

The Nuclear Regime Complex: A New Dataset

Shannon Carcelli, University of California, San Diego
Erik Gartzke, University of California, San Diego
Rebecca Gibbons, Georgetown University
Jeffrey M. Kaplow, University of California, San Diego

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Abstract:

Scholars wishing to study the impact of international institutions generally examine the characteristics and membership of a single treaty or set of treaties. But rarely does a single treaty—no matter how important—represent the extent of a state’s international commitments in a particular policy realm. Using membership in a treaty as a proxy for regime embeddedness can complicate inference, since there is likely to be much less variation in the membership of a single treaty than there is in the larger regime. In this paper, we introduce a new dataset that maps the nuclear regime—the 43 institutions, treaties, and agreements that deal with arms control and disarmament, nuclear non-proliferation, nuclear testing, and nuclear security. We argue that regime-level data are more appropriate for studies of the role of international institutions in constraining state behavior than are data focused on an individual treaty or treaties. We thus illustrate the use of the new dataset by developing a new measure of state embeddedness in the nuclear non-proliferation regime, examining whether regime membership has an effect on states’ propensity for conflict. Our data and findings have important implications for the study of international institutions.

Introduction

The proliferation of nuclear weapons and materials continues to be one of the gravest threats facing international security. The sustained decade-long effort by the U.S. government and others in the international community to curtail Iran's potential nuclear weapons program illustrates the challenge of this issue. The importance of this threat has been matched by scholarly study of the causes of nuclear proliferation (Jo and Gartzke 2007; Sagan 1996; Singh and Way 2004; Solingen 1994). Little attention has been paid, however, to one of the primary means of addressing the challenges posed by the proliferation of nuclear weapons and materials: the nuclear non-proliferation regime. This is despite the fact that a number of studies suggest that the cornerstone of the regime, the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), may exert a constraining influence on states (Fuhrmann 2009; Jo and Gartzke 2007; Kroenig 2009; Rublee 2009).

Of course, international security challenges do not end with the acquisition of nuclear weapons. The policy community struggles to manage North Korea's nuclear threat, an ongoing arms control process between the US and Russia, and a long-term drive to achieve a world without nuclear weapons. To a large literature on the consequences of nuclear proliferation (Beardsley and Asal 2009; Gartzke and Jo 2009; Sagan and Waltz 1995), recent scholarship has added a more detailed technical understanding of the make-up of global nuclear arsenals and their role in international relations (Gartzke, Kaplow, and Mehta 2014; Kroenig 2013; Sechser and Fuhrmann 2013). But this work, too, largely fails to address the role of multilateral and bilateral treaties and institutions in building confidence between nuclear states and facilitating efforts at arms control and disarmament.

In this paper, we argue that shifting the level of analysis from individual treaties to the broader regime will pay dividends for the study of international institutions. Not only is this approach more consistent with the way states actually see their international commitments, but it is likely to offer scholars more empirical leverage in answering important questions about the role these institutions play in halting proliferation or limiting international conflict. There is often little variation in the memberships of individual treaties—particularly high-profile treaties like the NPT, which has nearly universal

membership—but substantial variation in membership of the larger regime. A regime-level approach can make that variation available for use in empirical studies.

The nuclear regime is itself a rich domain for the study of international institutions.¹ First, nuclear treaties are clear in their goals. Non-proliferation and the prevention of nuclear war are straightforward motivations that minimize ambiguity among states and clarify theory for researchers. Second, nuclear treaties display a great deal of variation in their institutional features. Level of institutionalization and degree of obligation vary by treaty within the regime. The nuclear regime includes bilateral, regional and global agreements. This allows researchers to examine the effects of these types of variation. For example, are states more hesitant to join a treaty with more requirements, all else being equal? Does institutionalization improve cooperation? Is third-party monitoring more effective than monitoring by treaty members themselves? Do states view regional agreements as substitutes for or complements to global institutions?

Despite its perceived importance in international affairs, academic research into the full nuclear regime has been scarce. A lack of data may be one reason for the reluctance of international security scholars to examine the role of the nuclear regime in world politics. While it is relatively straightforward to code state membership in a single agreement, the full nuclear regime complex is made up of a large number of international institutions and agreements, with shifting memberships, eligibility criteria, obligations, and consequences for violation. It is no wonder, then, that even for those studying the nuclear non-proliferation regime, the measure of choice has been cast narrowly as membership in the NPT (Erickson and Way 2011; Fuhrmann and Berejikian 2012; Way and Sasikumar 2004).

This paper seeks to assist scholars in filling this gap by introducing a new dataset of the nuclear regime from its origins through 2013. These data provide new insight into both the attributes of individual

¹ In this paper, we use “nuclear regime” to refer to the set of international treaties, agreements, and institutions that address nuclear policy issues, including nuclear proliferation, nuclear testing, nuclear security, and nuclear arms control. There are therefore several important subsets of the larger nuclear regime. For example, the “non-proliferation regime” refers to the more limited set of treaties and agreements that restrict the proliferation of nuclear weapons.

treaties and institutions and the states that have elected to join them. The primary dataset includes 43 major nuclear-related institutions, agreements, conventions, and protocols across five categories—non-proliferation, nuclear security, arms control and disarmament, communication, and nuclear testing. For each agreement in the dataset, we provide information about its reporting, verification, and inspection requirements; the prescribed role of third-parties or international bodies; the agreement’s level of institutionalization; the presence of dispute-resolution or enforcement mechanisms; relationships with other treaties or agreements within the regime; and eligibility criteria. A parallel dataset tracks the membership of the regime, recording for each state its eligibility to join a particular agreement, dates of signature and ratification, and, if applicable, dates of exit and reentry.

