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ABSTRACT


On January 22, 2021, the Treaty on the Prohibition of Nuclear Weapons (TPNW) entered into force. The aim of the treaty is to delegitimize nuclear weapons by strengthening the antinuclear norm. The aim comes with the expectation that this will gradually contribute to an environment in which nuclear weapons can be eliminated because they are unacceptable instruments of statecraft. However, the effectiveness of antinuclear norms has been contested in discussions around the TPNW. In particular, the question of how norms operate within smaller identity communities has attracted the attention of scholars studying commitment to international treaties. By using a mixed-methods research design, this article adds to the ongoing discussion by exploring the conditions under which regional normative pressure can explain commitment to the TPNW. Statistical analyses show that regional normative pressure significantly increases the likelihood of commitment. Further analyses, using qualitative comparative analysis, indicate that this pressure is effective only toward states with previous nonproliferation commitments and where commitment to the TPNW does not entail a perceived weakening of national security. Thus, in the context of disarmament, normative pressure is trumped by security concerns.

KEYWORDS

Treaty on the Prohibition of Nuclear Weapons (TPNW); nuclear disarmament; norms; normative pressure; civil society; qualitative comparative analysis (QCA)

Introduction

On July 7, 2017, the UN General Assembly adopted the Treaty on the Prohibition of Nuclear Weapons (TPNW) by a vote of 122–1–1. The Netherlands voted against adoption, and Singapore abstained. The TPNW forbids the development, production, acquisition, possession, transfer, testing, use, and threat of use of nuclear weapons.¹ On October 24, 2020, Honduras became the 50th state to submit its ratification; the treaty therefore entered into force 90 days later, on January 22, 2021. The adoption of the TPNW marked the culmination of efforts led by governments, international organizations, and civil-society groups to emphasize the humanitarian consequences of nuclear weapons, in order to delegitimize the possession of these weapons. This humanitarian initiative grew out of frustration with the slow pace of nuclear disarmament as pursued through traditional channels. Except for the

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¹ Treaty on the Prohibition of Nuclear Weapons, July 7, 2017.

Netherlands, whose parliament mandated that its government participate, the United States, its allies, and the other nuclear-armed states did not join the TPNW negotiations.²

The TPNW is based not on the idea that its entry into force will automatically lead to the elimination of nuclear weapons, but rather on the idea that the antinuclear norm will be strengthened. A stronger norm leads to increased stigma and normative pressure on states that do not comply with the provisions of the treaty.³ However, critics have remained unconvinced, and the TPNW and the antinuclear norm have been labeled “weak,”⁴ “lopsided,”⁵ and “unethical.”⁶ The debate on the effectiveness of normative pressure remains highly relevant and ongoing but is often based on assumptions. This article provides a systematic empirical examination of commitment to the TPNW, building on the argument that states commit to international treaties when their regional peers do.

Under what conditions can regional normative pressure explain whether states commit to the TPNW? This study evaluates the relative weight of explanations derived from both the constructivist and the realist traditions. Whereas constructivists would expect regional normative pressure and internal pressure from norm entrepreneurs and pre-existing nonproliferation commitments to affect the willingness of states to commit to the TPNW, realists would expect states’ dependence on nuclear weapons for their security to carry more weight.

The article begins by outlining the underpinnings of these expectations. Next, it spells out the most important concepts in qualitative comparative analysis (QCA) and discusses the operationalizations of four sets of explanations. The main findings of the analyses are then summarized. Finally, some important implications of the findings are presented in the conclusion.

