>
<td>Britain</td>
<td>1954–2000</td>
</tr>
<tr>
<td>United States</td>
<td>Canada</td>
<td>1964–1984</td>
</tr>
<tr>
<td>United States</td>
<td>Denmark</td>
<td>1958–1965</td>
</tr>
<tr>
<td>United States</td>
<td>Greece</td>
<td>1960–2000</td>
</tr>
<tr>
<td>United States</td>
<td>Italy</td>
<td>1956–2000</td>
</tr>
<tr>
<td>United States</td>
<td>Morocco</td>
<td>1954–1963</td>
</tr>
<tr>
<td>United States</td>
<td>The Netherlands</td>
<td>1960–2000</td>
</tr>
<tr>
<td>United States</td>
<td>Philippines</td>
<td>1957–1977</td>
</tr>
<tr>
<td>United States</td>
<td>South Korea</td>
<td>1958–1991</td>
</tr>
<tr>
<td>United States</td>
<td>Spain</td>
<td>1958–1976</td>
</tr>
<tr>
<td>United States</td>
<td>Taiwan</td>
<td>1958–1974</td>
</tr>
<tr>
<td>United States</td>
<td>Turkey</td>
<td>1959–2000</td>
</tr>
<tr>
<td>United States</td>
<td>(West) Germany</td>
<td>1955–2000</td>
</tr>
</tbody>
</table>

*Note: Data are right censored.*
described above: “inadvertent” deployments, so-called nonnuclear bombs, and deployments on foreign territory over which the deployer maintains sovereignty. We use these alternate variables below to evaluate the sensitivity of our findings.

To test the extended deterrence hypotheses, we code two variables. Defensive alliance is a dichotomous variable that is coded 1 if the deployer and the host countries share a defense pact and 0 if not. We code this variable based on the Alliance Treaty Obligations and Provisions data set (Leeds et al. 2002). Shared rival is a variable from Fuhrmann (2012) which is based on the New Rivalry Data set (Klein, Goertz, and Diehl 2006). It is coded 1 if the deployer and host states have at least one common rival and 0 otherwise.

We use a nuclear proliferation data set originally compiled by Singh and Way (2004) and updated by Bleek (2010) to test the nonproliferation model. A host’s interest in an independent nuclear deterrent could provide nuclear powers with incentives to forward deploy nuclear weapons—even if the host has not initiated a full-blown nuclear program. We therefore include Nuclear exploration, which is coded 1 if the host state is formally exploring nuclear weapons research and 0 if not.

We test the power projection model by constructing three variables. Distance from State A measures the “great circle” distance between the two states in the dyad, measured in thousands of miles. Distance from State A’s rival measures the distance (also in thousands of miles) between the host state and the deployer’s rival.19 If the deployer has multiple rivals, we code this variable based on the enemy that is most proximate to the potential host. Finally, ICBM is a dichotomous variable that is coded 1 if a nuclear power possesses ICBMs in a given year and 0 if it does not (Early 2011).

We control for a handful of other factors that could influence foreign nuclear deployments. States with larger nuclear arsenals might be in a better position to forward deploy nuclear weapons because they can share weapons without undermining their ability to defend the homeland. We therefore include Arsenal size, which measures the (logged) number of nuclear weapons that the deploying country possesses (Sechser and Fuhrmann 2013). Deploying countries may be reluctant to station nuclear weapons in an unstable country because they could be vulnerable to sabotage or theft. Thus, Civil war is coded 1 if there is a civil war in the host country and 0 if not (Gleditsch et al. 2002). The end of the Cold War also may have affected incentives to undertake nuclear deployments. Post–Cold War is coded 1 if the year is after 1991 and 0 otherwise. To control for the effect of NPT membership on foreign nuclear deployments we include NPT, which is coded 1 if either the deployer or the host has ratified the NPT and 0 if not.

