Nuclear Weapons and Low-Level Military Conflict*

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Abstract

Do nuclear weapons deter low-level military conflict? Although the political effects of nuclear weapons have been debated for more than 70 years, scholarship has yet to produce a clear answer. We design a study that reduces the risk of omitted variable bias relative to prior research. Our analysis compares the rates of conflict among eventual nuclear powers in the periods before and after they obtained an arsenal. We include two-way fixed effects to control for time invariant state-specific confounders and address common shocks. Our findings indicate that switching from nonnuclear status to a nuclear arsenal decreases the risk of being targeted in militarized interstate disputes (MID) by nonnuclear challengers. However, when it comes to low-level conflict, nuclear powers do not appear to be deterred from instigating disputes with other nuclear-armed states. This result stands in contrast to most prior studies, which conclude that the possession of nuclear weapons increases or does not reliably decrease the risk of being targeted – even for nonnuclear challengers. Although there are clear limits to the deterrence benefits of nuclear weapons at low levels of conflict, states can reduce their vulnerability to some degree by developing a nuclear arsenal.

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Introduction

How do nuclear weapons influence international peace and stability? Scholars and policymakers have debated the answer since the U.S. nuclear bombings of Hiroshima and Nagasaki in August 1945. Much of the scholarship on this issue focuses on extreme forms of conflict such as major war or nuclear use (e.g., Waltz, 1990; Gaddis, 1986). There is near consensus among policymakers and scholars that nuclear weapons provide deterrent benefits at exceedingly high levels of conflict. Even the most vocal skeptics acknowledge that having a nuclear arsenal protects a country from a nuclear attack. This view is exemplified by former U.S. Secretary of Defense Robert McNamara (1983, 79), who wrote that nuclear weapons are "totally useless – except only to deter one's opponent from using them." By contrast, there is still considerable debate about the deterrent effects of nuclear weapons on low-level disputes – military disputes short of total war.[1]

One perspective holds that nuclear weapons deter low-level conflict because potential aggressors anticipate that an initial provocation could escalate to the point where nuclear retaliation might be on the table. A second school of thought suggests that nuclear arsenals do not deter – and may actually encourage – low-level conflict. A growing number of studies have used statistical analysis to adjudicate this debate (e.g., Sample, 1998; Horowitz, 2009; Beardsley and Asal, 2009*a*; Sobek, Foster and Robison, 2012; Bell and Miller, 2015; Early and Asal, 2018). The evidence is contradictory but most studies find a null result or a positive relationship between having nuclear weapons and being targeted in military disputes. What should we make of this evidence?

[1] The role of nuclear weapons in compellence is also still debated (Kroenig, 2013; Sechser and Fuhrmann, 2017), but this issue falls outside the scope of this paper.

One possibility is that nuclear weapons do not, in fact, deter low-level conflict in the aggregate. We think, however, that it would be premature to reach this conclusion on the basis of the evidence compiled to date. Observational studies of nuclear deterrence face a major inferential challenge: because nuclear weapons are not randomly assigned, the factors that drive nuclear proliferation – rather than the weapons themselves – could account for patterns we observe in the data. This challenge is well known, and scholars have made progress in addressing it over time (see especially Bell and Miller, 2015). Yet it is possible to do more to address the risk of omitted variable bias than prior research has done.

All prior studies base their conclusions at least in part on between-unit variation. They typically compare the conflict rates of nuclear and nonnuclear states using a near-global sample. This means that conclusions rest partially on differences in conflict between the United States (a nuclear power) and Malawi (a nonnuclear state). Researchers typically control for differences between these two countries that are easy to measure, like their national wealth and domestic political institutions. But they may also differ in ways that are difficult or impossible to measure, meaning that they cannot be controlled for in a statistical model. If those unmeasured differences cause nuclear policy and conflict behavior – a possibility that seems plausible – the resulting findings might be misleading.

This study takes a different approach.[2] We focus only on the 10 states that built nuclear weapons at some point since 1945. Using a dyadic setup that matches these 10 countries with all relevant potential challengers, we compare the conflict rates of the eventual nuclear powers before and after they obtained their arsenals. This approach is advantageous because the

[2]Our design is similar to a strategy described by Fearon (2012). We focus on whether nuclear weapons influence the likelihood that a country is *targeted* in military disputes. Nuclear weapons may also embolden challengers to instigate disputes (e.g., Bell, 2015), but this falls outside the scope of this study.

nonnuclear differences pre- and post-acquisition within the same country are likely smaller than those differences between two separate states. To keep the pre- and post-acquisition periods similar, we limit our analysis to the 20 or 30 years before and after a country obtained its first nuclear weapon.

We use two-way fixed effects to further reduce unobserved heterogeneity, giving us something that resembles a differences-in-differences design for causal inference (see Angriest and Pischke, 2009, 227-233). Dyad fixed effects control for time-invariant confounders within the same country-pair, while year fixed effects account for common shocks. In addition, we control for key confounders that vary over time within the same dyad. On this front, our analysis goes further than prior studies by controlling for international status – something that affects nuclear proliferation (Sagan, 1996) and international conflict (Renshon, 2016). There could still be unmeasured confounders, of course, but we believe that our design lowers the risk of omitted variable bias compared to other published research.

Our analysis produces some evidence that nuclear weapons deter low-level military disputes. We find that nonnuclear states are less likely to initiate low-level military disputes when the target's status shifts from nonnuclear to nuclear. In particular, based on our analysis of the 20 years pre- and post-weaponization, switching from nonnuclear to nuclear status reduces the probability of being targeted in a given year by 7.6 percentage points (95 percent confidence interval: -13.99, -1.16). This effect weakens when we shift to 30 years pre- and post-weaponization, suggesting that the deterrence benefits may decline as a country moves further from its point of becoming a nuclear power (see Horowitz, 2009). We do not find clear evidence that nuclear weapons deter low-level conflict when the challenger also has a nuclear arsenal. Overall, our analysis provides new evidence that nuclear weapons lower a state's vulnerability to being targeted in low-level disputes, on average, as long as the potential challenger could not also deliver a nuclear strike.

This paper proceeds by reviewing the two perspectives on nuclear weapons and low-level conflict in greater detail and generating testable hypotheses. We then describe our dataset and variables. The third section presents findings from our two-way fixed effects analysis. After discussing our main results, we present a variety of robustness tests and empirical extensions. These analyses help us identify factors that strengthen or weaken the deterrent effects of nuclear weapons. The final section summarizes our study and discusses the implications of our results.

Two Perspectives on Nuclear Deterrence

There is a substantial body of scholarship on nuclear deterrence. Nearly 2,000 books and articles include the phrase "nuclear deterrence" in their title, according to Google Scholar.[3] Many of these studies do not explicitly address deterrence at low levels of conflict. Those that do broadly fall into two camps. The first perspective is optimistic about the efficacy of nuclear deterrence for minor disputes while the second is far less sanguine.

Deterrence Optimists: Nuclear Weapons Deter Low-Level Conflict

One line of thinking suggests that nuclear weapons can deter conventional military disputes at all levels and make military crises less frequent. Mearsheimer (2001, 129) embraces this view: "There is no question," he writes, "that the presence of nuclear weapons makes states more cautious about using military force of any kind against each other" (see also Bell and

[3]This search was carried out on May 1, 2020.

Miller, 2015, 77). Horowitz (2009, 251) similarly puts it, "Even if a state never makes an explicit nuclear threat, the mere presence of nuclear weapons may exert a powerful coercive role in low-level militarized disputes."

This school of thought begins with the notion that nuclear weapons are a unique military technology that offers unparalleled deterrence benefits. First, because nuclear weapons are the most destructive weapon in human history, they can inflict tremendous amounts of punishment on potential aggressors. Second, nuclear weapons can be effective instruments of deterrence by denial (Jervis, 1984; Glaser, 1990). By using nuclear weapons on the battlefield, a state can frustrate its adversary's ability to achieve military victory.

A deterrent threat must be perceived as credible by potential challengers in order to be effective. Deterrence optimists acknowledge that a threat to use nuclear weapons in retaliation for low-level violence might lack credibility. However, disputes that start off small could eventually escalate to the point where nuclear use might be contemplated. Potential aggressors anticipate this possibility and therefore think twice about instigating even low-level disputes against nuclear-armed countries. Jervis (1984, 13) offers a clear articulation of this logic. "[B]ecause force cannot be easily controlled or compartmentalized," he argues, "the fear of nuclear war does deter the other side from much more than nuclear attack."

Nuclear powers can exploit their inability to control escalation to make seemingly unbelievable threats appear credible. This is the essence of what Schelling (1960) calls "brinkmanship." Once a dispute starts, things can quickly spiral out of control in ways that leaders do not anticipate as a result of accidents or miscalculation. Nuclear-armed states can play up this possibility in order to dissuade their adversaries from engaging in low-level provocations.

The deterrent effects of nuclear weapons on low-level conflict may be conditional on the nuclear status of the potential challenger (e.g., Beardsley and Asal, 2009*b*, 283). Brinkmanship theory was developed in part to explain how a nuclear-armed state could gain coercive leverage from its arsenal even when facing off against another nuclear power. This theory therefore expects that nuclear deterrence can be effective in nuclear dyads where both states possess atomic arsenals. However, another perspective suggests that targets will be unable to deter low-level conflict if the potential challenger is also nuclear-armed. In that case, the defender's (implicit) threat of nuclear escalation may not induce caution because the challenger could respond to a nuclear attack in-kind.

Statistical studies of general deterrence have mostly contradicted this line of thinking. Yet there are a couple of notable exceptions. Narang and Mehta (2019) find that nuclear-armed states are less likely to be targeted in low-level disputes by nonnuclear states, but this effect weakens in nuclear dyads. In the context of extended deterrence, Fuhrmann and Sechser (2014) show that countries with nuclear protection from another state are less likely to have military force used against them than their counterparts that do not have a nuclear umbrella.

The preceding discussion leads to a clear prediction about low-level conflict when the target possesses nuclear weapons and the challenger is nonnuclear:

Optimism Hypothesis 1: Nuclear-armed targets are statistically less likely to be targeted in low-level disputes by nonnuclear challengers.

The expectations are contradictory, however, in symmetric nuclear dyads. Brinkmanship theory implies that nuclear powers can deter low-level disputes even against nuclear-armed challengers. Another view expects that the challenger's possession of an arsenal offsets the deterrent benefits of nuclear weapons that targets might otherwise obtain.

Optimism Hypothesis 2a: Nuclear-armed targets are statistically less likely to be targeted in low-level disputes by nuclear challengers.

Optimism Hypothesis 2b: Nuclear-armed targets are not statistically less likely to be targeted in low-level disputes by nuclear challengers.