Normative pressure and constructivism

Insights from constructivist analyses can help to explain what role norms and normative pressure play when states decide whether to make legal commitments by joining international treaties. Norms are here understood as standards of appropriate behavior for actors with a given identity.⁷ Various scholars have argued that international norms

² For background reading on the TPNW negotiations, see, for example, Rebecca Davis Gibbons, “The Humanitarian Turn in Nuclear Disarmament and the Treaty on the Prohibition of Nuclear Weapons,” *Nonproliferation Review*, Vol. 25, Nos. 1–2 (2018), pp. 11–36; William C. Potter, “Disarmament Diplomacy and the Nuclear Ban Treaty,” *Survival*, Vol. 59, No. 4 (2017), pp. 75–108; Nick Ritchie and Kjølv Egeland, “The Diplomacy of Resistance: Power, Hegemony and Nuclear Disarmament,” *Global Change, Peace & Security*, Vol. 30, No. 2 (2018), pp. 121–41.

³ Beatrice Fihn, “The Logic of Banning Nuclear Weapons,” *Survival*, Vol. 59, No. 1 (2017), pp. 43–50; Motoko Mekata, “How Transnational Civil Society Realized the Ban Treaty: An Interview with Beatrice Fihn,” *Journal for Peace and Nuclear Disarmament*, Vol. 1, No. 1 (2018), pp. 79–92; Jonathon Baron, Rebecca Davis Gibbons, and Stephen Herzog, “Japanese Public Opinion, Political Persuasion, and the Treaty on the Prohibition of Nuclear Weapons,” *Journal for Peace and Nuclear Disarmament*, Vol. 3, No. 2 (2020), pp. 299–309.

⁴ Jean-Baptiste Jeangene Vilmer, “The Forever-Emerging Norm of Banning Nuclear Weapons,” *Journal of Strategic Studies*, Vol. 45, No. 3 (2022), p. 21.

⁵ Brad Roberts, “Ban the Bomb? Or Bomb the Ban? Next Steps on the Ban Treaty,” European Leadership Network, March 2018, p. 9, <<https://www.europeanleadershipnetwork.org/wp-content/uploads/2018/03/180322-Brad-Roberts-Ban-Treaty.pdf>>. See also Michal Onderco, “Why Nuclear Weapon Ban Treaty Is Unlikely to Fulfil Its Promise,” *Global Affairs*, Vol. 3, Nos. 4–5 (2017), pp. 391–404.

⁶ Heather Williams, “Why a Nuclear Weapons Ban Is Unethical (for Now),” *RUSI Journal*, Vol. 161, No. 2 (2016), p. 45.

⁷ Martha Finnemore and Kathryn Sikkink, “International Norm Dynamics and Political Change,” *International Organization*, Vol. 54, No. 4 (1998), p. 891.

can drive state behavior.⁸ Seminal works demonstrate how norm cascades and transnational advocacy networks may encourage legal commitments.⁹ Studies that systematically examine the effect of normative pressure on state commitment include analyses of human-rights treaties¹⁰ and treaties on international monetary affairs.¹¹ In the nuclear domain, normative pressure has been identified as responsible for many decisions to join the 1968 Treaty on the Non-Proliferation of Nuclear Weapons (NPT),¹² and findings indicate that regional norm diffusion helps to explain the ratification of treaties governing nuclear-weapon-free zones (NWFZs).¹³ International norms and normative pressure have been a focal point in the discussion on the emergence, evolution, and future of the TPNW.¹⁴ Supporters of the treaty promote the stigmatization of both nuclear weapons and the governments relying on deterrence. Such stigmatization creates perceptions of unacceptability, which can be incompatible with the identity a state wishes to hold.¹⁵

The literature on state commitment offers three basic arguments for how normative pressure affects state behavior. First, a prominent view holds that states make decisions about commitment based on regional norm diffusion. Put simply, states commit to international treaties when their regional peers do. Although norms also exist on the global level among all states in the global system, numerous smaller identity communities allow regional norms to operate.¹⁶ This has also been demonstrated in the nuclear domain. Research on NWFZ treaties indicates that, if only a few countries in a region ratify an agreement, states may not feel an urgent need to commit. When more and more states decide to ratify, the pressure on their regional peers increases.¹⁷ Nick Ritchie and Alexander Kmentt argue that the TPNW operates in this way, reinforcing

⁸ See, for example, Finnemore and Sikkink, "International Norm Dynamics"; Alexander Wendt, "Anarchy Is What States Make of It: The Social Construction of Power Politics," *International Organization*, Vol. 46, No. 2 (1992), pp. 391–425; Carmen Wunderlich, "Theoretical Approaches in Norm Dynamics," in Harald Müller and Carmen Wunderlich, eds., *Theoretical Approaches in Norm Dynamics* (Athens, GA: University of Georgia Press, 2013), pp. 20–47.