We deal with temporal dependence in two ways. First, following Carter and Signorino (2010), we include a variable that counts the number of years that pass without a deployment (Time), along with its square (Time^2) and its cube (Time^3). Second, because these variables do not account for the length of time that weapons have been deployed (they are each coded 0 if a deployment occurred in the previous year) we include the variable Deployment years, which measures the number of consecutive years that a country has hosted foreign nuclear weapons.
Empirical Analysis and Findings

Table 2 displays the findings from logit models with standard errors clustered by dyad to address heteroscedasticity among country pairs in the sample. The estimation sample includes all directed dyads where a foreign nuclear deployment could conceivably occur, which we define as those in which the potential deployer possesses nuclear weapons and the deployer and host are nonrivals. Countries sometimes deploy nuclear forces to neutral states with which they do not share a military alliance (e.g., the US deployment to Morocco), which is why it is appropriate to include nonallied dyads in our data set. However, as previously discussed, we also test the hypotheses using a more limited sample that includes allied dyads only.

The findings from the baseline model (model 1) provide strong support for the extended deterrence perspective. The coefficient on Defense pact is positive and statistically significant ($p < .01$), indicating that, on average, allies of the deploying state are more likely than nonallies to host nuclear weapons on their soil (Hypothesis $D_1$). This is an intuitive finding, but it was not predetermined given that several deployments were to nonallied countries, as we previously discussed. Shared rival is also positive and statistically significant at the 99 percent level, indicating that nuclear powers are more likely to deploy nuclear forces on the territory of states with which they share a common enemy (Hypothesis $D_2$), even after controlling for the effect of alliances.

The results also provide partial support for the power projection argument. Distance from State A is statistically insignificant, meaning that the distance between the potential deployer and the host does not predict whether there will be a nuclear deployment (Hypothesis $P_1$). However, as expected, Distance from State A’s rival is negative and highly significant ($p < .01$). This suggests that countries are more likely to station nuclear forces in countries that are located in close proximity to their rivals, supporting Hypothesis $P_2$. ICBM is negative and statistically significant ($p < .01$), indicating that nuclear powers become less likely to forward deploy forces when they acquire long-range missiles. However, the advent of ICBMs has not rendered foreign nuclear deployments irrelevant. To evaluate whether long-range missiles fundamentally changed the factors that motivate states to forward deploy nuclear weapons, we compared the behavior of ICBM possessors to states that did not possess ICBMs. The findings, available in the Online Appendix, show that the same factors are statistically significant whether we examine ICBM possessors or nonpossessors.

On the other hand, the results do not support the nonproliferation model. Nuclear exploration is negative and statistically significant ($p < .05$), revealing that—contrary to Hypothesis $N_1$—states actively exploring their nuclear options are actually less likely to host foreign nuclear weapons. However, nuclear states might deploy forces preemptively, before states even begin to formally investigate their nuclear options. One might argue, for example, that Turkey would have explored nuclear weapons if the United States had not stationed nuclear forces in that country.
## Table 2. Logit Analysis of Foreign Nuclear Deployments.