Deterrence Pessimists: Nuclear Weapons Cannot Deter and Might Encourage Low-Level Conflict

Another group of scholars argues that the possession of nuclear weapons does not deter low-level conflict but may limit the onset of more severe types of military disputes. Waltz (2012, 161) argues that "nuclear stability permits lower-level violence," adding that "most scholars of nuclear matters" accept this view. Paul (2000, 76) concurs: "major wars should not occur" when states possess nuclear weapons but these forces "would not be an effective deterrent against low-level attacks by regional adversaries." Even Jervis, who argued in favor of deterrence optimism in *The Illogic of American Nuclear Strategy* (1984) seemed to embrace a more pessimistic position in some of his later work. One implication of the nuclear revolution, he stated, is that "major wars should not occur [but] ... Smaller powers can fight wars and the superpowers can jostle each other at lower levels of violence" (Jervis, 1986, 694).

This school of thought emphasizes a fundamental credibility problem that defenders face when using nuclear weapons to deter minor disputes.[4] Nuclear threats in this context lack credibility because carrying them out would be exceedingly costly for the challenger. Using nuclear weapons to "win" might provoke a serious international backlash in the form of economic sanctions, international isolation, and alignment against the state. It would also shatter the longstanding tradition of nuclear non-use, which is sometimes called the nuclear taboo (Tannenwald, 2007). Potential challengers anticipate that these costs would be too much for the nuclear defender to bear because the stakes in low-level disputes are small. As Huth and Russett (1988, 35) put it, nuclear weapons in this kind of situation are simply "overkill."

[4] The argument draws on Sechser and Fuhrmann (2017, 48-51).

A key difference between deterrence optimists and pessimists relates to escalation control. Optimists agree that nuclear deterrent threats are not credible when the stakes are small, but they argue that low-level disputes could eventually become severe enough to put the nuclear option on the table. Pessimists, by contrast, have greater confidence in states' ability to control escalation once a dispute begins – especially if nuclear weapons are involved. One or both countries will have incentives to end the dispute before the situation spirals out of control, based on this line of thinking. States can safely initiate low-level conflict against a nuclear power, then, without worrying about suffering a nuclear attack in retaliation.

The literature offers considerable support for this line of thinking. Multiple studies show that nuclear powers are not statistically less likely to be targeted in low-level disputes than their nonnuclear counterparts (Gartzke and Jo, 2009; Sobek, Foster and Robison, 2012; Fuhrmann and Sechser, 2014; Fuhrmann and Tkach, 2015). At the same time, once a low-level dispute begins, nuclear weapons seem to lower the risk of escalation. Huth, Bennett and Gelpi (1992) report that nuclear arsenals do not bolster general deterrence but show in a subsequent study that the presence of these forces "makes a very large contribution" to immediate deterrence success – that is, limiting escalation once a dispute has already begun (Huth, Gelpi and Bennett, 1993, 618). Similarly, Beardsley and Asal (2009*a*) find that nuclear weapons reduce a state's vulnerability to violent crises but do not deter nonviolent ones.

This perspective leads to an interesting implication for nuclear dyads specifically: when both the challenger and the target possess nuclear weapons, the risk of low-level military conflict should increase but major wars should not happen. Analysts took note of this so-called stability-instability paradox early in the nuclear age. In 1954, B.H. Liddel Hart argued that the development of nuclear weapons "reduces the likelihood of full-scale war, it increases the possibility of limited war pursued by widespread local aggression" (quoted in Krepon, 2004, 1). Snyder (1960, 31) made a similar observation a few years later: "when the strategic balance is stable–when both sides have the capacity to strike back powerfully after absorbing a first strike–the tactical balance tends to become unstable because limited attacks can be undertaken and limited wars can be carried to fairly high levels of intensity without serious danger that either side will decide to initiate all-out strategic warfare." Some scholars have provided empirical support for the stability-instability paradox (Geller, 1990; Gibler, Rider and Hutchison, 2005; Rauchhaus, 2009). However, after accounting for the conflict history of a dyad, Bell and Miller (2015) find that symmetric nuclear dyads are not more conflict prone at low-levels compared to nonnuclear dyads.

The logic of deterrence pessimism leads to the following predictions:

Pessimism Hypothesis 1: Nuclear-armed targets are not statistically less likely to be targeted in low-level disputes by nonnuclear challengers.

Pessimism Hypothesis 2: Nuclear-armed targets are statistically more likely to be targeted in low-level disputes by nuclear challengers.

Research Design

We test the hypotheses on nuclear deterrence by examining the real-world conflict behavior of countries over time. Prior research that takes this approach compares the conflict rates between nuclear and nonnuclear countries or dyads (e.g., Geller, 1990; Huth, Bennett and Gelpi, 1992; Beardsley and Asal, 2009*a*; Gartzke and Jo, 2009; Rauchhaus, 2009; Fuhrmann and Tkach, 2015). This research strategy results in "apples-to-oranges" comparisons. These studies base their conclusions partially on differences in military conflict rates between, for example, France and Mongolia. Analysts obviously recognize that these countries are different and account for this heterogeneity by including potential confounders that can easily be measured in their statistical models. The well-known challenge, though, is that these states may differ in ways that cannot be measured or even observed by the analyst. If these unmeasured differences cause a state to obtain nuclear weapons and also affect its propensity to engage in military conflict, the resulting pattern in the data would not reflect a causal relationship.

We seek to increase the homogeneity of our "treatment" (nuclear powers) and "control" groups (nonnuclear powers). To do this, we adopt a within-unit research design that compares the 10 nuclear powers' conflict rates before and after they obtained an arsenal. Although there are differences within countries pre- and post-nuclearization, this heterogeneity is probably smaller than it is across countries in a global sample. To increase the comparability of observations in the pre- and post-arsenal phases we limit the scope temporally. For each nuclear power, our analysis examines military conflict in the 20 or 30 years before and after weaponization.[5] We use two separate cut-points – 20 and 30 years – to see if minor changes in the number of included years influence our findings. These time periods reflect our aim to balance two considerations. First, if the number of pre- and post- observations is too small, we would likely lack sufficient variation to exploit in a statistical analysis. Second, we want to keep the pre- and post-weaponization temporally proximate to reduce heterogeneity, especially with respect to unobservables. South Africa, for instance, assembled its first nuclear weapon in 1979. Including what happened in 1920 as a pre-nuclear observation is potentially problematic because the country was a much different place then compared to all of the post-weaponization years and it is not clear that these differences can be easily controlled for in a statistical model.

There are, of course, still differences between the pre- and post-weaponization periods within the same countries. We address this in two ways. First, we control for important observable confounders, which are described below. Second, we use two-way fixed effects to account for unmeasured heterogeneity. Dyad fixed effects control for time-invariant differences within the same country-pair in the two periods, like geography. Year fixed effects address common shocks, including the end of World War II in 1945. This by no means solves the problem of omitted variable bias, but we believe that it brings us closer to identifying a causal relationship between nuclear weapons and military conflict, relative to prior studies.[6] Although two-way fixed effects are commonly used in economics and political science to deal

[5] We modify this approach in three cases due to data restrictions (see the online appendix).

[6] Another approach to causal inference is instrumental variables regression (for a nuclear-specific example, see Gartzke and Jo, 2009). However, finding a suitable instrument is difficult and we are unable to think of one that would work for our purposes in this study.

with unobservable confounders (e.g., Goldstein, Rivers and Tomz, 2007; Ross and Voeten, 2016), we are not aware of a published study on nuclear deterrence that has done so. However, we are not the first or only scholars to recognize the need for such a strategy in this context; our design is similar to the one described by Fearon (2012).[7]

Data Structure

We created a panel dataset with the directed-dyad-year as the unit of observation. Our setup distinguishes between challengers and targets. Because we are interested in studying the deterrent effects of nuclear weapons, we focus on how nuclear weapons possession influences the likelihood of being *targeted* in a military dispute. All 10 countries that eventually obtained indigenously-built nuclear forces are included in our dataset as targets. We pair each target with potential challengers, which we classify as states that have been in a militarized dispute with the target at least once (Clark and Regan, 2003). This limits the analysis to cases where the challenger has plausible incentives to use military force against the target, which is important for a study of deterrence. It would be misleading to conclude, for example, that the United States was deterred from attacking Canada simply because there was an absence of military conflict between these two states.

Dependent Variable: Low-Level Military Conflict

The dependent variable is based on an updated version of the Correlates of War's (COW) Militarized Interstate Dispute (MID) data set by Gibler, Miller and Little (2016). We classify low-level conflict as any MID that does not escalate to war. This includes threats, displays, and uses of force that result in fewer than 1,000 fatalities. We code the dependent variable 1 if the challenger initiates such a military dispute against the target in a given year, and 0 if not. Recall, however, that Snyder (1961) suggests that wars "at fairly high levels of intensity" can occur in nuclear dyads. He and others might group limited wars, which includes most of the ones fought post-1945, with other kinds of low-level conflict. To explore the sensitivity

[7] One difference is that Fearon (2012) describes a monadic design while ours is dyadic.

of our findings, we include all MIDs – including wars – in our outcome variable in a follow-on test discussed below. We also excluded uses of force from our measure of low-level disputes, focusing on threats and displays only.

Independent Variable: Nuclear Weapons

Our coding of nuclear weapons possession is based on Sechser and Fuhrmann (2017).[8] This measure generally relies on a country's first nuclear test to identify the onset of an arsenal. This is a low threshold for what constitutes a nuclear power since a nuclear test does not necessarily imply that a state has a combat-ready arsenal. In measuring nuclear status in this way, we are focusing on existential deterrence – the notion that the mere existence of nuclear weapons is enough to deter conflict, regardless of how nuclear forces may be operationalized (see Narang, 2013, 481-482). This is the same approach taken by the vast majority of statistical studies; we adopt it as well in order to facilitate cross-study comparisons.

Our research objective is to assess how possessing nuclear weapons affects a country's propensity to be *targeted* in military disputes, and the deterrent effects of nuclear weapons might be conditional on the capabilities of the challenger. We therefore create four nuclear variables based on a dyad's nuclear capabilities. NUCLEAR CHALLENGER ONLY is coded 1 if the challenger in a dyad is nuclear-armed and the target is not, and 0 otherwise. We code NUCLEAR TARGET ONLY 1 if the target in a dyad has nuclear weapons and the challenger does not, and 0 in all other cases. The variable NUCLEAR DYAD is coded 1 if both states possess nuclear weapons and 0 if not, while NONNUCLEAR DYAD identifies country-pairs where the challenger and the target are nonnuclear.