⁹ Finnemore and Sikkink, "International Norm Dynamics"; Margaret E. Keck and Kathryn Sikkink, "Transnational Advocacy Networks in International and Regional Politics," *International Social Science Journal*, Vol. 51, No. 159 (1999), pp. 89–101.

¹⁰ See Oona A. Hathaway, "Why Do Countries Commit to Human Rights Treaties?" *Journal of Conflict Resolution*, Vol. 51, No. 4 (2007), pp. 588–621; Beth A. Simmons, "Why Commit? Explaining State Acceptance of International Human Rights Obligations," unpublished manuscript, University of California at Berkeley, Department of Political Science, 2002, <<https://wcfia.harvard.edu/publications/why-commit-explaining-state-acceptance-international-human-rights-obligations>>; Jay Goodliffe and Darren G. Hawkins, "Explaining Commitment: States and the Convention against Torture," *Journal of Politics*, Vol. 68, No. 2 (2006), pp. 358–71.

¹¹ See Beth A. Simmons, "International Law and State Behavior: Commitment and Compliance in International Monetary Affairs," *American Political Science Review*, Vol. 94, No. 4 (2000), pp. 819–35.

¹² Mariana Budjeryn, "The Power of the NPT: International Norms and Ukraine's Nuclear Disarmament," *Nonproliferation Review*, Vol. 22, No. 2 (2015), pp. 203–37; Mariana Budjeryn, "The Power of the NPT: International Norms and Nuclear Disarmament of Belarus, Kazakhstan and Ukraine, 1990–1994," PhD diss., Central European University, 2016; Maria Rost Rublee, *Nonproliferation Norms: Why States Choose Nuclear Restraint* (Athens, GA: University of Georgia Press, 2009).

¹³ Matthew Fuhrmann and Xiaojun Li, "Rethinking Ratification: Legalization and Nuclear Weapon Free Zone Treaties," *Social Science Research Network*, August 14, 2009, <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1452775>.

¹⁴ See, for example, Potter, "Disarmament Diplomacy"; Vilmer, "The Forever-Emerging Norm"; Tom Sauer and Mathias Reveraert, "The Potential Stigmatizing Effect of the Treaty on the Prohibition of Nuclear Weapons," *Nonproliferation Review*, Vol. 25, Nos. 5–6 (2018), pp. 1–19; Fihn, "The Logic of Banning Nuclear Weapons."

¹⁵ Harald Müller and Carmen Wunderlich, "Nuclear Disarmament without the Nuclear-Weapon States: The Nuclear Weapon Ban Treaty," *Daedalus*, Vol. 149, No. 2 (2020), pp. 179–80; Fihn, "The Logic of Banning Nuclear Weapons," pp. 47–48.

¹⁶ Beth A. Simmons ("International Law and State Behavior") identifies two groups of states among which norms are likely to exist: all states in the global system, and states sharing the same geographical region. Both levels are analytically interesting; however, this article focuses on capturing the variation in regional normative pressure. See also Fuhrmann and Li, "Rethinking Ratification"; Hathaway, "Why Do Countries Commit"; Simmons, "Why Commit?"; Goodliffe and Hawkins, "Explaining Commitment."