To illustrate the regime-level approach, we use the new dataset to examine the link between membership in the nuclear non-proliferation regime and risk of international conflict. We find that, contrary to the expectations of the literature on the liberal peace, membership in a larger number of the agreements that make up the nuclear non-proliferation regime is associated with a greater risk of conflict. This finding, while preliminary, has important implications for work examining the link between international institutions and international conflict (Boehmer, Gartzke, and Nordstrom 2004; Mansfield and Pevehouse 2000; Oneal and Russett 2001).

We proceed in five parts. We begin with an introduction to the nuclear regime and its subsets, arguing that a regime-level perspective is important to understanding outcomes of interest in international relations. Next, we describe our new dataset in detail, explaining the information contained in the dataset and our data collection process. Third, we discuss some general trends that emerge from an examination of new data on the nuclear non-proliferation regime. Fourth, we present an application of the data to modeling international conflict. Finally, we conclude with some proposals for future research on the nuclear regime.

A Regime-Level Perspective

Since the advent of nuclear weapons, members of the international community have sought to

limit the proliferation of nuclear weapons states. Initial efforts, including the Baruch Plan and the Acheson-Lilienthal plan in the 1940s, failed. The United States addressed the proliferation threat by shrouding all aspects of its nuclear weapons program in secrecy after World War II, hoping to preserve the monopoly on this capability for as long as possible. The explosion of a Soviet nuclear device in 1949, followed by Great Britain in 1954, France in 1960, and China in 1964 indicated that nuclear secrets could not be kept and that the number of weapons states would likely keep growing. By the 1960s, and especially after China's nuclear test, the United States and Soviet Union were ready to cooperate to limit the number of additional weapons states. The two powers each drafted texts for a nuclear non-proliferation treaty, seeking input from and making compromises with non-nuclear weapons states (Shaker 1980). The NPT was unanimously supported in the UN General Assembly in 1968 and entered into force in 1970. This treaty became the cornerstone of the non-proliferation regime.

At the same time, states have sought to reduce the risk of nuclear weapons use. As a result of these efforts, a nuclear regime—encompassing arms control treaties, confidence-building measures, and limits on nuclear testing—has sprung up to parallel the institutions and treaties of nuclear non-proliferation. The elements of this regime include both bilateral and multilateral arrangements, and range from general statements of principle to specific counts of allowable weapons platforms. The regime also includes a variety of institutional features and obligations for state parties. Some agreements establish international secretariats, while others only involve periodic meetings of parties. Some agreements require third-party monitoring, while others do not stipulate any monitoring at all. The effects of these differing institutional features, of interest to scholars and policy-makers alike, can only be understood by looking at the regime as a whole. Because there is no single institution to address all the potential dangers of nuclear weapons use or proliferation, states can elect to be members of different aspects of the regime. Some states are fully embedded within the regime, while others appear to pick and choose, based on either substantive or institutional features.

For example, Brazil is a member of most of the treaties and agreements within the nuclear regime, but is not a member of the Proliferation Security Initiative (PSI)—a cooperative effort, with the

United States, to combat illicit trade in nuclear materials and technology—and has not ratified the Additional Protocol, which would allow greater access by international inspectors to its nuclear facilities. Indonesia has taken a leadership role on nuclear non-proliferation and disarmament in Southeast Asia; it was the first state in the region to ratify the Additional Protocol and it recently ratified the Comprehensive Test Ban Treaty (CTBT), which limits nuclear testing. But it has been skeptical of the PSI and UN Security Council Resolution 1540, an effort to limit proliferation through changes in domestic law. Some states may avoid agreements that levy costly obligations, such the Additional Protocol, while showing support for the regime by signing on to less arduous commitments. Examining international nuclear policy from the perspective of the overall regime helps analysts to begin unpacking why states select particular regime activities and not others. Put another way, a regime-level perspective provides one means of better understanding the perceived costs and benefits associated with different regime elements.

A number of states see the nuclear non-proliferation regime, and the NPT in particular, as promoting a discriminatory world of nuclear “haves” versus “have-nots” (Miller 2012). Such states may nevertheless find it in their interest to support other aspects of the nuclear regime, such as limits on nuclear testing, nuclear security, and nuclear weapons disarmament. India, for example, is not considered a nuclear weapon state under the NPT, and therefore cannot join the treaty without renouncing nuclear weapons. It is, however, a member in good standing of most of the treaties that make up the non-proliferation regime. An analysis that includes an indicator of NPT membership instead of regime membership, therefore, would understate India’s actual embeddedness in the nuclear regime. Such a simple measure also would not account for the other nuclear weapons treaties that India has joined, such as the Limited Test Ban Treaty and the Convention for the Suppression of Acts of Nuclear Terrorism.

A regime-level perspective helps answer a number of questions both about nuclear non-proliferation and nuclear weapons specifically, and institutional arrangements generally. For example, examining the entirety of agreements within the regime helps us better understand the level of obligation required under the regime and changes that may undermine or strengthen these obligation over time, the types of agreements that are more likely to garner membership, the types of institutional arrangements

that are acceptable to the broadest group of states, and the types of states that are most likely to join particular aspects of the regime. Further, it allows us to disaggregate the functions of different parts of the regime, rather than generalizing across them. By distinguishing between the arms control, nuclear testing, and nuclear non-proliferation aspects of the regime, for example, scholars can focus their attention on the subset of treaties and agreements that theory predicts will affect important outcomes in international relations, or alternatively can determine which aspects of the regime have the strongest effect on a particular dependent variable.