Given that these four categories are mutually exclusive and exhaustive, we can make one of them the base category and interpret the other three measures relative to the base. To test optimism hypothesis 1 and pessimism hypothesis 1, we use NONNUCLEAR DYAD as

[8] We make one change: using 1988 as the first year that Pakistan assembled a weapon, based on Indian intelligence estimates. The online appendix shows the results when we use 1987 as the first weaponization year for Pakistan, as in Sechser and Fuhrmann (2017). In the online appendix, we also report the findings when we change the starting year of weaponization of India to 1988, Pakistan to 1990, and South Africa to 1982 to be consistent with Gartzke and Kroenig (2009).

the base category. This allows us to interpret NUCLEAR TARGET ONLY as how a nonnuclear challenger's propensity to initiate a military dispute changes when the target's nuclear status shifts from nonnuclear to nuclear. To identify how nuclear challenges respond to changes in the target's nuclear status, which is relevant for testing optimist hypotheses 2a and 2b as well as pessimist hypothesis 2, we make NUCLEAR CHALLENGER ONLY the base category and focus our interpretation on NUCLEAR DYAD.

Confounding Factors

We control for other variables that affect both a state's risk of being targeted and its probability of acquiring nuclear weapons.

- TARGET'S CONFLICT HISTORY. A target's conflict history is an important confounding factor since past military disputes increase the risk of future hostilities and nuclear proliferation (Bell and Miller, 2015). We include a variable that measures the total number of military disputes the target experienced over the previous ten years, based on the MID data set.

- TARGET'S INTERNATIONAL STATUS. As we discussed previously, international status is a potentially important confounding variable. We imported Renshon (2016)'s data on status, which is based on diplomatic exchanges, and updated them through 2005.[9] We used a 5-year lag of status variable.[10]

- TARGET ALLIANCE WITH MAJOR POWER and DYADIC ALLIANCE. Military alliances, especially those with major powers, may decrease the chance of being militarily targeted and lowers the risk of nuclear proliferation. We control for whether the target shares a defensive alliance with a major power using ATOP data (Leeds et al., 2002) and the COW list of major powers (Correlates of War Project, 2017). We also account for dyadic defense pacts between the challenger and the target.

[9] This is a late as we can go because the diplomatic exchange data end in this year.

[10] As a robustness check reported in the online appendix, we generated 5-year average of status variable and re-ran the analysis.

- CHALLENGER'S CAPABILITIES and TARGET'S CAPABILITIES. We control for the material capabilities of the challenger and target using the COW Composite Index of National Capability (CINC) data (Singer, Bremer and Stuckey, 1972). States with greater material resources are likely to play a more active role in international politics, creating greater opportunities for military conflict, and more capable states should be in a better position to obtain nuclear arms.

- DEMOCRACY TARGET, DEMOCRACY CHALLENGER, and DEMOCRACY DYAD. Democratic peace theory suggests that democracies are less likely to fight each other (e.g., Russett and Oneal, 2001). Democracies may also be more likely to develop nuclear weapons (Jo and Gartzke, 2007). We control for regime type using Polity V data (Marshall, Jaggers and Gurr, 2002), classifying states as democracies if they score six or higher on the 21-point composite indicator.

- TIME, TIME SQUARED, and TIME CUBED. We correct for temporal dependence using the number of years that pass between disputes in a dyad, along with its square and its cube (Carter and Signorino, 2010).

Findings

Table 1 provides the results of four logit regressions with the standard errors clustered by dyad.[11] Models 1 and 2 use NONNUCLEAR DYAD as the base category, allowing us to test Optimism Hypothesis 1 and Pessimism Hypotheses 1 by interpreting the coefficient on NUCLEAR TARGET ONLY. Models 3 and 4, by contrast, allow us to test Optimism Hypotheses 2a and 2b and Pessimism Hypothesis 2 by assessing how nuclear-armed challengers respond when a target obtains an arsenal. In these models, NUCLEAR CHALLENGER ONLY is the base category and our main variable of interest is NUCLEAR DYAD. Models 1 and 3 examine the

[11] Logit is an appropriate estimator given that our dependent variable is dichotomous. We also estimated the models in Table 1 using the linear probability model, as discussed below.

20 years before and after weaponization, while Models 2 and 4 use the 30-year threshold.[12]

The evidence supports Optimism Hypothesis 1 and contradicts Pessimism Hypothesis 1. The negative and statistically significant ($p < 0.05$) coefficients on NUCLEAR TARGET ONLY in Models 1 and 2 indicate that countries are less likely to be targeted in low-level disputes by nonnuclear challengers when they switch from nonnuclear to nuclear status. These results are consistent with the view that countries can deter disputes with nonnuclear adversaries by obtaining a nuclear arsenal.

However, according to Models 3 and 4, it is unclear whether nuclear weapons provide deterrence benefits when the challenger is also nuclear-armed. The sign on NUCLEAR DYAD is positive in Model 3 and negative in Model 4. In both cases, there is considerable uncertainty about the difference between nonnuclear and nuclear targets when the challenger has nuclear weapons, as evidenced by the large p-values for NUCLEAR CHALLENGER ONLY in Models 3 (0.447) and 4 (0.694). This null result is consistent with Optimism Hypothesis 2b. By contrast, this evidence does not support Optimism Hypotheses 2a or Pessimism Hypothesis 2.

Moving beyond statistical significance, we assess how substantively important nuclear weapons are in influencing the probability of conflict. Figure 1 shows the average marginal effect of nuclear weapons, along with the other independent variables, based on all four models in Table 1.

As illustrated in Figure 1a, based on Model 1, the marginal effect of NUCLEAR TARGET ONLY is -0.077. When the challenger is nonnuclear, therefore, shifting from a nonnuclear to a nuclear target reduces the probability of a low-level dispute in a given year by about 8 percentage points – from 14 percent to 6 percent. Countries with nuclear weapons are still targeted in disputes by nonnuclear challengers, but states can more than cut their vulnerability to low-level conflict in half by arming. Based on the 95 percent confidence

[12] This study is not designed to interpret how nuclear weapons influence conflict initiation. It would be inappropriate to do so since nuclear-armed challengers are included in our sample only if they have a history of conflict with one of the 10 nuclear powers. Future research might emulate our design with a focus on conflict initiation.

interval, the effect could be as small as 1.3 percentage points and as large as 14.0 percentage points. The marginal effect of NUCLEAR TARGET ONLY declines to 4.0 percentage points (95 percent confidence interval: -0.21, -7.82) when we shift to our 30-year threshold, as shown in Figure 1b.

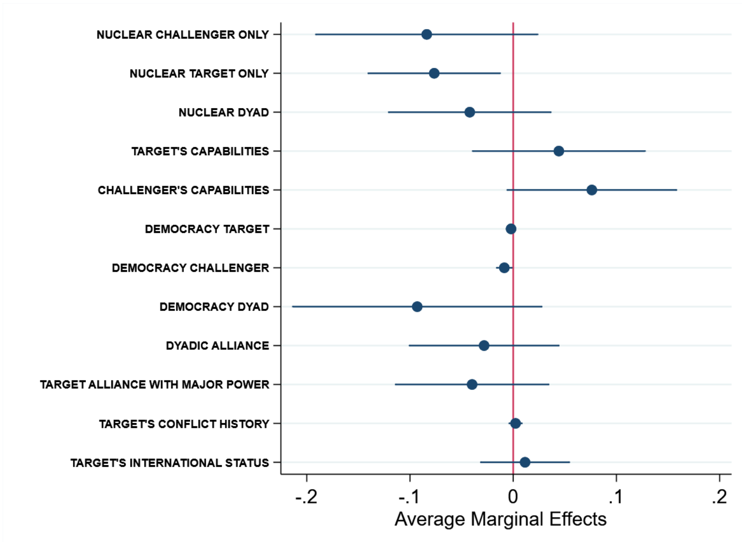
When it comes to nuclear-armed challengers, getting nuclear weapons could produce large increases or decreases in the likelihood of conflict for the target, but the effect is most likely smaller than when the challenger is nonnuclear. Based on Model 3 (Figure 1c), switching the target's status from nonnuclear to nuclear increases the probability of a low-level dispute with a nuclear power by 4.16 percentage points (95 percent confidence interval: -6.92, 15.25) The marginal effect of NUCLEAR DYAD is smaller (1.15 percentage points) when we use the 30-year threshold (Figure 1d), with a confidence interval that spans from -5.79 to 8.08 percentage points.

Table 1: Logit Analysis of the Deterrent Effect of Nuclear Weapons on Low-Level Military Conflict

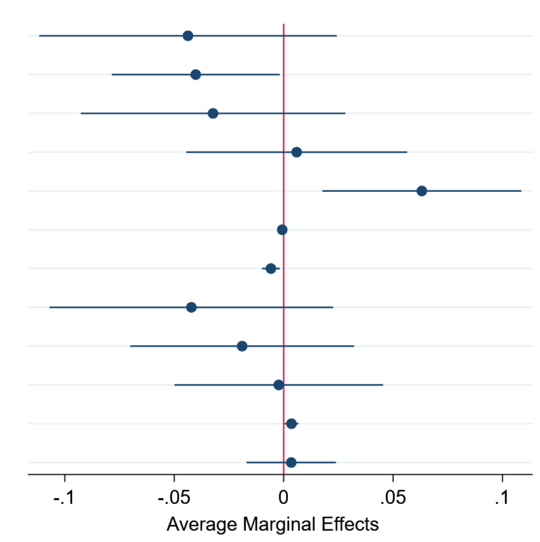
	Sample 20 years	Sample 30 years	Sample 20 years	Sample 30 years
	Model 1	Model 2	Model 3	Model 4
NUCLEAR DYAD	-0.58	-0.59	0.57	0.21
	(0.55)	(0.56)	(0.78)	(0.64)
NUCLEAR TARGET ONLY	-1.05*	-0.73*	0.099	0.065
	(0.46)	(0.35)	(0.87)	(0.64)
NUCLEAR CHALLENGER ONLY	-1.15	-0.79		
	(0.76)	(0.63)		
NONNUCLEAR DYAD			1.15	0.79
			(0.76)	(0.63)
TARGET'S CAPABILITIES	0.61	0.11	0.61	0.11
	(0.59)	(0.46)	(0.59)	(0.46)
CHALLENGER'S CAPABILITIES	1.05+	1.14**	1.05+	1.14**
	(0.58)	(0.42)	(0.58)	(0.42)
DEMOCRACY TARGET	-0.028	-0.012	-0.028	-0.012
	(0.024)	(0.018)	(0.024)	(0.018)
DEMOCRACY CHALLENGER	-0.12*	-0.11**	-0.12*	-0.11**
	(0.052)	(0.035)	(0.052)	(0.035)
DEMOCRACY DYAD	-1.28	-0.76	-1.28	-0.76
	(0.85)	(0.60)	(0.85)	(0.60)
DYADIC ALLIANCE	-0.39	-0.34	-0.39	-0.34
	(0.51)	(0.47)	(0.51)	(0.47)
TARGET ALLIANCE WITH MAJOR POWER	-0.55	-0.041	-0.55	-0.041
	(0.52)	(0.44)	(0.52)	(0.44)
TARGET'S CONFLICT HISTORY	0.031	0.064*	0.031	0.064*
	(0.043)	(0.027)	(0.043)	(0.027)
TARGET'S INTERNATIONAL STATUS	0.16	0.063	0.16	0.063
	(0.30)	(0.19)	(0.30)	(0.19)
CONSTANT	7.58+	3.50	6.43	2.71
	(4.16)	(2.68)	(4.35)	(2.70)
N	2066	3981	2066	3981
Year and Dyad Fixed Effects	Yes	Yes	Yes	Yes
Log Likelihood	-522.2	-802.3	-522.2	-802.3