<table>
<thead>
<tr>
<th></th>
<th>(1) Full sample</th>
<th>(2) Full sample</th>
<th>(3) Allies only</th>
<th>(4) Allies only</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Defense pact</strong></td>
<td>4.016** (0.579)</td>
<td>4.024** (0.659)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Shared rival</strong></td>
<td>1.583** (0.470)</td>
<td>1.681** (0.407)</td>
<td>1.628** (0.496)</td>
<td>1.679** (0.424)</td>
</tr>
<tr>
<td><strong>Nuclear exploration</strong></td>
<td>−1.869* (0.736)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Probability of proliferation</strong> (State B)</td>
<td></td>
<td>−0.828 (0.801)</td>
<td></td>
<td>0.590 (0.870)</td>
</tr>
<tr>
<td><strong>Distance from State A</strong></td>
<td>−0.100 (0.118)</td>
<td>−0.044 (0.115)</td>
<td>−0.122 (0.116)</td>
<td>−0.047 (0.108)</td>
</tr>
<tr>
<td><strong>Distance from state A's rival</strong></td>
<td>−0.506** (0.155)</td>
<td>−0.346** (0.103)</td>
<td>−0.821** (0.295)</td>
<td>−0.515* (0.202)</td>
</tr>
<tr>
<td><strong>ICBM</strong></td>
<td>−2.512** (0.621)</td>
<td>−3.204** (0.628)</td>
<td>−2.402** (0.914)</td>
<td>−2.788** (0.834)</td>
</tr>
<tr>
<td><strong>Civil war</strong></td>
<td>−1.992** (0.749)</td>
<td>−2.034* (0.798)</td>
<td>−1.538* (0.603)</td>
<td>−1.756* (0.729)</td>
</tr>
<tr>
<td><strong>Arsenal size</strong></td>
<td>0.847** (0.117)</td>
<td>0.942** (0.099)</td>
<td>0.857** (0.143)</td>
<td>0.927** (0.127)</td>
</tr>
<tr>
<td><strong>Post–Cold War</strong></td>
<td>−1.991** (0.770)</td>
<td>−1.647* (0.719)</td>
<td>−1.946** (0.688)</td>
<td>−1.787** (0.605)</td>
</tr>
<tr>
<td><strong>NPT</strong></td>
<td>−1.166* (0.549)</td>
<td>−0.237 (0.442)</td>
<td>−1.111* (0.553)</td>
<td>0.212 (0.459)</td>
</tr>
<tr>
<td><strong>Deployment years</strong></td>
<td>0.112** (0.036)</td>
<td>0.066⁺ (0.035)</td>
<td>0.082** (0.028)</td>
<td>0.022 (0.027)</td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td>−1.476** (0.235)</td>
<td>−2.813** (0.399)</td>
<td>−1.473** (0.234)</td>
<td>−2.696** (0.393)</td>
</tr>
<tr>
<td><strong>Time²</strong></td>
<td>0.080** (0.027)</td>
<td>0.251** (0.052)</td>
<td>0.078** (0.025)</td>
<td>0.234** (0.051)</td>
</tr>
<tr>
<td><strong>Time³</strong></td>
<td>−0.001⁺ (0.001)</td>
<td>−0.006** (0.002)</td>
<td>−0.001* (0.001)</td>
<td>−0.006** (0.002)</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>−6.928** (0.670)</td>
<td>−6.948** (0.691)</td>
<td>−2.612** (0.670)</td>
<td>−2.923** (0.541)</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>41,252</td>
<td>34,244</td>
<td>4,195</td>
<td>3,898</td>
</tr>
<tr>
<td><strong>Pseudo R²</strong></td>
<td>.891</td>
<td>.917</td>
<td>.857</td>
<td>.896</td>
</tr>
</tbody>
</table>

Note: ICBM = intercontinental ballistic missile; NPT = Nuclear Nonproliferation Treaty. Robust standard errors in parentheses.  
⁺p < .10, *p < .05, **p < .01.
beginning in the 1950s. We therefore conduct an alternate test of Hypothesis N1 using the predicted probability of nuclear weapons pursuit as a substitute for Nuclear exploration. Countries that are at risk for building nuclear weapons, according to this alternative argument, should be more likely to host foreign nuclear weapons. Yet, the coefficient on the predicted probability of weapons pursuit is statistically insignificant (model 2), indicating that, on average, likely proliferators are not more likely to host foreign bombs—whether they have formally explored the nuclear option or not. We also used the state’s security environment, a factor widely regarded as a reliable predictor of proliferation, as a proxy for its interest in building nuclear weapons. As we show in the online appendix, involvement in militarized interstate disputes is not statistically related to hosting foreign nuclear weapons, further undermining the nonproliferation hypothesis.