The benefits of studying international institutions through the lens of the nuclear regime are two-fold. First, the security dilemma may maximize both the incentives for and the obstacles to setting up a successful global regime (Jervis 1982). Thus, it is likely that institutional designs that are effective for security regimes will also be effective for regimes in domains that are less costly and uncertain. If the degree of institutionalization, type of monitoring, or the depth of obligations changes state behavior in the context of their own security, it is likely to affect their behavior in other realms as well. Second, there may be links between military alliances and other forms of cooperation (Gowa and Mansfield 1993). If this is the case, then states' accession to security regimes may also play an important role in their behavior in other domains. To the extent that security is the primary goal of the state, security regimes should provide scholars with the best understanding of the determinants of cooperation under the most extreme of circumstances.

The Nuclear Regime Dataset

Our nuclear regime dataset includes information on 43 institutions, treaties, agreements, conventions, and protocols between 1957 and 2013. We employ a broad conception of the nuclear regime, including several agreements—such as the Antarctic Treaty or the Outer Space Treaty—for which nuclear issues are only one part of a larger set of commitments taken on by state bodies. This broad definition of nuclear agreements gives scholars the option to limit the set of agreements to some subset of treaties when a narrower definition is appropriate. To build a comprehensive list of applicable international

agreements, we consulted several experts in the field, online resources (such as those provided by the Nuclear Threat Initiative, the Federation of American Scientists, and the International Atomic Energy Agency), and published reference works (such as the Inventory of International Nonproliferation Organizations and Regimes, now hosted by the Monterey Institute of International Studies). For information about individual agreements, we referred to the text of the agreements themselves, and consulted a variety of secondary sources in the academic literature, from governments, and from non-governmental organizations. To code state membership in a treaty, we referred to official member-state rosters where available, but also drew from centralized resources for treaty membership data, including the Nuclear Threat Initiative, the United Nations, and the US Department of State. A list of major sources for each agreement is provided in the dataset and, when possible, we reference applicable articles and sections from the treaty text when coding particular variables.

When a particular coding decision was ambiguous, we reached a unanimous decision among three coders and noted the ambiguous coding in the data along with a detailed justification of our coding decision. This will allow future researchers to easily recode the treaty as they see fit. For example, we code the NPT as being institutionalized with a permanent secretariat in the form of the International Atomic Energy Agency (IAEA). The actual text of the NPT, however, does not establish a permanent secretariat. While we judge that the IAEA has filled this role for the NPT, other scholars may disagree, and the structure of the dataset facilitates such recoding.

Treaty-level variables

The nuclear regime dataset comes in two parts. In the first, the unit of analysis is the international agreement. We collected information on a number of attributes of nuclear-related agreements.

- **Treaty type.** We categorize each treaty as an arms control or disarmament agreement, a non-proliferation agreement, a nuclear testing agreement, a communications agreement, or a nuclear security agreement. For treaties that include provisions related to multiple categories, we code a secondary treaty type variable as well. The Protocols to the Latin America Nuclear Weapon Free

Zone Treaty, for example, have provisions related to both non-proliferation and nuclear testing.

- **Protocol or sub-agreement.** A number of subsidiary conventions or protocols are only available to states that are members of the original treaty, or are seen as strengthening provisions already present in the overarching agreement. These protocols may not be appropriate for some forms of analysis, and so we record in our dataset the treaty with which a protocol is associated.
- **Reporting, verification, and inspection requirements.** Nuclear agreements often levy significant obligations on member states in the form of reporting, monitoring, and verification measures. We collected information about the specific requirements of these treaties (reporting, monitoring, voluntary inspections, or challenge inspections) and the parties responsible for conducting verification (self-reporting, other state parties, non-governmental organizations, or international governmental organizations). In some cases, these categories overlap. The African Nuclear Weapons Free Zone Treaty (also known as the Treaty of Pelindaba), for example, calls for self-reporting, challenge inspections by other member states, and voluntary inspections conducted by the IAEA.
- **Institutionalization.** We record the level of institutionalization within the treaty, including whether the agreement allows for the regular meeting of state parties and whether it establishes a permanent secretariat to administer the treaty.
- **Enforcement and dispute resolution.** Some nuclear treaties establish mechanisms for resolving disputes within the treaty. While no treaties within the nuclear regime have explicit enforcement provisions, several call for the cases of violators to be referred to the United Nations Security Council.
- **Eligibility criteria.** Not all states are considered eligible to join all agreements. A number of treaties are bilateral, and others are limited by geography, nuclear weapons status, nuclear supplier status, or by membership in another treaty or institution.
- **Key dates.** For each treaty, we record when the agreement opened for signature, when it entered into force, and, if applicable, when a particular level of compliance was required. A number of

arms control treaties, for example, require force reductions to have occurred by a particular date.

State-level variables

The second piece of the nuclear regime dataset treats the state as the unit of analysis. For each state, we code the following variables with respect to each treaty.

- **Eligibility.** We code the year that the state became eligible to sign or accede to the treaty.
- **Signature, ratification, and accession.** We record the year of signature and ratification/accession for each treaty.
- **Exit and reentry.** Several states have exited nuclear treaties, and in one case—Cambodia’s move to rejoin the IAEA in 2009 after leaving the agency six year prior—decided to reenter. We code exit and reentry dates to allow for comprehensive country-year analysis of regime membership.
- **Treaty in force for state.** We code the year the treaty came into force for a particular state.
- **Status.** For treaties that allow for observer status, such as the Antarctic Treaty, we code whether the state is a full voting member.