Model 1 and 2: NONNUCLEAR DYAD is the baseline category.
Model 3 and 4: NUCLEAR CHALLENGER ONLY is the baseline category.
Robust standard errors are clustered by dyad and are in parentheses.
Cubic polynomial (three knots) of peace years is included but not shown.
+ $p < 0.10$, * $p < 0.05$, ** $p < .01$, *** $p < .001$

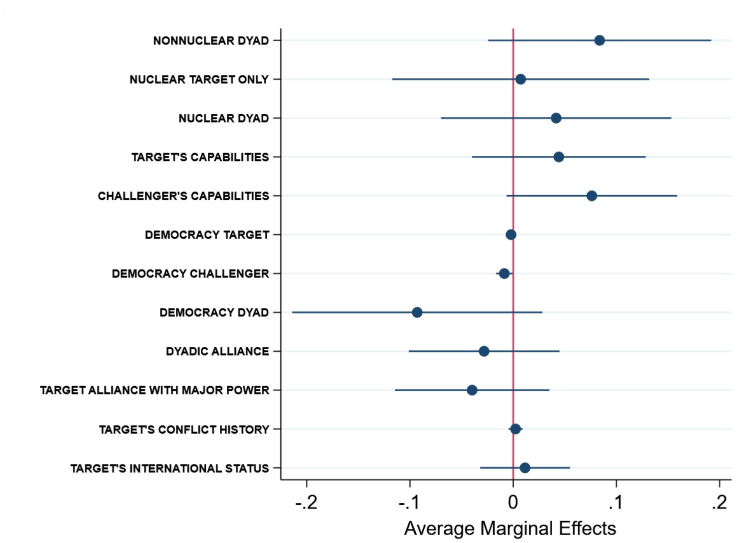
Figure 1: Average marginal effects of the independent variables



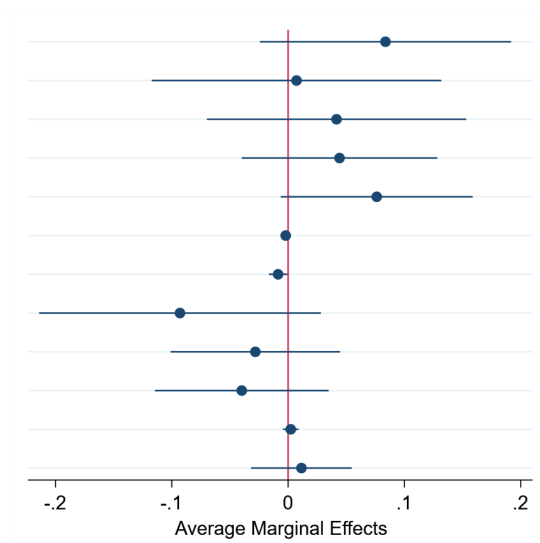
(a) Model 1



(b) Model 2



(c) Model 3



(d) Model 4

Extensions and Robustness Checks

We carried out some additional analysis to explore interesting extensions and probe the sensitivity of our findings. We describe all of the results below and report the tables and figures in the online appendix.

- **Alternate dependent variables.** We modify our dependent variable in two ways. First, we include wars since severe conflicts – including those that feature the use of tactical nuclear weapons – could still be permitted under the stability-instability paradox (Bell and Miller, 2015). In the case of nonnuclear challengers, the deterrent effects of nuclear weapons strengthen from a statistical standpoint but the marginal effects are virtually identical. The findings for nuclear challengers do not meaningfully change. Second, we excluded uses of force and classified low-level conflict as threats and displays of force only. This alternation increases the deterrent effect of switching from a nonnuclear to a nuclear target for both types of challengers.

- **Additional dyad-year observations.** We remove the 20 and 30-year restrictions and compare all observations for eventual nuclear powers. We examine two distinct time periods: 1945-2010 and 1880-2010. The former limits the analysis to the atomic age and the latter includes an equal number of observations (65) in the pre- and post-nuclear periods. The findings are broadly similar in terms of p-values, but the marginal effects are about cut in half.

- **Balanced sample.** We balanced the pre- and post-weaponization periods. The post-nuclear periods of three countries do not reach the full 20 or 30 sample years: North Korea (5 years), South Africa (12 years), and Pakistan (23 years). We replicate our analysis after making the pre-nuclear periods the same length for these countries. In addition, we generate a balanced panels that match all pre- and post-nuclear years within every dyad. These modifications do not produce major changes in our results.

- **Linear probability model.** One limitation of using logit with two-way fixed effects is that dyads or years that no variation on the dependent variable are dropped from the analysis. The linear probability model can address this issue by maintaining these observations, leading to a larger sample. We replicate our main analysis using the linear probability model and find evidence pointing in the same general direction, but the effects are weaker relative to the logit analysis.

- **Monadic analysis.** We conduct an analysis of nuclear deterrence using a monadic dataset where the unit of observation is the country-year rather than the directed-dyad-year. The results are more mixed overall. We explain the reasons for this, as well as why a dyadic setup is more appropriate, in the appendix.

- **Influence of individual countries.** Our analysis combines all nuclear powers and estimates the average effect of arsenals on being targeted in military disputes. When it comes to nuclear deterrence, however, some states may fare better than others. To find out which nuclear powers are most responsible for the patterns that we observe, we re-estimated all four of our main models while eliminating each state one-by-one from the estimation sample. We then assessed whether the average marginal effect increases or decreases relative to our baseline model. The results indicate that China and Israel experienced smaller deterrent benefits than other countries. Russia and the United Kingdom fare the best against nonnuclear challengers, while North Korea and Pakistan did better than average against nuclear powers. In some re-runs of Models 1 and 2, particularly when we exclude Russia, the United Kingdom, and the United States, the 95 percent confidence interval around the average marginal effect of NUCLEAR TARGET ONLY crosses slightly over zero. This does not mean that nuclear weapons have "no effect" on conflict in these cases. But our overall uncertainty about the direction of the relationship increases: it is still likely to be negative but there is a small chance that it could be positive.

Summary and Implications

We sought to answer a central question in international relations: how do nuclear weapons influence military conflict? We focused on low-level disputes because there is a more active debate in scholarship about the political effects of nuclear weapons in this context. One view suggests that nuclear weapons can deter minor confrontations, in addition to conventional war and the use of nuclear weapons. A second camp is less sanguine, suggesting that nuclear weapons cannot reduce – and may increase – a country's vulnerability to small-scale disputes.

We designed a study to find out which perspective is correct. Our research design has two unique features relative to prior work on nuclear deterrence. First, we limit our analysis to the ten countries that have built nuclear arsenals and focus on within-unit variation in conflict. We compare the conflict rates during the 20 or 30 years before and after each state acquired nuclear weapons. We pair each country with adversaries that might have incentives to initiate disputes against them. Focusing on within-dyad variation reduces unit heterogeneity and increases our confidence that the nonnuclear and nuclear observations in our sample are similar. Second, we use two-way fixed effects to account for common shocks across units and potential confounders that do not vary over time within the same unit. In addition, like other prior studies, we control for time variant confounding factors. We go further than earlier work, however, by controlling for the target's international status.

We find evidence that developing nuclear weapons reduces a country's vulnerability to low-level military disputes initiated by nonnuclear challengers. An emerging trend in scholarship suggests that nuclear weapons are irrelevant for international relations (see especially Mueller, 2009). The null findings reported in studies that evaluate the deterrent effect of nuclear weapons reinforce this view (e.g., Huth, Bennett and Gelpi, 1992; Gartzke and Jo, 2009; Bell and Miller, 2015; Fuhrmann and Tkach, 2015). Our results suggest that the emerging wisdom about nuclear deterrence goes too far. In our view, prior studies produce null results mostly because they do not go as far as they could to address the non-random assignment of nuclear weapons – not because nuclear weapons are incapable of deterring military actions short of total war.

At the same time, our analysis highlights the limitations of nuclear weapons for deterrence. We find that nuclear weapons do not reliably deter nuclear-armed challengers from initiating low-level conflicts. The violent border clashes between China and India that began in May 2020, therefore, are not terribly surprising based on our analysis. Our study does not reliably show, however, that obtaining nuclear weapons systematically invites low-level confrontations. This result adds to the evidence against the stability-instability paradox, which expects an increase in low-level confrontations when two adversaries obtain nuclear weapons (see especially Bell and Miller, 2015).

Our findings raise two potentially fruitful areas for future research. The first deals with cross-national variation in the efficacy of nuclear deterrence. We intentionally focused on existential deterrence to determine whether nuclear deterrence is effective in its most basic form, on average, using our improved research design. Yet some research shows that the efficacy of deterrence can vary across nuclear powers (Narang, 2013; Kroenig, 2013; Early and Asal, 2018) – a point that our analysis confirms. Future studies might investigate the reasons for this variation more deeply.

A second extension of this study involves differences in nuclear deterrence over time. Most of our statistical models show that the deterrent effects of nuclear weapons weaken when we shift our sample threshold from 20 to 30 years. Adding the full range of dyad-year observations also weakens the effect, compared to what we found in our 20-year sample. This could suggest that the deterrent effects are strongest in the years immediately after a country first obtains nuclear weapons. This might seem counter-intuitive since states' nuclear capabilities generally become more sophisticated and robust as time passes. However, Horowitz (2009) shows that countries learn based on their experiences and treat nuclear powers differently over time. If others see experienced nuclear powers as more "responsible," meaning that inadvertent escalation is less likely, the deterrent effects on low-level conflict could weaken as time passes (Horowitz, 2009, 240). Determining whether this, or some other explanation, accounts for the over-time variation we find represents an interesting avenue for future work.