A close examination of the data underscores the limitations of the nonproliferation argument. States deployed nuclear weapons on the territory of states that were exploring nuclear weapons on only four occasions: United States–Italy, United States–Taiwan, United States–South Korea, and United States–West Germany. Meanwhile, states refrained from stationing nuclear weapons on the territory of potential proliferators on more than a dozen occasions. The United States, for example, never deployed nuclear forces to Argentina, Australia, Brazil, France, Iran (an ally prior to 1979), or Norway.

Turning to the control variables, states are more likely to station nuclear forces abroad when they have larger nuclear arsenals, as indicated by the positive and statistically significant coefficient on Arsenal size. Concerns about host state instability appear to influence deployment decisions: Civil war is negatively associated with hosting nuclear weapons. States became generally less likely to station nuclear forces abroad after the cold war. NPT is statistically significant and negative, indicating that NPT membership appears to somewhat constrain nuclear deployments. The statistical significance and positive sign on the coefficient of Deployment years indicates that nuclear weapons are more likely to remain in place the longer they are deployed abroad. Finally, the other three time-related variables collectively indicate that states are less likely to deploy nuclear weapons to a given host the longer they have refrained from doing so.

Do these findings hold when we limit our analysis only to allied states? We address this question by replicating model 1 in a limited sample that excludes all nonallied dyads (model 3). Although this decreases our sample size by 90 percent (from 41,252 observations to 4,195), the results are remarkably similar to those above. We continue to find support for the extended deterrence model: the statistical significance of Shared rival indicates that nuclear powers are more likely to bolster commitments to allies by placing nuclear weapons on their soil when they are vulnerable to attack by a common enemy. This explains, in part, why some US allies hosted foreign nuclear weapons (e.g., Belgium, South Korea, and West Germany) while others did not (e.g., Australia, Thailand, and Uruguay). The power projection model likewise explains variation in nuclear
deployments among allies. Consistent with our previous finding, allies located in close proximity to a nuclear power’s rival are more likely to host nuclear weapons than allies that are located far from the deployer’s enemies. ICBM likewise continues to be statistically significant in model 3, while Distance from State A remains insignificant. Our analysis yields similar conclusions about the nonproliferation model when we examine allied dyads only. Nonproliferation does not appear to motivate nuclear deployments whether we use Nuclear exploration (model 3) or the predicted probability of proliferation (model 4) to measure the host’s interest in an indigenous nuclear arsenal.

How substantively important are these factors in shaping the probability of foreign nuclear deployments? To address this question, we calculate the odds ratio for each statistically significant independent variable, which represents the ratio of the odds of an event occurring in one group to the odds of the same event occurring in another group (Liao 1994, 13). This ratio is calculated by exponentiating the coefficient on an independent variable. An odds ratio greater than 1 indicates a positive relationship between the independent variable and the probability of foreign nuclear deployments; a ratio less than 1 indicates a negative relationship. By subtracting 1 from the odds ratio and multiplying the resulting figure by 100, we can calculate the percentage change in an event’s probability caused by a one-unit increase in the independent variable.

Table 3 displays the relevant odds ratios and the percentage change in odds based on the estimates from model 1. Beginning with the extended deterrence argument, the odds of a nuclear power deploying forces on the territory of an ally are about 55 times greater than the odds of stationing weapons in a nonallied country. Put differently, the relative odds of a deployment are 5,447 percent greater for allies than nonallies. This is quite a large effect, particularly by standards employed in international relations. Having a shared rival also has a strong positive effect on deployments. The odds of stationing nuclear weapons on the territory of a state with which a nuclear power shares a rival are 4.87 times greater than the odds of deploying forces to a state with which it does not share an enemy. Thus, having a shared rivalry increases the odds of a nuclear deployment by 387 percent.