Exploring Membership in the Nuclear Non-Proliferation Regime

In this section, we examine our nuclear regime data in more detail. We focus here on the nuclear non-proliferation regime, defined broadly to include both non-proliferation and nuclear security-related agreements and institutions. This subset of the larger dataset includes 22 international agreements. The first of which, the IAEA itself, opened for membership in 1957; the most recent agreement is the Treaty on a Nuclear Weapon Free Zone in Central Asia, which opened for signature in 2006 and entered into force in 2009.

Membership in the nuclear non-proliferation regime is extremely broad: all states except North Korea are currently party to at least one agreement within the regime. To evaluate the extent to which states are embedded within the regime, we calculated, for each country-year, the share of agreements for which a state is eligible, that it actually joined. This measure, unlike a raw count of treaty memberships,

does not advantage states that are eligible for a greater number of agreements. By this measure, there is substantial variation in the depth of state membership in the non-proliferation regime. The United Kingdom, for example, is a member of more than 70 percent of the treaties for which it is eligible, while Somalia, East Timor, and Micronesia have each joined less than 10 percent of possible agreements.

Figure 1 charts membership in the nuclear non-proliferation regime over time. The solid line tracks the annual mean for the share of eligible treaties joined, on the left axis. The dashed line shows the mean number of agreements for which states are eligible, while the dotted line is mean number of agreements joined, both scaled to the right axis. While the number of available agreements and agreements joined has trended up dramatically since the early days of the regime, the average share of eligible agreements joined—the state’s actual embeddedness in the regime—has remained relatively stable since the 1970s, when the number of agreements began its rapid rise. Membership has thus largely kept pace with eligibility.

Figure 1, however, obscures significant variation in membership levels among states. Figure 2 provides a snapshot of regime membership—measured again as the share of eligible agreements that a state has joined—for all states across four years: 1965, 1980, 1995, and 2010. In 1965, the IAEA was the only element of the regime, and so states were either fully members or fully outside the regime. Membership included the United States, the Soviet Union, and their allies; China, India, and sub-Saharan Africa were excluded. By 1980, China had been brought into some elements of the regime, and more variation had crept into the membership portfolios of Latin American and Western European states. In 1995, China had surpassed the United States in its level of regime membership, as had Western Europe. The collapse of the Soviet Union had created more variation in regime membership for Eastern Europe and Central Asia. India and most of Africa are still outside of the regime. Finally, by 2010, the United States had slipped below the average level of regime membership, having joined only about 39 percent of the treaties for which it was eligible. With the increase in the number of nuclear security agreements, India had begun to be integrated into the regime for the first time, having joined 30 percent of its eligible agreements. At the same time, China and Russia had surpassed US membership in the regime.