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Online Appendix for

Nuclear Weapons and Low-Level Military Conflict

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- **Additional dyad-year observations.** In Table 1, we remove the 20- and 30-year restrictions and compare all observations for eventual nuclear powers. We examine two distinct time periods: 1945-2010 and 1880-2010. The former limits the analysis to the atomic age and the latter includes an equal number of observations (65) in the pre- and post-nuclear periods. The findings are broadly similar in terms of p-values, but the marginal effects are about cut in half. The confidence intervals around the marginal effects also become tighter. In Model 1, for example, the 95 percent confidence interval around the marginal effect of NUCLEAR TARGET ONLY ranges from -7.24 percentage points to -0.956 percentage points; the range was -14.0 to -1.3 in the main model reported in the paper.

- **Balanced sample.** In Table 2, we balanced the pre- and post-weaponization periods. The post-nuclear periods of three countries do not reach the full 20 or 30 sample years: North Korea (5 years), South Africa (12 years), and Pakistan (23 years). We replicate our analysis after making the pre-nuclear periods the same length for these countries. In addition, in Table 3, we generate a balanced panels that match all pre- and post-nuclear years within every dyad. These modifications do not produce major changes in our results.

- **Alternate dependent variables.** We modify our dependent variable in two ways. First, in Table 4, we include wars since severe conflicts – including those that feature the use of tactical nuclear weapons – could still be permitted under the stability-instability paradox (Bell and Miller, 2015). In the case of nonnuclear challengers, the deterrent effects of nuclear weapons become stronger from a statistical standpoint, as the p-values on NUCLEAR TARGET ONLY become smaller (0.008 and 0.018), but the marginal effects are similar. The findings for nuclear challengers do not meaningfully change. Second, in Table 5, we excluded uses of force and classified low-level conflict as threats and displays of force only. This alternation increases the deterrent effect of switching from a nonnuclear to a nuclear target for both types of challengers.

- **Linear probability model.** One limitation of using logit with two-way fixed effects is that dyads or years with no variation on the dependent variable are dropped from the analysis. The linear probability model can address this issue by maintaining these observations, leading to a larger sample. In Table 6, we replicate our main analysis using the linear probability model and find evidence pointing in the same general direction, but the effects are weaker relative to the logit analysis. Using our 20-year threshold, we find that switching from nonnuclear to nuclear status lowers the probability a nonnuclear-initiated dispute by 1.5 percentage points ($p < 0.05$). When we use the 30-year threshold, the effect is a 1.1 percentage-point reduction with a slightly larger p-value ($p < 0.1$).

- **Monadic analysis.** We conduct an analysis of nuclear deterrence using a monadic dataset where the unit of observation is the country-year rather than the directed-dyad-year. We believe that a dyadic analysis is more appropriate for testing our hypotheses. At the same time, because some studies of international conflict use monadic datasets, we want to provide readers with a sense of how the results change if we shift to this setup. The dependent variable here is the number of times a country was targeted in low-level disputes during a given year, and we included all of the relevant independent variables from our dyadic analysis. One limitation of a monadic setup is that we cannot distinguish between nuclear and nonnuclear challengers – which is necessary to test the hypotheses – using independent variables. As an alternative way to get at this, we generate two separate dependent variables based on the challenger's nuclear status: one identifies disputes instigated by nonnuclear states only, while the other exclusively codes conflicts where the challenger has nuclear weapons.

Table 7 displays the results from six Poisson regressions. We find some evidence that developing nuclear weapons lowers a state's vulnerability to low-level conflict. Examining all low-level disputes regardless of the challenger's nuclear status and using our 20-year threshold, Model 1 shows that switching from nonnuclear to nuclear status lowers the number of times a state is targeted in any low-level dispute in a given year ($p < 0.05$). However, this effect weakens and our uncertainty about the direction of the relationship increases in the other models. The p-value is significant at the 0.05 level in Model 5, suggesting that nuclear powers are less likely to target countries after they obtain a bomb. However, we should be skeptical of these results because we do not have adequate within-year variation in the dependent variable to reliably estimate this models; Stata reports coefficients for the year fixed effects but all of the standard errors are missing.

At least three factors could account for the more ambiguous results in the monadic context (these reasons also lead us to have more confidence on the dyadic results). First, the disaggregated dependent variables may generate greater uncertainty in our estimates since we cannot simultaneously account for disputes initiated by nuclear and nonnuclear states.

Second, in the monadic analysis we lose the ability to control for challenger-specific and relational variables that might be important confounders. For example, we find that democratic challengers are less likely to initiate low-level disputes than their non-democratic counterparts. Nuclear powers might have many non-democratic adversaries, potentially giving them more opportunities to experience conflict. Failing to account for this possibility, which is more difficult to do in a country-year analysis, could lead to biased results.

Third, we have a much smaller sample size in the monadic analysis. When we use the 20-year threshold, for example, our sample size is more than 8-times larger in the dyadic analysis (2,129 observations compared to 251). It is not surprising that the uncertainty in our estimates would increase along with such a sharp decline in sample size, especially given our use of two-way fixed effects. This could explain why no variable in our monadic analysis – including those that many studies identify as associated with military conflict – consistently has a p-value below 0.05.

- **5-year average status variable.** In the main analysis in the paper, we controlled for international status by including a 5-year lagged variable in the model. In Table 8, we instead used the average status value of the previous five years. For example, for the United States' status in 2010, we used the average of status value from 2005 to 2009. The results do not change significantly from the main analysis when we used this operationalization.

- **Pakistani weaponization in 1987.** We made one modification to the weaponization dates provided by Sechser and Fuhrmann (2017): changing the coding of Pakistan from 1987 to 1988. A.Q Khan, the "father" of Pakistan's nuclear bomb, made reference to the possibility that Pakistan had assembled a nuclear device in 1987. However, 1988 is the first year we found evidence of weapons assembly from Indian intelligence. According to Kampani (2014, 91), India believed that Pakistan had assembled three nuclear bombs with a 15-20 kt yield in March 1988. In Table 9, we replicated our analysis after using the original Sechser and Fuhrmann (2017) dates. The findings are similar although the p-values do increase slightly in Models 1 and 2.

- **Gartzke and Kroenig (2009) weaponization dates.** We alter our analysis based on the weaponization dates in Gartzke and Kroenig (2009). This results in three coding changes: (1) changing South Africa from 1979 to 1982; (2) changing Pakistan from 1988 to 1990; and (3) changing India from 1974 to 1988. Table 10 reports the results, which are broadly similar. The findings become a bit stronger in Model 1 compared to our main analysis and weaken ever so slightly in Model 2.

- **Influence of individual countries.** Our analysis combines all nuclear powers and estimates the average effect of arsenals on being targeted in military disputes. When it comes to nuclear deterrence, however, some states may fare better than others. To find out which nuclear powers are most responsible for patterns that we observe, we re-estimated all four of our main models while eliminating each state one-by-one from the estimation sample. We then assessed whether the average marginal effect increases or decreases relative to our baseline model. Figure 1 illustrates the results for disputes initiated by nonnuclear states (Models 1 and 2 in the main paper) and Figure 2 displays the findings when nuclear powers are the initiators (Models 3 and 4 in the main paper). The results indicate that China and Israel experienced smaller deterrent benefits than other countries against both kinds of challengers. The average marginal effect moves farthest to the left (i.e., becomes the most negative) when these two states are removed from the analysis in both Figures 1 and 2. Russia, the United Kingdom, and the United States fare the best against nonnuclear challengers, based on this analysis, as the marginal effect moves farthest to the right when they are individually excluded (see Figure 1). Notice that the 95 percent confidence interval crosses slightly over zero when we exclude these countries from the analysis. This does not mean that nuclear weapons have "no effect" on conflict with these states eliminated. The confidence interval tells us where the marginal effect would fall 95 percent of the time if we were to repeat this analysis again-and-again using hypothetically different data. Thus, our overall uncertainty about the direction of the relationship increases when each of these countries is individually excluded: it is still likely to be negative but there is a small chance that it could be positive. Figure 2 shows that Pakistan and North Korea (along with the United Kingdom) did better than average when it comes to reducing their risk of being targeted by nuclear powers post-weaponization.

Table 1: Expanded Sample: Post World War II and After 1879 (Dyadic Analysis)

	Sample After 1945	Sample After 1879	Sample After 1945	Sample After 1879
	Model 1	Model 2	Model 3	Model 4
NUCLEAR DYAD	-1.31*	-0.36	-0.18	0.13
	(0.57)	(0.43)	(0.59)	(0.58)
NUCLEAR TARGET ONLY	-0.86*	-0.60*	0.27	-0.11
	(0.34)	(0.30)	(0.65)	(0.58)
NUCLEAR CHALLENGER ONLY	-1.13	-0.49		
	(0.71)	(0.61)		
NONNUCLEAR DYAD			1.13	0.49
			(0.71)	(0.61)
TARGET'S CAPABILITIES	0.48	0.15	0.48	0.15
	(0.34)	(0.22)	(0.34)	(0.22)
CHALLENGER'S CAPABILITIES	0.62*	0.71***	0.62*	0.71***
	(0.26)	(0.18)	(0.26)	(0.18)
DEMOCRACY TARGET	0.048	0.0032	0.048	0.0032
	(0.042)	(0.019)	(0.042)	(0.019)
DEMOCRACY CHALLENGER	-0.050+	-0.052*	-0.050+	-0.052*
	(0.027)	(0.021)	(0.027)	(0.021)
DEMOCRACY DYAD	-0.38	-0.72*	-0.38	-0.72*
	(0.34)	(0.33)	(0.34)	(0.33)
DEFENSE ALLIANCE WITH CHALLENGER	-0.13	-0.51	-0.13	-0.51
	(0.43)	(0.35)	(0.43)	(0.35)
DEFENSE ALLIANCE WITH MAJOR POWERS	0.24	0.20	0.24	0.20
	(0.31)	(0.26)	(0.31)	(0.26)
TARGET'S CONFLICT HISTORY	0.066**	0.067***	0.066**	0.067***
	(0.021)	(0.018)	(0.021)	(0.018)
TARGET'S INTERNATIONAL STATUS	-0.016	0.26+	-0.016	0.26+
	(0.18)	(0.15)	(0.18)	(0.15)
CONSTANT	-0.14	1.18	-1.27	0.69
	(1.65)	(1.12)	(1.70)	(1.11)
N	6129	10801	6129	10801
Year and Dyad Fixed Effects	Yes	Yes	Yes	Yes
Log Likelihood	-1098.4	-1504.8	-1098.4	-1504.8

Model 1 and 2: NONNUCLEAR DYAD is the baseline category.
Model 3 and 4: NUCLEAR CHALLENGER ONLY is the baseline category.
Robust standard errors are clustered by dyad and are in parentheses.
Cubic polynomial (three knots) of peace years is included but not shown.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < .01$, *** $p < .001$

Table 2: North Korea, Pakistan, and South Africa Balanced Sample (Dyadic Analysis)