¹⁷ Fuhrmann and Li, "Rethinking Ratification."

norms of nuclear prohibition at the regional as well as the global level. They underline the importance of encouraging TPNW accession on a regional basis, to help raise political attention within the region and create pressure on nonmembers to join.¹⁸

A second argument points to the effect of internal pressure from the members of a state's civil society, acting as norm entrepreneurs that push states to commit to international treaties by putting policy issues on the agenda and forcing states to take a stand and by pointing out inconsistencies between what states claim to stand for and the policies and politics they enact.¹⁹ The role of civil society as norm entrepreneur has been well documented in the Ottawa Process and the Oslo Process leading up to the bans on antipersonnel mines and cluster munitions, respectively.²⁰ In the nuclear domain, civil-society pressure was instrumental in the pre-negotiation phase of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) as well as NWFZ treaties, whereas the NPT is seen as more of a product of governments' calculations and security assessments than a response to pressure from civil society.²¹ The International Campaign to Abolish Nuclear Weapons (ICAN) and its 650 partner organizations in more than 100 countries have enjoyed increased recognition as norm entrepreneurs that represent a real force pushing states to join the TPNW.²² In the Netherlands, Pax, one of nine ICAN partner organizations and the main peace movement in the country, was involved in successful efforts to pressure the Dutch government to attend the treaty negotiations—a notable accomplishment, as it was the only NATO state to do so.²³ The portion of the Japanese public supporting the TPNW has shown considerable resistance to political persuasion, indicating that the Japanese government cannot ignore internal pressure without losing credibility as a leader on nuclear disarmament—both domestically and internationally.²⁴ Proponents of the TPNW expect that, with enough public pressure, more states, including NATO members, will change their policy and eventually join the treaty.²⁵

Third, states desire to act consistently and will seek to act in accordance with previous behavior. Previous nonproliferation commitments allow transnational actors to put pressure on governments to abide by their legal obligations, and impose costs when

¹⁸ Nick Ritchie and Alexander Kmentt, "Universalising the TPNW: Challenges and Opportunities," *Journal for Peace and Nuclear Disarmament*, Vol. 4, No. 1 (2021), pp. 77–84.

¹⁹ Finnemore and Sikkink, "International Norm Dynamics"; John Borrie, "Humanitarian Reframing of Nuclear Weapons and the Logic of a Ban," *International Affairs*, Vol. 90, No. 3 (2014), pp. 625–46.

²⁰ Daniel Rietiker, *Humanization of Arms Control: Paving the Way for a World Free of Nuclear Weapons* (New York: Routledge, 2018), pp. 81–86.

²¹ Rietiker, *Humanization of Arms Control*, p. 126.

²² International Campaign to Abolish Nuclear Weapons (ICAN), "Partner Organizations," n.d., <<https://www.icanw.org/partners>>; Mekata, "How Transnational Civil Society Realized the Ban Treaty"; Jonathan L. Black-Branch, *The Treaty on the Prohibition of Nuclear Weapons: Legal Challenges for Military Doctrines and Deterrence Policies* (Cambridge, UK: Cambridge University Press, 2021), pp. 287–90. For discussions on norm entrepreneurs, see Finnemore and Sikkink, "International Norm Dynamics"; Maria Rost Rublee and Avner Cohen, "Nuclear Norms in Global Governance: A Progressive Research Agenda," *Contemporary Security Policy*, Vol. 39, No. 3 (2018), pp. 317–40; Müller and Wunderlich, "Nuclear Disarmament," p. 180.

²³ Black-Branch, *The Treaty on the Prohibition of Nuclear Weapons*, pp. 287–8. For a recent discussion on Dutch attitudes toward joining the TPNW, see Michal Onderco, Michal Smetana, Sico van der Meer, and Tom W. Etienne, "When Do the Dutch Want to Join the Nuclear Ban Treaty? Findings of a Public Opinion Survey in the Netherlands," *Nonproliferation Review*, Vol. 28, No. 1–3 (2021), pp. 149–63.