Figure 1: Membership in the nuclear non-proliferation regime over time

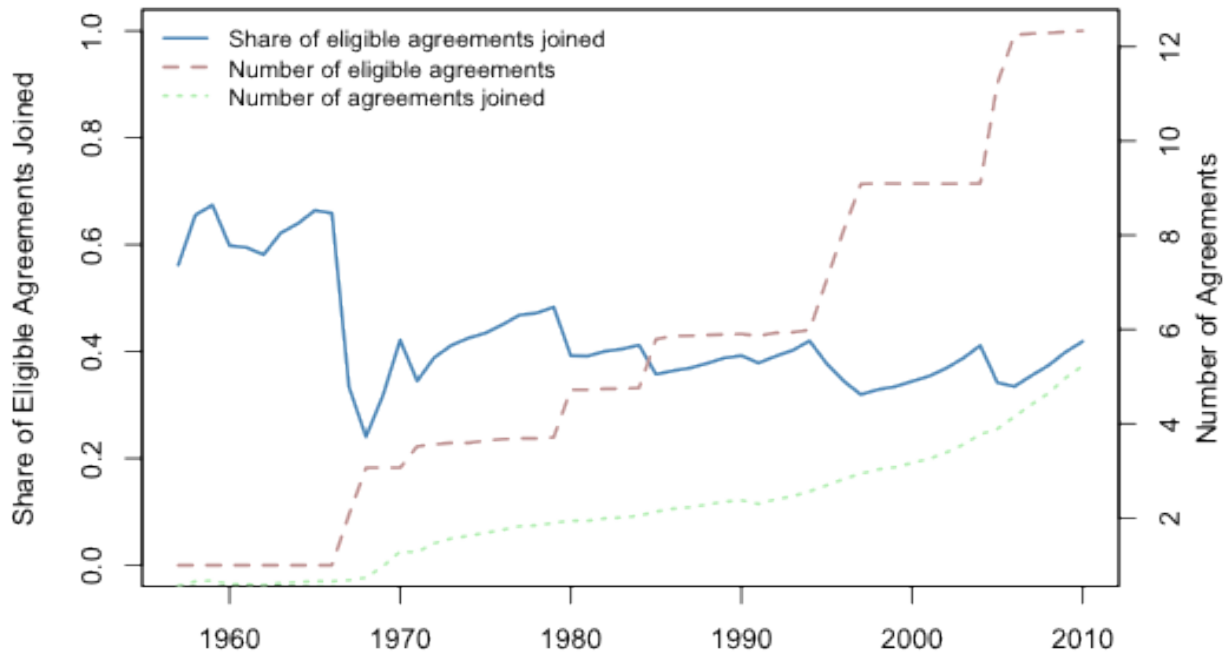
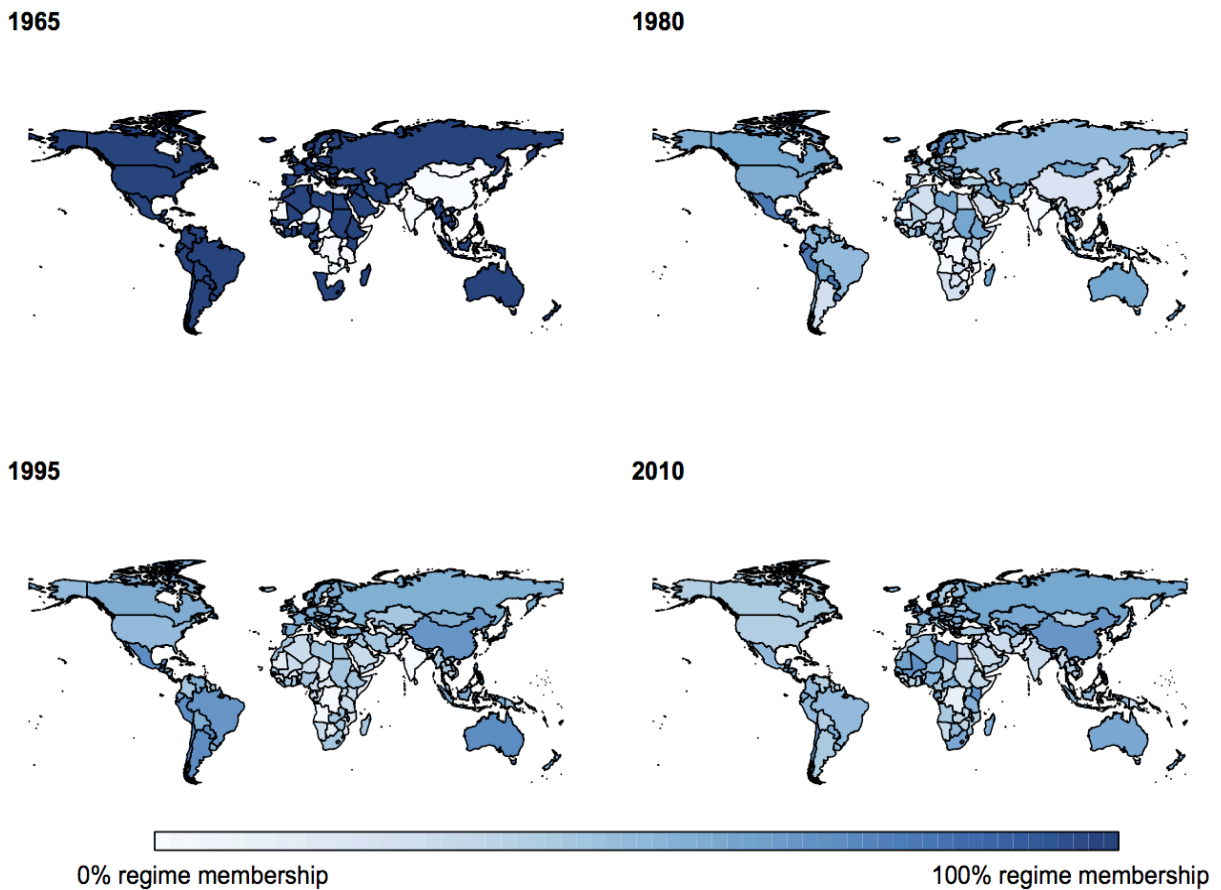


Figure 2: Global membership in the nuclear non-proliferation regime over time



One possible explanation for the regional differences in regime membership described above is the potential link between democracy and a state's propensity to join international organizations. Our new dataset shows that democracies have, on average, joined more elements of the nuclear non-proliferation regime than non-democracies. Figure 3 breaks down regime membership based on a state's Polity score (Marshall, Jaggers, and Gurr 2010). The solid line plots the average regime membership of democracies (states with Polity scores greater than or equal to 6), the dashed line represents autocracies (states with Polity scores less than or equal to -6), and the dotted line anocracies (Polity scores between -6 and 6). Since the NPT came into force in 1970, democracies have, on average, been party to more elements of the non-proliferation regime than other states.

Of particular interest is the relationship between the development of civilian nuclear and membership in the non-proliferation regime. Since the early days of the regime, the international community has been challenged to balance the provision of peaceful uses of nuclear energy promised Article IV of the NPT, with restrictions on trade in nuclear materials and technology. Many early signatories to the NPT, in fact, joined the treaty at least in part to benefit commercial nuclear energy interests (Koremenos 2001).

Our new data can shed some light on this relationship. Figure 4 tracks the link between regime membership and two measures of a state's interest in nuclear energy. The upper chart uses data on the number of IAEA Technical Cooperation (TC) projects a state has active in a given year (Brown and Kaplow 2014); the bottom chart examines the share of a state's total energy production that comes from nuclear power (World Bank 2008). For ease of visualization, we have divided states into two categories: joiners are party to a share of eligible agreements greater than the mean for a particular year, while abstainers have joined fewer eligible agreements than the mean for that year. Each dot in Figure 4 represents a single state in a given year, while the solid lines provide the mean for each category. Joiners tend, on average, to receive higher levels of IAEA technical assistance and to have a higher share of domestic energy production come from nuclear power.