	Sample 20 years	Sample 30 years	Sample 20 years	Sample 30 years
	Model 1	Model 2	Model 3	Model 4
NUCLEAR DYAD	-0.34	-0.58	0.86	0.27
	(0.60)	(0.55)	(0.82)	(0.67)
NUCLEAR TARGET ONLY	-0.96*	-0.74*	0.24	0.12
	(0.47)	(0.36)	(0.90)	(0.66)
NUCLEAR CHALLENGER ONLY	-1.20	-0.86		
	(0.78)	(0.63)		
NONNUCLEAR DYAD			1.20	0.86
			(0.78)	(0.63)
TARGET'S CAPABILITIES	0.48	0.16	0.48	0.16
	(0.61)	(0.48)	(0.61)	(0.48)
CHALLENGER'S CAPABILITIES	1.10+	1.21**	1.10+	1.21**
	(0.59)	(0.45)	(0.59)	(0.45)
DEMOCRACY TARGET	-0.031	-0.010	-0.031	-0.010
	(0.024)	(0.018)	(0.024)	(0.018)
DEMOCRACY CHALLENGER	-0.13*	-0.098**	-0.13*	-0.098**
	(0.060)	(0.037)	(0.060)	(0.037)
DEMOCRACY DYAD	-1.14	-0.79	-1.14	-0.79
	(0.82)	(0.61)	(0.82)	(0.61)
DEFENSE ALLIANCE WITH CHALLENGER	-0.42	-0.25	-0.42	-0.25
	(0.52)	(0.47)	(0.52)	(0.47)
DEFENSE ALLIANCE WITH MAJOR POWERS	-0.46	-0.048	-0.46	-0.048
	(0.54)	(0.44)	(0.54)	(0.44)
TARGET'S CONFLICT HISTORY	0.031	0.070*	0.031	0.070*
	(0.043)	(0.028)	(0.043)	(0.028)
TARGET'S INTERNATIONAL STATUS	-0.081	0.0045	-0.081	0.0045
	(0.31)	(0.24)	(0.31)	(0.24)
CONSTANT	5.67	4.12	4.48	3.26
	(4.49)	(2.75)	(4.72)	(2.77)
N	1988	3754	1988	3754
Year and Dyad Fixed Effects	Yes	Yes	Yes	Yes
Log Likelihood	-502.3	-756.0	-502.3	-756.0

Model 1 and 2: NONNUCLEAR DYAD is the baseline category.
Model 3 and 4: NUCLEAR CHALLENGER ONLY is the baseline category.
Robust standard errors are clustered by dyad and are in parentheses.
Cubic polynomial (three knots) of peace years is included but not shown.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < .01$, *** $p < .001$

Table 3: All Dyads Balanced (Dyadic Analysis)

	Sample 20 years	Sample 30 years	Sample 20 years	Sample 30 years
	Model 1	Model 2	Model 3	Model 4
NUCLEAR DYAD	-0.38	-0.52	0.73	0.22
	(0.63)	(0.57)	(0.82)	(0.69)
NUCLEAR TARGET ONLY	-0.99^{*}	-0.83^{*}	0.12	-0.094
	(0.50)	(0.39)	(0.93)	(0.67)
NUCLEAR CHALLENGER ONLY	-1.11	-0.74		
	(0.80)	(0.62)		
NONNUCLEAR DYAD			1.11	0.74
			(0.80)	(0.62)
TARGET'S CAPABILITIES	0.33	0.098	0.33	0.098
	(0.59)	(0.51)	(0.59)	(0.51)
CHALLENGER'S CAPABILITIES	1.04^{+}	0.97^{*}	1.04^{+}	0.97^{*}
	(0.60)	(0.44)	(0.60)	(0.44)
DEMOCRACY TARGET	-0.036	-0.0059	-0.036	-0.0059
	(0.024)	(0.018)	(0.024)	(0.018)
DEMOCRACY CHALLENGER	-0.13^{*}	-0.11^{**}	-0.13^{*}	-0.11^{**}
	(0.059)	(0.040)	(0.059)	(0.040)
DEMOCRACY DYAD	-1.25	-1.16^{+}	-1.25	-1.16^{+}
	(0.85)	(0.66)	(0.85)	(0.66)
DEFENSE ALLIANCE WITH CHALLENGER	-0.35	-0.36	-0.35	-0.36
	(0.56)	(0.43)	(0.56)	(0.43)
DEFENSE ALLIANCE WITH MAJOR POWERS	-0.40	0.56	-0.40	0.56
	(0.62)	(0.54)	(0.62)	(0.54)
TARGET'S CONFLICT HISTORY	-0.0016	0.065^{*}	-0.0016	0.065^{*}
	(0.042)	(0.030)	(0.042)	(0.030)
TARGET'S INTERNATIONAL STATUS	-0.12	0.068	-0.12	0.068
	(0.33)	(0.27)	(0.33)	(0.27)
CONSTANT	5.06	2.79	3.94	2.06
	(4.45)	(2.85)	(4.74)	(2.91)
N	1810	3193	1810	3193
Year and Dyad Fixed Effects	Yes	Yes	Yes	Yes
Log Likelihood	-466.1	-667.2	-466.1	-667.2

Model 1 and 2: NONNUCLEAR DYAD is the baseline category.
Model 3 and 4: NUCLEAR CHALLENGER ONLY is the baseline category.
Robust standard errors are clustered by dyad and are in parentheses.
Cubic polynomial (three knots) of peace years is included but not shown.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < .01$, *** $p < .001$

Table 4: Alternate DV - War Included (Dyadic Analysis)

	Sample 20 years	Sample 30 years	Sample 20 years	Sample 30 years
	Model 1	Model 2	Model 3	Model 4
NUCLEAR DYAD	-0.46	-0.58	0.55	0.16
	(0.51)	(0.54)	(0.80)	(0.65)
NUCLEAR TARGET ONLY	-1.13^{**}	-0.82^{*}	-0.12	-0.078
	(0.43)	(0.35)	(0.89)	(0.65)
NUCLEAR CHALLENGER ONLY	-1.01	-0.74		
	(0.80)	(0.64)		
NONNUCLEAR DYAD			1.01	0.74
			(0.80)	(0.64)
TARGET'S CAPABILITIES	1.00^{+}	0.33	1.00^{+}	0.33
	(0.58)	(0.45)	(0.58)	(0.45)
CHALLENGER'S CAPABILITIES	1.02^{+}	1.12^{**}	1.02^{+}	1.12^{**}
	(0.60)	(0.42)	(0.60)	(0.42)
DEMOCRACY TARGET	-0.022	-0.0057	-0.022	-0.0057
	(0.018)	(0.012)	(0.018)	(0.012)
DEMOCRACY CHALLENGER	-0.10^{*}	-0.097^{**}	-0.10^{*}	-0.097^{**}
	(0.047)	(0.036)	(0.047)	(0.036)
DEMOCRACY DYAD	-1.04	-0.59	-1.04	-0.59
	(0.64)	(0.49)	(0.64)	(0.49)
DEFENSE ALLIANCE WITH CHALLENGER	-0.86^{+}	-0.57	-0.86^{+}	-0.57
	(0.48)	(0.46)	(0.48)	(0.46)
DEFENSE ALLIANCE WITH MAJOR POWERS	-0.25	0.13	-0.25	0.13
	(0.51)	(0.42)	(0.51)	(0.42)
TARGET'S CONFLICT HISTORY	0.047	0.073^{**}	0.047	0.073^{**}
	(0.042)	(0.027)	(0.042)	(0.027)
TARGET'S INTERNATIONAL STATUS	0.15	0.057	0.15	0.057
	(0.29)	(0.19)	(0.29)	(0.19)
CONSTANT	8.58^{*}	4.28	7.57^{+}	3.53
	(4.12)	(2.70)	(4.35)	(2.73)
N	2291	4280	2291	4280
Year and Dyad Fixed Effects	Yes	Yes	Yes	Yes
Log Likelihood	-551.3	-837.4	-551.3	-837.4

Model 1 and 2: NONNUCLEAR DYAD is the baseline category.
Model 3 and 4: NUCLEAR CHALLENGER ONLY is the baseline category.
Robust standard errors are clustered by dyad and are in parentheses.
Cubic polynomial (three knots) of peace years is included but not shown.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < .01$, *** $p < .001$

Table 5: Alternate DV - Use of Forces and War Excluded (Dyadic Analysis)

	Sample 20 years	Sample 30 years	Sample 20 years	Sample 30 years
	Model 1	Model 2	Model 3	Model 4
NUCLEAR DYAD	-0.45	-0.94	-0.25	-0.76
	(1.06)	(0.80)	(1.35)	(0.94)
NUCLEAR TARGET ONLY	-2.16*	-1.68**	-1.96	-1.50
	(0.88)	(0.59)	(1.22)	(0.92)
NUCLEAR CHALLENGER ONLY	-0.20	-0.18		
	(0.91)	(0.75)		
NONNUCLEAR DYAD			0.20	0.18
			(0.91)	(0.75)
TARGET'S CAPABILITIES	3.67**	0.73	3.67**	0.73
	(1.28)	(0.78)	(1.28)	(0.78)
CHALLENGER'S CAPABILITIES	1.86	1.96**	1.86	1.96**
	(1.40)	(0.76)	(1.40)	(0.76)
DEMOCRACY TARGET	0.018	0.095	0.018	0.095
	(0.060)	(0.099)	(0.060)	(0.099)
DEMOCRACY CHALLENGER	0.024	-0.035	0.024	-0.035
	(0.086)	(0.055)	(0.086)	(0.055)
DEMOCRACY DYAD	-0.97	-1.99+	-0.97	-1.99+
	(2.67)	(1.19)	(2.67)	(1.19)
DEFENSE ALLIANCE WITH CHALLENGER	-1.14	-0.29	-1.14	-0.29
	(1.30)	(0.90)	(1.30)	(0.90)
DEFENSE ALLIANCE WITH MAJOR POWERS	-1.40	0.44	-1.40	0.44
	(1.03)	(0.49)	(1.03)	(0.49)
TARGET'S CONFLICT HISTORY	-0.20+	0.052	-0.20+	0.052
	(0.11)	(0.057)	(0.11)	(0.057)
TARGET'S INTERNATIONAL STATUS	0.80	0.47	0.80	0.47
	(0.58)	(0.30)	(0.58)	(0.30)
CONSTANT	20.1*	6.53	19.9*	6.35
	(8.27)	(4.87)	(8.15)	(5.02)
N	525	1434	525	1434
Year and Dyad Fixed Effects	Yes	Yes	Yes	Yes
Log Likelihood	-140.6	-269.3	-140.6	-269.3

Model 1 and 2: NONNUCLEAR DYAD is the baseline category.
Model 3 and 4: NUCLEAR CHALLENGER ONLY is the baseline category.
Robust standard errors are clustered by dyad and are in parentheses.
Cubic polynomial (three knots) of peace years is included but not shown.
+ $p < 0.10$, * $p < 0.05$, ** $p < .01$, *** $p < .001$