The substantive effect of ICBMs is striking: the odds of a nuclear state forward-deploying nuclear weapons are 90 percent lower when it possesses ICBMs. The need to forward deploy nuclear forces therefore declines considerably once states develop the capacity to hit faraway targets from the homeland. Yet, as previously underscored, extended deterrence and power projection remain important motives for stationing nuclear forces abroad even after ICBM acquisition. Distance from State A’s rival, the other statistically significant power projection variable, has an odds ratio of 0.60, indicating that increasing the distance between the potential host state and the deployer’s rival by 1,000 miles (i.e., a one-unit increase in this variable) lowers the odds of a deployment by 40 percent.
The odds ratio for *Nuclear exploration* is 0.15, indicating that hosts that are exploring the development of nuclear weapons are less than one-sixth as likely to house foreign nuclear weapons on their soil. Interestingly, this effect is similar across allied and nonallied dyads. Nuclear weapons exploration thus has a strong negative effect on deployments regardless of whether we focus on allies or all dyads.

The controls that achieve conventional levels of statistical significance also exert significant substantive effects on the likelihood of foreign nuclear deployments. A one-unit increase in *Arsenal size* increases the odds of a deployment by 133 percent. States that experience civil wars are 86 percent less likely than other countries to host foreign nuclear weapons. Increasing *Post–Cold War* or *NPT* from 0 to 1 lowers the odds of a nuclear deployment by 86 percent and 69 percent, respectively. Finally, the odds ratio of *Deployment years* is 1.12, meaning that hosting nuclear weapons for an additional year increases the relative odds that a state will continue to have forces stationed on its soil by 12 percent.22

### Table 3. Substantive Effects of Statistically Significant Covariates.

<table>
<thead>
<tr>
<th>covariate</th>
<th>Odds ratio</th>
<th>Percentage change in odds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defense pact</td>
<td>55.47</td>
<td>5,447</td>
</tr>
<tr>
<td>Shared rival</td>
<td>4.87</td>
<td>387</td>
</tr>
<tr>
<td>Nuclear exploration</td>
<td>0.15</td>
<td>–85</td>
</tr>
<tr>
<td>Distance from State A’s rival</td>
<td>0.60</td>
<td>–40</td>
</tr>
<tr>
<td>ICBM</td>
<td>0.08</td>
<td>–92</td>
</tr>
<tr>
<td>Civil war</td>
<td>0.14</td>
<td>–86</td>
</tr>
<tr>
<td>Arsenal size</td>
<td>2.33</td>
<td>133</td>
</tr>
<tr>
<td>Post–Cold War</td>
<td>0.14</td>
<td>–86</td>
</tr>
<tr>
<td>NPT</td>
<td>0.31</td>
<td>–69</td>
</tr>
<tr>
<td>Deployment years</td>
<td>1.12</td>
<td>12</td>
</tr>
</tbody>
</table>

*Note: ICBM = intercontinental ballistic missile; NPT = Nuclear Nonproliferation Treaty.*

The Sensitivity Analysis

We conduct additional tests to evaluate whether our findings are sensitive to changes in the coding of our dependent variable or our sample size. The relevant findings are displayed in Table 4. First, we use an alternate dependent variable that codes the initiation of nuclear deployments only—reducing the number of 1s in the data set from 593 to 24 (model 5). Second, we replicate our analysis using the more lenient criteria described above to code foreign nuclear deployments (model 6). Third, we limit the estimation sample to dyads involving states that actually stationed forces abroad at some point during our period of study (model 7). Fourth, we only include the United States and the Soviet Union as potential deployers, given that these two states are arguably the most important when it comes to the forward deployment of nuclear weapons (model 8).
The findings are similar to those reported in Table 2, further underscoring the robustness of the core results. There are, however, a few minor differences compared to our baseline model. Nuclear exploration is insignificant in models 5 and 6, suggesting that the negative relationship between nuclear deployments and nuclear exploration is sensitive to the coding of the dependent variable. Distance from State A is statistically significant and negative in model 8; that variable was insignificant in all of the models that we previously reported. In other cases, the statistical significance of variables weakens slightly but they remain significant at conventional levels. In terms of the control variables, the most significant change is that the significance of Post–Cold War washes away in model 8, indicating that the salience of this variable declines when we limit our sample to the Soviet Union and the United States.