Figure 3: Democracy and nuclear non-proliferation regime membership

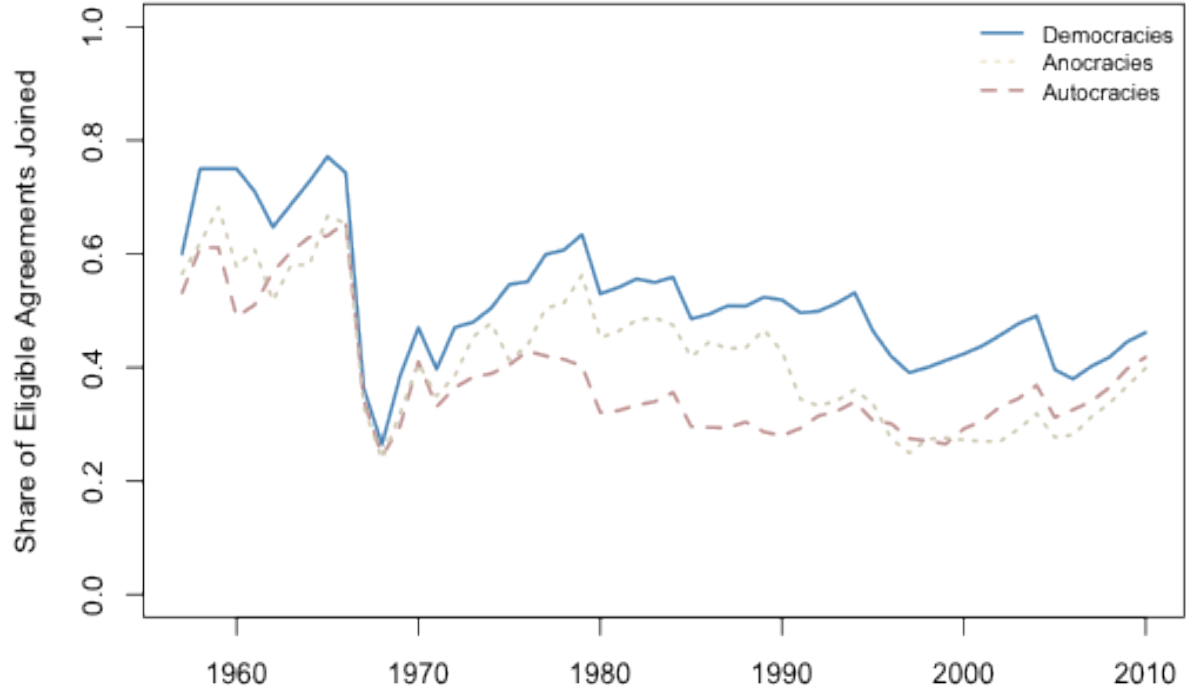
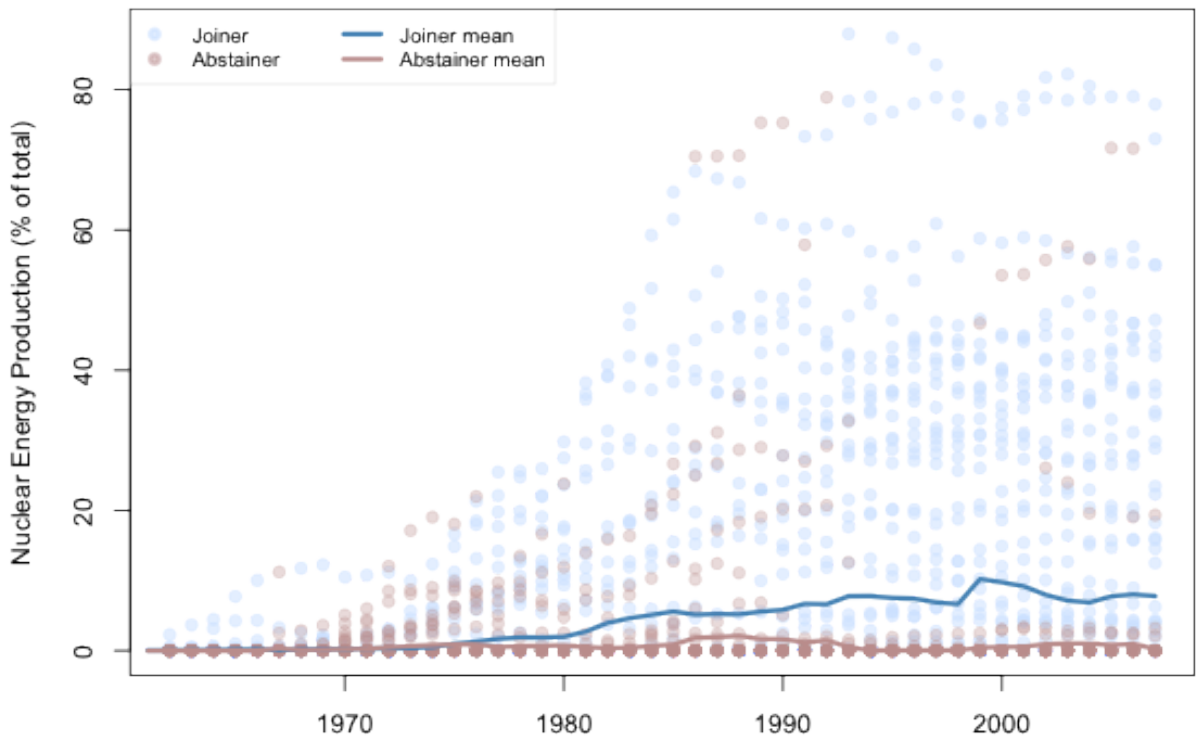
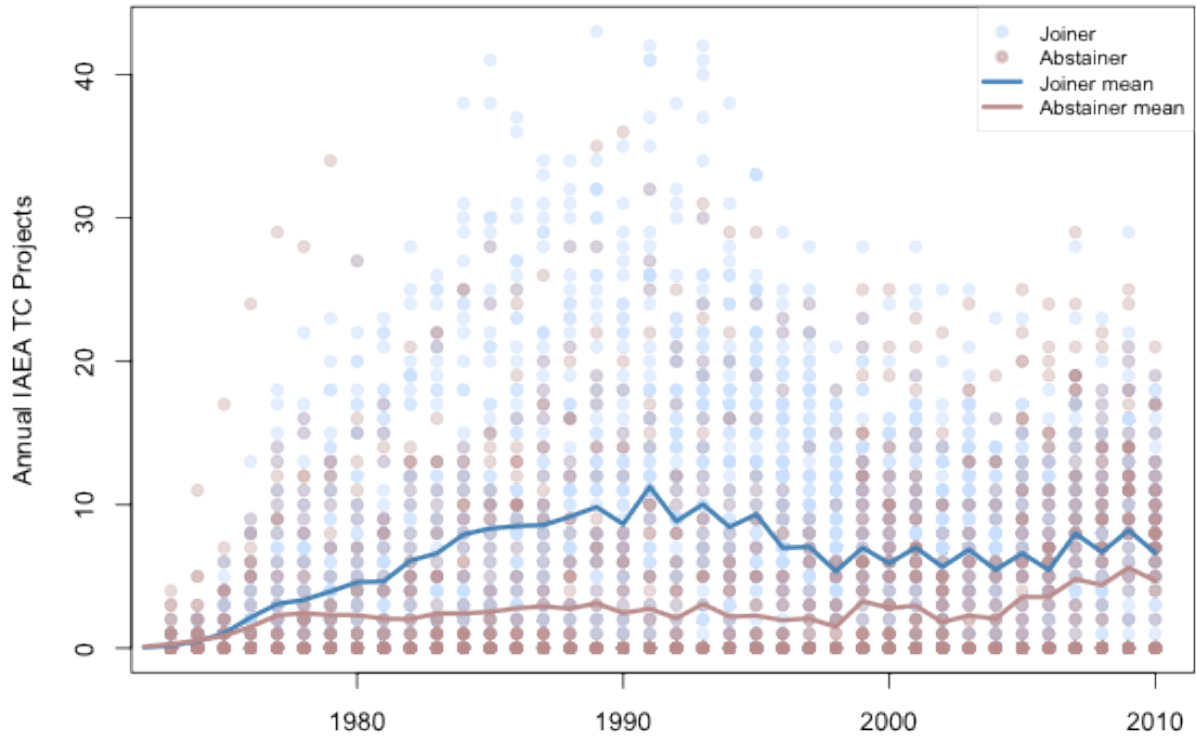