Table 6: Linear Probability Models (Dyadic Analysis)

	Sample 20 years	Sample 30 years	Sample 20 years	Sample 30 years
	Model 1	Model 2	Model 3	Model 4
NUCLEAR DYAD	-0.0017	-0.0061	0.019	0.0083
	(0.025)	(0.023)	(0.030)	(0.024)
NUCLEAR TARGET ONLY	-0.015*	-0.011+	0.0065	0.0030
	(0.0062)	(0.0064)	(0.042)	(0.029)
NUCLEAR CHALLENGER ONLY	-0.021	-0.014		
	(0.041)	(0.030)		
NONNUCLEAR DYAD			0.021	0.014
			(0.041)	(0.030)
TARGET'S CAPABILITIES	0.0079	0.0051	0.0079	0.0051
	(0.0088)	(0.0068)	(0.0088)	(0.0068)
CHALLENGER'S CAPABILITIES	0.016*	0.015**	0.016*	0.015**
	(0.0064)	(0.0046)	(0.0064)	(0.0046)
DEMOCRACY TARGET	-0.00030	-0.00016	-0.00030	-0.00016
	(0.00022)	(0.00023)	(0.00022)	(0.00023)
DEMOCRACY CHALLENGER	-0.00049	-0.00075*	-0.00049	-0.00075*
	(0.00032)	(0.00030)	(0.00032)	(0.00030)
DEMOCRACY DYAD	-0.017*	-0.013+	-0.017*	-0.013+
	(0.0085)	(0.0075)	(0.0085)	(0.0075)
DEFENSE ALLIANCE WITH CHALLENGER	-0.0060	-0.0046	-0.0060	-0.0046
	(0.0054)	(0.0065)	(0.0054)	(0.0065)
DEFENSE ALLIANCE WITH MAJOR POWERS	-0.0063	0.00080	-0.0063	0.00080
	(0.0064)	(0.0059)	(0.0064)	(0.0059)
TARGET'S CONFLICT HISTORY	0.00027	0.00087*	0.00027	0.00087*
	(0.00062)	(0.00039)	(0.00062)	(0.00039)
TARGET'S INTERNATIONAL STATUS	-0.0032	0.0011	-0.0032	0.0011
	(0.0045)	(0.0031)	(0.0045)	(0.0031)
CONSTANT	0.097*	0.13**	0.076	0.12*
	(0.039)	(0.047)	(0.055)	(0.056)
N	10436	15167	10436	15167
Year and Dyad Fixed Effects	Yes	Yes	Yes	Yes
Log Likelihood	6712.4	9973.5	6712.4	9973.5

Model 1 and 2: NONNUCLEAR DYAD is the baseline category.
Model 3 and 4: NUCLEAR CHALLENGER ONLY is the baseline category.
Robust standard errors are clustered by dyad and are in parentheses.
Cubic polynomial (three knots) of peace years is included but not shown.
+ $p < 0.10$, * $p < 0.05$, ** $p < .01$, *** $p < .001$

Table 7: Count DV and Poisson Regression Model (Monadic Analysis)

	Sample 20 years	Sample 30 years	Sample 20 years	Sample 30 years	Sample 20 years	Sample 30 years
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
NUCLEAR TARGET	-0.56*	-0.29	-0.54	-0.30	-1.02*	-0.65
	(0.28)	(0.23)	(0.37)	(0.24)	(0.48)	(0.46)
DEMOCRACY TARGET	-0.44	-0.38*	-0.55	-0.80***	0.32	1.06+
	(0.37)	(0.15)	(0.43)	(0.12)	(0.89)	(0.62)
TARGET'S CAPABILITIES	0.72+	0.20	0.86***	-0.0045	1.42	1.16
	(0.41)	(0.29)	(0.26)	(0.18)	(1.10)	(1.08)
DEFENSE ALLIANCE WITH MAJOR POWERS	-0.46	-0.12	-0.70+	-0.36	0.12	1.30
	(0.31)	(0.24)	(0.40)	(0.26)	(1.22)	(1.07)
TARGET'S CONFLICT HISTORY	0.012	0.036	0.029	0.057+	0.041	-0.0016
	(0.031)	(0.025)	(0.038)	(0.029)	(0.037)	(0.032)
TARGET'S INTERNATIONAL STATUS	0.038	0.090	-0.11	0.086	0.25	-0.032
	(0.16)	(0.089)	(0.20)	(0.11)	(0.31)	(0.18)
CONSTANT	-14.9	1.93***	-16.7	1.35***	-20.3	-21.4
	(2.59)	(0.51)	(3.11)	(0.40)	(60.3)	(92.4)
N	373	529	373	529	373	529
Year and Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Log Likelihood	-279.3	-410.9	-223.7	-339.6	-99.2	-147.0

Model 1 and 2: Both nuclear and nonnuclear challengers initiated MIDs.
Model 3 and 4: Only nonnuclear challengers initiated MIDs.
Model 5 and 6: Only nuclear challengers initiated MIDs.
Robust standard errors are clustered by target countries and are in parentheses.
Cubic polynomial (three knots) of peace years is included but not shown.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < .01$, *** $p < .001$

Table 8: Alternate Status Variable - Average 5-year Status Variable (Dyadic Analysis)

	Sample 20 years	Sample 30 years	Sample 20 years	Sample 30 years
	Model 1	Model 2	Model 3	Model 4
NUCLEAR DYAD	-0.55	-0.49	0.60	0.27
	(0.52)	(0.55)	(0.80)	(0.66)
NUCLEAR TARGET ONLY	-1.02*	-0.68*	0.13	0.087
	(0.44)	(0.35)	(0.89)	(0.66)
NUCLEAR CHALLENGER ONLY	-1.15	-0.77		
	(0.78)	(0.63)		
NONNUCLEAR DYAD			1.15	0.77
			(0.78)	(0.63)
TARGET'S CAPABILITIES	0.29	-0.062	0.29	-0.062
	(0.59)	(0.49)	(0.59)	(0.49)
CHALLENGER'S CAPABILITIES	0.85	1.00*	0.85	1.00*
	(0.58)	(0.44)	(0.58)	(0.44)
DEMOCRACY TARGET	-0.033	-0.012	-0.033	-0.012
	(0.024)	(0.018)	(0.024)	(0.018)
DEMOCRACY CHALLENGER	-0.10*	-0.099**	-0.10*	-0.099**
	(0.050)	(0.034)	(0.050)	(0.034)
DEMOCRACY DYAD	-1.41+	-0.87	-1.41+	-0.87
	(0.83)	(0.57)	(0.83)	(0.57)
DEFENSE ALLIANCE WITH CHALLENGER	-0.43	-0.34	-0.43	-0.34
	(0.51)	(0.47)	(0.51)	(0.47)
DEFENSE ALLIANCE WITH MAJOR POWERS	-0.38	-0.0039	-0.38	-0.0039
	(0.51)	(0.44)	(0.51)	(0.44)
TARGET'S CONFLICT HISTORY	0.018	0.061*	0.018	0.061*
	(0.041)	(0.026)	(0.041)	(0.026)
TARGET'S INTERNATIONAL STATUS	-0.32	-0.061	-0.32	-0.061
	(0.39)	(0.23)	(0.39)	(0.23)
CONSTANT	5.90	2.43	4.75	1.66
	(4.17)	(3.00)	(4.32)	(3.00)
N	2135	4075	2135	4075
Year and Dyad Fixed Effects	Yes	Yes	Yes	Yes
Log Likelihood	-536.0	-818.9	-536.0	-818.9

Model 1 and 2: NONNUCLEAR DYAD is the baseline category.
Model 3 and 4: NUCLEAR CHALLENGER ONLY is the baseline category.
Robust standard errors are clustered by dyad and are in parentheses.
Cubic polynomial (three knots) of peace years is included but not shown.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < .01$, *** $p < .001$

Table 9: Pakistani Weaponization in 1987 (Dyadic Analysis)

	Sample 20 years	Sample 30 years	Sample 20 years	Sample 30 years
	Model 1	Model 2	Model 3	Model 4
NUCLEAR DYAD	-0.52	-0.58	0.58	0.15
	(0.53)	(0.55)	(0.83)	(0.65)
NUCLEAR TARGET ONLY	-0.89*	-0.65^{+}	0.20	0.082
	(0.44)	(0.34)	(0.94)	(0.67)
NUCLEAR CHALLENGER ONLY	-1.09	-0.74		
	(0.84)	(0.66)		
NONNUCLEAR DYAD			1.09	0.74
			(0.84)	(0.66)
TARGET'S CAPABILITIES	0.52	0.095	0.52	0.095
	(0.59)	(0.46)	(0.59)	(0.46)
CHALLENGER'S CAPABILITIES	1.03^{+}	1.12**	1.03^{+}	1.12**
	(0.58)	(0.42)	(0.58)	(0.42)
DEMOCRACY TARGET	-0.031	-0.013	-0.031	-0.013
	(0.024)	(0.018)	(0.024)	(0.018)
DEMOCRACY CHALLENGER	-0.12*	-0.10**	-0.12*	-0.10**
	(0.053)	(0.035)	(0.053)	(0.035)
DEMOCRACY DYAD	-1.24	-0.76	-1.24	-0.76
	(0.90)	(0.60)	(0.90)	(0.60)
DEFENSE ALLIANCE WITH CHALLENGER	-0.40	-0.36	-0.40	-0.36
	(0.51)	(0.47)	(0.51)	(0.47)
DEFENSE ALLIANCE WITH MAJOR POWERS	-0.53	-0.042	-0.53	-0.042
	(0.52)	(0.43)	(0.52)	(0.43)
TARGET'S CONFLICT HISTORY	0.032	0.063*	0.032	0.063*
	(0.043)	(0.027)	(0.043)	(0.027)
TARGET'S INTERNATIONAL STATUS	0.11	0.046	0.11	0.046
	(0.31)	(0.18)	(0.31)	(0.18)
CONSTANT	6.95^{+}	3.36	5.86	2.63
	(4.16)	(2.68)	(4.38)	(2.69)
N	2031	3985	2031	3985
Year and Dyad Fixed Effects	Yes	Yes	Yes	Yes
Log Likelihood	-519.1	-803.7	-519.1	-803.7

Model 1 and 2: NONNUCLEAR DYAD is the baseline category.
Model 3 and 4: NUCLEAR CHALLENGER ONLY is the baseline category.
Robust standard errors are clustered by dyad and are in parentheses.
Cubic polynomial (three knots) of peace years is included but not shown.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < .01$, *** $p < .001$