Discussion and Conclusion

This article analyzed a central question in the study of nuclear strategy: Why do countries station nuclear weapons on the territory of other states? To find out, we developed and tested three theoretical models of foreign nuclear deployment. The first model, extended deterrence, posited that nuclear powers forward deploy forces to protect friends that may be vulnerable to third-party aggression. Second, a nonproliferation model suggested that countries station nuclear weapons abroad to dissuade host states from developing independent nuclear arsenals. Third, a power projection model theorized that nuclear states make deployments based on geographic factors that allow them to better defend their geopolitical interests.

We constructed a new data set of foreign nuclear deployments to test these arguments, finding the strongest support for the extended deterrence model. States are substantially more likely to place nuclear weapons on the territory of allies as well as states with whom they share common rivals. Further analysis showed that nuclear powers are more likely to deploy weapons to allies with whom they share a rival—and presumably are more vulnerable to attack—than allies with whom they do not share an enemy. We also found some support for the power projection model. States located in close proximity to a nuclear power’s rival are more likely to host foreign nuclear weapons, and ICBM possession by the potential deployer reduces the probability of stationing forces abroad, although the distance between the deployer and host itself appears unrelated to the likelihood of a deployment. The results yielded no support, however, for the nonproliferation argument. The findings suggested that a host state’s interest in nuclear weapons is unrelated, and perhaps negatively related, to the likelihood that it will have nuclear forces stationed on its territory—even if the deployer and host are allies.

These findings offer some of the first empirically grounded insights into the determinants of foreign nuclear deployments. They are interesting, in part, because they expose commonalities among the determinants of foreign nuclear deployments and indigenous proliferation. The literature on the causes of nuclear proliferation has long established that a key reason countries acquire nuclear weapons is to deter
### Table 4. Logit Analysis of Foreign Nuclear Deployments.

<table>
<thead>
<tr>
<th></th>
<th>(5) Initiations only</th>
<th>(6) Expanded deployments</th>
<th>(7) Deployers only</th>
<th>(8) United States/Union of Soviet Socialist Republics only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defense pact</td>
<td>3.112** (0.645)</td>
<td>3.732** (0.511)</td>
<td>3.888** (0.585)</td>
<td>4.246** (1.002)</td>
</tr>
<tr>
<td>Shared rival</td>
<td>1.042* (0.578)</td>
<td>1.384** (0.479)</td>
<td>1.544** (0.463)</td>
<td>1.236* (0.601)</td>
</tr>
<tr>
<td>Nuclear exploration</td>
<td>−1.138 (1.283)</td>
<td>−0.997 (0.825)</td>
<td>−1.698* (0.761)</td>
<td>−1.239* (0.701)</td>
</tr>
<tr>
<td>Distance from State A</td>
<td>−0.022 (0.123)</td>
<td>−0.144 (0.110)</td>
<td>−0.107 (0.117)</td>
<td>−0.214* (0.103)</td>
</tr>
<tr>
<td>Distance from State A’s rival</td>
<td>−0.636** (0.193)</td>
<td>−0.555** (0.161)</td>
<td>−0.462** (0.159)</td>
<td>−0.760** (0.234)</td>
</tr>
<tr>
<td>ICBM</td>
<td>−2.533** (0.872)</td>
<td>−2.794** (0.630)</td>
<td>−2.414** (0.627)</td>
<td>−2.147* (0.895)</td>
</tr>
<tr>
<td>Civil war</td>
<td></td>
<td>−1.809** (0.662)</td>
<td>−1.929** (0.728)</td>
<td>−1.426* (0.728)</td>
</tr>
<tr>
<td>Arsenal size</td>
<td>0.654** (0.157)</td>
<td>0.895** (0.123)</td>
<td>0.770** (0.124)</td>
<td>1.170** (0.207)</td>
</tr>
<tr>
<td>Post–Cold War</td>
<td></td>
<td>−1.503** (0.541)</td>
<td>−1.937* (0.765)</td>
<td>−1.150 (1.248)</td>
</tr>
<tr>
<td>NPT</td>
<td>−1.537* (0.677)</td>
<td>−1.076* (0.486)</td>
<td>−1.162* (0.538)</td>
<td>−2.365** (0.634)</td>
</tr>
<tr>
<td>Deployment years</td>
<td>−1.071** (0.342)</td>
<td>0.097** (0.030)</td>
<td>0.113** (0.036)</td>
<td>0.110* (0.045)</td>
</tr>
<tr>
<td>Time</td>
<td></td>
<td>−1.480** (0.239)</td>
<td>1.334** (0.190)</td>
<td>1.001* (0.000)</td>
</tr>
<tr>
<td>Time²</td>
<td>0.095* (0.038)</td>
<td>−1.500** (0.249)</td>
<td>0.081** (0.028)</td>
<td>0.066** (0.019)</td>
</tr>
<tr>
<td>Time³</td>
<td>−0.002* (0.001)</td>
<td>0.084** (0.030)</td>
<td>−0.001* (0.001)</td>
<td>−0.001* (0.000)</td>
</tr>
<tr>
<td>Constant</td>
<td>−8.173** (0.951)</td>
<td>−6.770** (0.666)</td>
<td>−6.218** (0.787)</td>
<td>−9.258** (1.455)</td>
</tr>
<tr>
<td>N</td>
<td>40,365</td>
<td>41,252</td>
<td>20,059</td>
<td>11,709</td>
</tr>
<tr>
<td>Pseudo $R^2$</td>
<td>.392</td>
<td>.883</td>
<td>.876</td>
<td>.888</td>
</tr>
</tbody>
</table>