Figure 4: Nuclear energy and nuclear non-proliferation regime membership



Regime Membership and International Conflict

We turn now to an application of our data to an empirical question of importance: does a state's membership in the nuclear non-proliferation regime affect its risk of being involved in international conflict? A productive research agenda has focused on international organizations as the "third leg" of the Kantian Triad, leading scholars to expect to find international peace to follow from cooperation in international organizations (Hafner-Burton and Montgomery 2006; Oneal and Russett 2001). Some research, however, suggests caution. Boehmer et al. (2004) find that international organizations can actually contribute to conflict when they add to international uncertainty.

Membership in the nuclear non-proliferation regime sends a particular kind of message to the international community. A number of studies have found that states parties to the NPT are less likely to pursue nuclear weapons than non-members (not least because those states interested in weapons are likely to find the NPT to be more costly) (Fuhrmann 2009; Jo and Gartzke 2007; Kroenig 2009). Violating one's commitments under the nuclear non-proliferation regime is costly, and this cost only increases as states join a greater number of constituent agreements. The NPT and the broader non-proliferation regime, then, may help to screen states for nuclear weapons ambitions. To the extent that a latent nuclear capability provides some protection against conflict, states may actually telegraph their vulnerability by becoming more deeply embedded in the nuclear non-proliferation regime. But regime membership may signal a state's type in another way. States with similar levels of regime membership may be more likely to share foreign policy interests in general, making them less likely to engage in conflict.

Our nuclear regime dataset provides new empirical leverage on the relationship between regime membership and international conflict. As the purpose of this analysis is primarily to demonstrate the use of our new data, we keep our methods simple and avoid complex model specifications. Our results should thus be treated as preliminary. We structure our data as a time series cross section, with the undirected dyad-year as the unit of analysis. Our data includes interstate dyads from 1957 to 2010.² Our dependent

² While the nuclear regime dataset contains information through 2013, we limit the scope of this analysis to match the availability of covariate data.

variable is a dichotomous variable indicating whether or not the pair of states began an armed conflict in a given year, using data from PRIO and the Uppsala Conflict Data Program (Gleditsch et al. 2002).³ Observations after the first year of a conflict in a dyad are dropped from the data; the dyad reenters the dataset when the conflict concludes.

We employ two independent variables of interest: the average level of regime membership in the dyad, and the absolute difference between the two levels of regime membership in the dyad. In both cases, regime membership is measured as the share of eligible agreements within the non-proliferation regime that a state has joined. As with the analyses above, we treat the non-proliferation regime broadly as any agreement categorized as non-proliferation or nuclear security-related. Existing studies often use NPT membership as a proxy for regime membership. To show that our regime membership data can improve upon this measure, we include as an independent variable the number of states within the dyad that are NPT members in a given year.

We include in our models several control variables that are commonly used in the literature on international conflict. To account for power dynamics within the dyad, we use the ratio of the states' Composite Index of National Capability (CINC) levels, from the Correlates of War Project (Singer 1988). Geography is likely to be an important determinant of conflict. We include a continuous measure of the minimum distance between the two states in the dyad, as well as a dummy variable indicating whether or not the two states are contiguous (Weidmann, Kuse, and Gleditsch 2010). Finally, we address the role of state regime type by including a dichotomous variable that is set to 1 if both states in the dyad are democracies, with Polity scores greater than or equal to 6 (Marshall, Jaggers, and Gurr 2010).