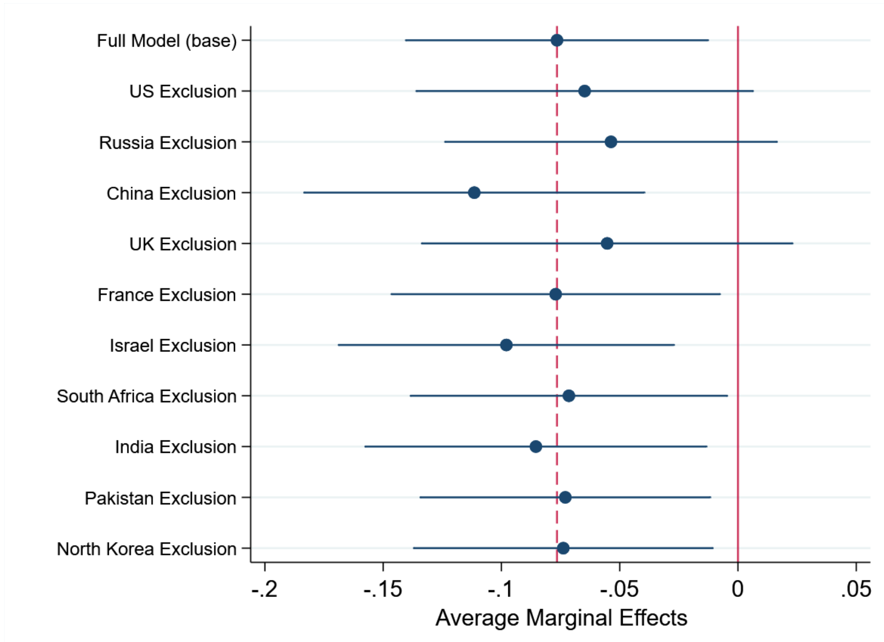
Table 10: Gartzke and Kroenig (2009) Weaponization Dates (Dyadic Analysis)

	Sample 20 years	Sample 30 years	Sample 20 years	Sample 30 years
	Model 1	Model 2	Model 3	Model 4
NUCLEAR DYAD	-1.17*	-0.59	0.16	0.13
	(0.58)	(0.53)	(0.85)	(0.66)
NUCLEAR TARGET ONLY	-1.24*	-0.68^{+}	0.091	0.044
	(0.50)	(0.36)	(0.93)	(0.67)
NUCLEAR CHALLENGER ONLY	-1.33^{+}	-0.72		
	(0.76)	(0.62)		
NONNUCLEAR DYAD			1.33^{+}	0.72
			(0.76)	(0.62)
TARGET'S CAPABILITIES	1.10^{+}	0.13	1.10^{+}	0.13
	(0.66)	(0.47)	(0.66)	(0.47)
CHALLENGER'S CAPABILITIES	0.88	1.12**	0.88	1.12**
	(0.58)	(0.42)	(0.58)	(0.42)
DEMOCRACY TARGET	-0.026	-0.011	-0.026	-0.011
	(0.025)	(0.018)	(0.025)	(0.018)
DEMOCRACY CHALLENGER	-0.13**	-0.11**	-0.13**	-0.11**
	(0.045)	(0.035)	(0.045)	(0.035)
DEMOCRACY DYAD	-0.49	-0.69	-0.49	-0.69
	(0.67)	(0.59)	(0.67)	(0.59)
DEFENSE ALLIANCE WITH CHALLENGER	-0.58	-0.36	-0.58	-0.36
	(0.47)	(0.47)	(0.47)	(0.47)
DEFENSE ALLIANCE WITH MAJOR POWERS	-0.54	-0.027	-0.54	-0.027
	(0.55)	(0.44)	(0.55)	(0.44)
TARGET'S CONFLICT HISTORY	0.040	0.072**	0.040	0.072**
	(0.046)	(0.027)	(0.046)	(0.027)
TARGET'S INTERNATIONAL STATUS	0.22	0.076	0.22	0.076
	(0.25)	(0.18)	(0.25)	(0.18)
CONSTANT	9.99*	3.54	8.66^{+}	2.81
	(4.34)	(2.72)	(4.51)	(2.74)
N	2104	4042	2104	4042
Year and Dyad Fixed Effects	Yes	Yes	Yes	Yes
Log Likelihood	-528.8	-804.0	-528.8	-804.0

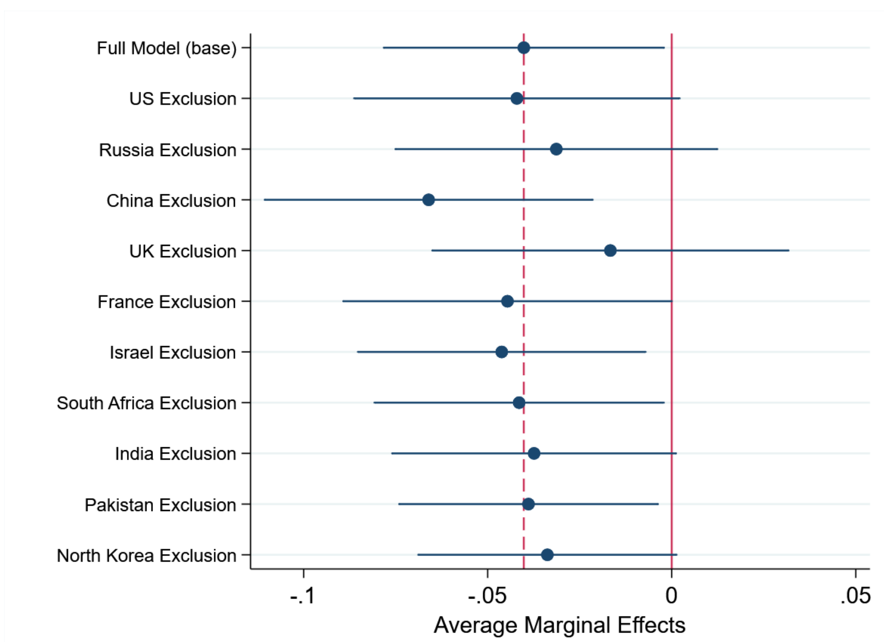
Model 1 and 2: NONNUCLEAR DYAD is the baseline category.
Model 3 and 4: NUCLEAR CHALLENGER ONLY is the baseline category.
Robust standard errors are clustered by dyad and are in parentheses.
Cubic polynomial (three knots) of peace years is included but not shown.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < .01$, *** $p < .001$

Figure 1: Influence of Individual Countries (Model 1 and Model 2)

We eliminate each country, one-by-one from the dyadic sample in Model 1 and 2 in Table 1 in the main text. Average marginal effects of nuclear weapon on the probability of being targeted in low-level militarized disputes with 95 % confidence interval.



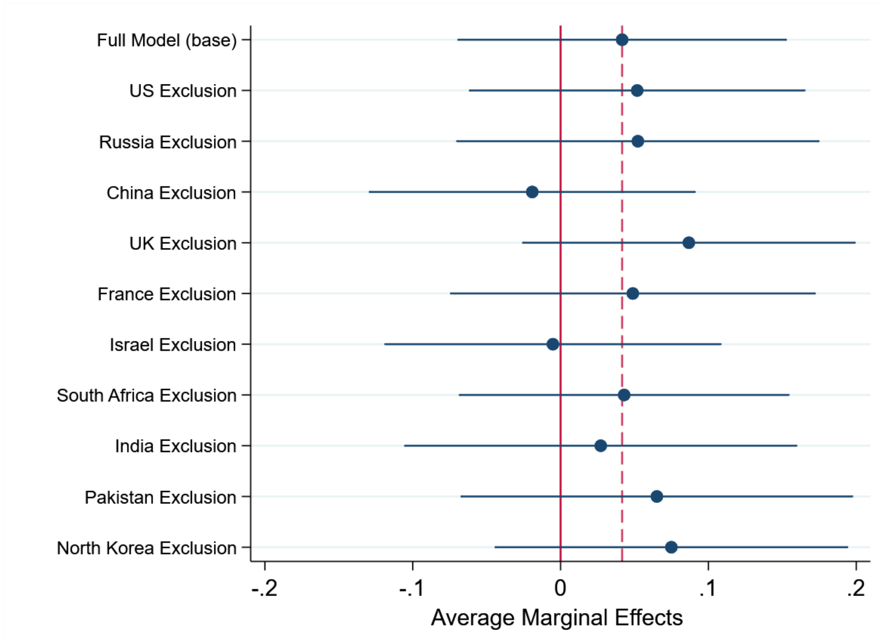
(a) 20 Years Sample



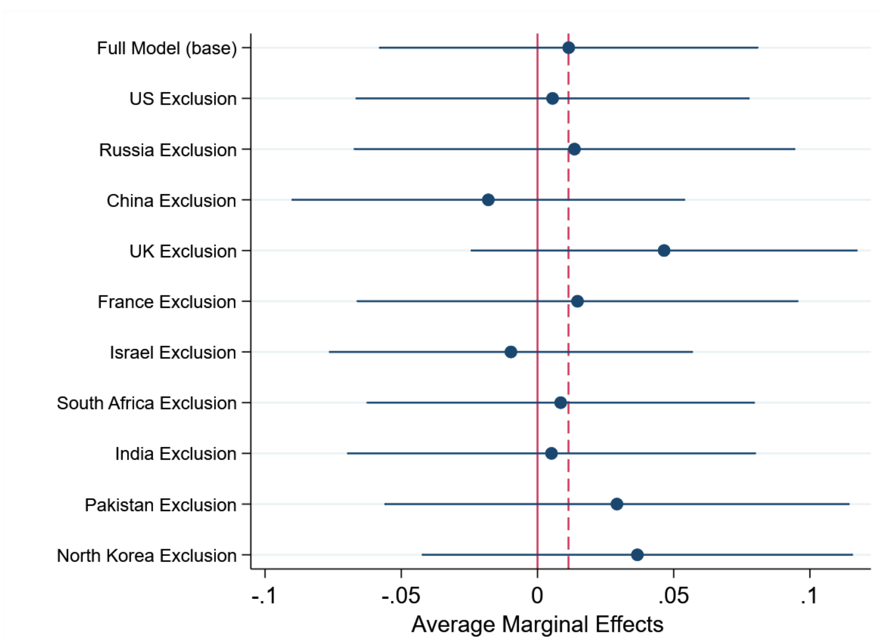
(b) 30 Years Sample

Figure 2: Influence of Individual Countries (Model 3 and Model 4)

We eliminate each country, one-by-one from the dyadic sample in Model 3 and 4 in Table 1 in the main text. Average marginal effects of nuclear weapon on the probability of being targeted in low-level militarized disputes with 95 % confidence interval. The panels report AMEs of nuclear weapons on MIDs targeting in low-level disputes.



(a) 20 Years Sample



(b) 30 Years Sample