Note: ICBM = intercontinental ballistic missile; NPT = Nuclear Nonproliferation Treaty. Robust standard errors are given in parentheses. *$p < .10$, *$p < .05$, **$p < .01$. 
aggression from potentially hostile states. Our study confirms that deterrence appears to be the most widespread motive for foreign nuclear deployments as well. Foreign deployments appear designed primarily to protect protégés from attack, a result that parallels the emphasis on national security motivations in the literature on indigenous proliferation. Deterrence is not necessarily the only motive for nuclear deployments, but clearly it plays a significant role.

One factor that did not stand out in our analysis was the desire to quell nuclear proliferation. Given that nonproliferation appears to have played a central role in motivating US deployments to South Korea and Taiwan, one might expect that the United States would be more prone to deploy nuclear weapons to countries seen to be proliferation risks. With its long-standing interest in nonproliferation, stationing a few nuclear weapons on the territory of a potential proliferator might be a small price for the United States to pay to prevent the further spread of nuclear weapons. Our analysis, however, did not bear this out.

This finding is somewhat puzzling, particularly in light of evidence that nuclear deployments are effective proliferation suppressants (Reiter forthcoming). One possible explanation for this finding is that nuclear powers simply do not believe that it is worth forward-deploying nuclear forces if the main benefit of doing so is curtail ing the host’s interest in nuclear weapons. A second possibility is that nuclear states actually would like to station nuclear forces abroad to promote nonproliferation objectives, but the host governments refuse to accept foreign weapons. This appears to have been the case in France, for example, where Charles de Gaulle was determined to build the force de frappe and refused US offers to station nuclear weapons. Third, it might be impractical or potentially dangerous to deploy nuclear weapons when the potential host is thinking about proliferating. Alliance relationships might be strained in such cases, making it less likely that the nuclear power would accept the risks that come with foreign nuclear deployments. Moreover, nuclear states might worry about domestic instability in allied countries that are considering building nuclear weapons.

From a policy standpoint, the results of this study shed light on the conditions under which the United States or another nuclear power might be willing to undertake new nuclear deployments in the future. In particular, observers have recently speculated that the United States might consider forward-deploying nuclear forces to countries such as South Korea or Saudi Arabia. Others have suggested that US nuclear weapons in Europe have outgrown their usefulness and will soon be withdrawn. What do our findings suggest about these possibilities?