Temporal dependence in our pooled time series is likely to be a concern. We thus include in our model specifications a cubic polynomial of peace years—the time since the previous dyadic conflict (Carter and Signorino 2010). International conflict is a rare event. We use rare-events logit to correct for rare events and finite sample bias. We report robust standard errors, clustered by dyad.

³ Robustness checks using a directed dyadic data structure and the militarized interstate dispute dataset from the Correlates of War project yield similar results (Ghosn, Palmer, and Bremer 2004).

Table 1 shows results from three models of armed conflict. In Model 1, the variable of interest is the mean level of regime membership within the dyad. The coefficient on this variable is positive and significant at the $p < 0.1$ level, suggesting that higher levels of regime membership are associated with an increased risk of conflict. Model 2 tests a different aspect of regime membership within the dyad. The variable of interest here is the absolute difference between the membership levels of the two states. The coefficient on this variable, too, is positive and statistically significant. States with similar levels of embeddedness in the non-proliferation regime are less likely to engage in conflict.

Model 3 repeats the analysis in Model 2, but adds a variable representing NPT membership. A greater number of NPT member states in the dyad is significantly associated with a reduced risk of international conflict. Even when controlling for NPT status, however, the significant role of regime membership persists. States are still more likely to engage in conflict when their membership in the non-proliferation regime differs.⁴ This model illustrates the additional empirical leverage provided by a more nuanced understanding of regime membership. Important aspects of regime dynamics can be missed when membership in a single treaty—no matter how prominent—is used as a proxy for membership in the overall regime.

The control variables in this analysis behave as expected and consistent with findings in the larger literature on international conflict. The greater the ratio of CINC scores within the dyad, the less likely are the states to engage in conflict. More distant states are significantly less likely to fight, while contiguous states are significantly more likely to do so. If both states are democracies, conflict between them is less likely.

These findings should be treated as preliminary. There are certainly other possible confounding factors that are not addressed in this analysis, including the possibility that states select into regime membership based on their anticipation of future conflict. Previous research on IGOs has found that conflict is positively associated with a state's overall activity in the international system, which in turn

⁴ This result persists when using a dichotomous variable representing shared NPT membership within the dyad.

Table 1: Rare-events logit analysis of non-proliferation regime membership and international conflict

		Model 1	Model 2	Model 3
		Conflict onset	Conflict onset	Conflict onset
Regime membership	Mean regime membership	1.067 (0.635) ^		
	Difference in regime memberships		1.653 (0.576) **	1.182 (0.523) *
	Number of NPT states in dyad			-0.874 (0.331) **
Power	CINC ratio	-1.888 (0.759) *	-2.053 (0.754) **	-2.079 (0.754) **
Geography	Minimum distance	-0.021 (0.005) ***	-0.022 (0.006) ***	-0.021 (0.006) ***
	Contiguity	1.972 (0.347) ***	1.946 (0.354) ***	1.870 (0.353) ***
Democracy	Both democracies	-1.776 (0.757) *	-1.571 (0.756) *	-1.636 (0.753) *
Temporal dependence	Peace years	0.002 (0.187)	0.053 (0.180)	0.073 (0.174)
	Peace years ²	0.003 (0.010)	0.001 (0.010)	0.002 (0.009)
	Peace years ³	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
	Constant	-7.919 (1.212) ***	-8.161 (1.069) ***	-7.677 (1.067) ***
N		523,482	523,482	523,482

Rare-events logit coefficients with robust standard errors, clustered by dyad, in parentheses.

*** p<0.001, ** p<0.01, * p<0.05, ^ p<0.10

should be related to activity in IGOs and treaties. Boehmer et al. (2004) control for the number of diplomatic missions in each state as a proxy for overall international exposure, and a similar approach might be useful here. It is also possible that joint regime membership in our models is acting as a proxy for the general affinity of states, and we might control for this possibility using, for example, the similarity of states' UN voting in the General Assembly (Gartzke 1998). Despite these cautions, our simple analysis illustrates how our nuclear regime data can make a contribution in revisiting existing debates in the international conflict and international organizations literatures, especially where previous analyses have used a membership in a single treaty as a rough proxy for wider regime membership.

Conclusion

While there is a rich academic literature on the causes and consequences of nuclear proliferation, it has largely failed to address the conditions under which international institutions can affect state behavior with regard to nuclear non-proliferation, security, testing, and arms control. Existing quantitative research struggles to define and operationalize the increasingly complex variety of actors and issue areas encompassed by the nuclear regime. Current data also do not begin to take advantage of the depth of

variation that exists in the nuclear regime. The dataset presented in this paper is designed to fill this gap in our current understanding of the regime. Future research can use this dataset to address more detailed and nuanced questions than have been examined previously. At the most basic level, researchers can now begin to evaluate the contention of Downes, Rocke and Barsoom (1996) “that there is little need for enforcement because there is little deep cooperation” in arms agreements (388). With the right statistical tools, scholars may use this dataset to determine whether the nuclear regime in fact has an effect on state behavior.

Beyond the effect of the regime as a whole, variation within the regime will allow researchers to pinpoint the institutional features that lead to greater cooperation. For example, the nuclear regime dataset codes treaties on monitoring and enforcement mechanisms, along with institutionalization and compliance obligations. These are all valuable independent variables, and their effect on state ratification and compliance can now be statistically determined. This kind of work will inform research in the nuclear regime in particular as well as international institutions more broadly.

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