The central result of this article is that the deployment strategies of nuclear powers depend critically on security threats rather than nonproliferation risks. Foreign nuclear deployments are designed primarily to protect allies and project power against adversaries rather than influence the behavior of host states. Even in the ICBM age, policy makers in nuclear states continue to see nuclear deployments as important signals of alliance commitment. If the United States–China relationship were to take a turn for the worse, for example, then Japan, South Korea, or even
Taiwan might become candidates for US deployments because of their proximity to China and close relationship with the United States. In light of our findings, it also would not be surprising if the United States thinks seriously about redeploying nuclear forces to South Korea in response to continued North Korean aggression. By contrast, even if Saudi Arabia or other Middle Eastern states were to take steps toward developing their own nuclear programs, the historical record suggests that this alone would be insufficient to trigger new nuclear deployments. If the past is any guide, future nuclear deployments are more likely to be dictated by alliance cohesion rather than threats of proliferation.

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Notes

1. We follow Sagan (1996/1997) in using the term model here to refer to a broad theoretical framework rather than a formal mathematical deduction.
2. Spain joined North Atlantic Treaty Organization (NATO) after US nuclear forces were removed from its territory.
4. Scholars have begun to explore the sources of nonnuclear military posture as well; see, for example, Sechser and Saunders (2010).
5. Scholars have, however, conducted individual case studies of foreign nuclear deployments (e.g., Allison and Zelikow 1999).
7. Although in principle states could offset some of these costs by using indigenous nuclear arsenals to coerce concessions from other states, there is considerable evidence that nuclear weapons are poor tools of coercion (Sechser 2011; Sechser and Fuhrmann 2013).

8. Fuhrmann and Sechser (in press) find that having a nuclear-armed ally significantly reduces the likelihood that a state will be targeted by an aggressor. Huth (1990) similarly shows that having a nuclear ally improves the likelihood of extended immediate deterrence. There is also some evidence that states with major power allies are less likely to acquire nuclear weapons (Sasikumar and Way 2009).

9. During the cold war, this strategy was known as coupling: increasing the likelihood that a war in Western Europe would become nuclear. For an incisive game theoretic analysis of coupling, see O’Neill (1990).


11. See Schelling (1960) for a discussion of hand tying as a means of enhancing the credibility of deterrent threats.

12. The tactic at work here is signaling by “sinking costs” (or “burning money”). See Ben-Porath and Dekel (1992) for a formal presentation of the concept in signaling games.

13. See, for example, Spector (1990, 122-23).

14. This is not meant to imply that projecting power necessarily carries security benefits: indeed, Fuhrmann and Sechser (in press) show that foreign nuclear deployments do not, in fact, bolster deterrence. Enhancing one’s ability to project power could also undermine the credibility of assurances to adversaries (Sechser 2010).


16. A list of sources we used to construct our data set as well as brief case descriptions is available in an online appendix.

17. For further details on the foreign deployment data set, see Fuhrmann and Sechser (in press).

18. Deployments occur in about 1.4 percent of the observations in our sample (593 of the 41,252).

19. We use the Klein, Goertz, and Diehl (2006) rivalry data to construct this measure. This variable is coded missing if the potential deployer did not have any rivals.

20. Due to missing data on some of the covariates, our empirical analysis covers the period from 1950 to 2000.

21. We use Fuhrmann’s (2012) nuclear proliferation model to construct this measure. This model is discussed in greater detail in the Online Appendix for this article.

22. We do not include $\text{Time}$, $\text{Time}^2$, and $\text{Time}^3$ in Table 3, but these variables also are substantively significant.

**Supplemental Materials**

Data, replication commands, and an associated appendix for this article are available at http://dvn.iq.harvard.edu/dvn/dv/tsechser and http://people.tamu.edu/~mfuhrmann/.
References


Kissinger, Henry. 1957. *Nuclear Weapons and Foreign Policy*.