²⁴ Baron, Gibbons, and Herzog, "Japanese Public Opinion." A similar study shows that Americans to a greater extent could be persuaded to shift their opinion from supporting the TPNW. See Stephen Herzog, Jonathon Baron, and Rebecca Davis Gibbons, "Antinormative Messaging, Group Cues, and the Nuclear Ban Treaty," *Journal of Politics*, Vol. 84, No. 1 (2022), pp. 591–96.

²⁵ Mekata, "How Transnational Civil Society Realized the Ban Treaty," p. 86.

international norms are violated. Non-state actors can use existing treaty commitments as a platform from which to voice protest against inconsistencies in government policies. These international and domestic mechanisms together “lock in” a non-nuclear posture after countries commit.²⁶ According to this logic, states parties to an NWFZ treaty would be more likely to commit to the TPNW. NWFZ treaties oblige states parties to forgo many of the same nuclear-related activities as the TPNW; in fact, the TPNW may be seen as a large-scale NWFZ treaty in its own right.²⁷ For states parties to an NWFZ treaty, committing to the TPNW may appear to be the only consistent and appropriate behavior.

Security interests and realism

Drawing on insights from the realist tradition, another strand of literature emphasizes that states’ commitment preferences—particularly to treaties in the security realm—are guided first and foremost by security considerations. Realist theory presumes that the international system is anarchic and that relationships between states are characterized by insecurities, dangers, and threats to the very existence of the state. For realists, the state is the main actor in the international arena; states as rational actors compete with other states for power and security. This competition is viewed as a zero-sum game—that is, more for one means less for another. Realists also hold that the primary goal of states is the maximization of national interest, which ultimately means national autonomy and security.²⁸

Realists tend to view nuclear weapons as a potentially crucial source of security, both for the states possessing them and for states that are under a nuclear umbrella—that is, states with a security guarantee from a nuclear-armed state.²⁹ The nuclear-revolution theory holds that nuclear weapons have transformed how states can provide security for themselves and their allies, with deterrence replacing defense. Nuclear-revolution theorists argue that having a second-strike capability makes a state essentially secure: nuclear weapons bring stability, security, and peace precisely because of their destructive potential.³⁰

Studies on nuclear proliferation based in the realist tradition have found that states will commit to treaties that prevent them from acquiring nuclear weapons only if their own security environment permits this.³¹ Findings indicate that security threats discourage states from establishing NWFZ treaties,³² but some states that have joined the NPT are likely to have done so to “cement a nonproliferation bargain with regional rivals.”³³

²⁶ Matthew Fuhrmann and Yonatan Lupu, “Do Arms Control Treaties Work? Assessing the Effectiveness of the Nuclear Nonproliferation Treaty,” *International Studies Quarterly*, Vol. 60 (2016), p. 532.

²⁷ Black-Branch, *The Treaty on the Prohibition of Nuclear Weapons*, p. 268.

²⁸ John J. Mearsheimer, “The False Promise of International Institutions,” *International Security*, Vol. 19, No. 3 (1994–95), pp. 9–14.

²⁹ Kenneth N. Waltz, “Nuclear Myths and Political Realities,” *American Political Science Review*, Vol. 84, No. 3 (1990), pp. 731–45; Charles L. Glaser, *Analyzing Strategic Nuclear Policy* (Princeton, NJ: Princeton University Press, 1990), pp. 361–69.

³⁰ Kenneth Waltz, “The Spread of Nuclear Weapons: More May Be Better,” *Adelphi Papers*, Vol. 21, No. 171 (1981), pp. 1–32; Nuno P. Monteiro, *Theory of Unipolar Politics* (Cambridge, UK: Cambridge University Press, 2014), p. 91.

³¹ Stephen Herzog, “After the Negotiations: Understanding Multilateral Nuclear Arms Control,” PhD diss., Yale University, 2021, pp. 17–24.

³² Fuhrmann and Li, “Rethinking Ratification,” p. 31.

³³ Scott D. Sagan, “The Causes of Nuclear Weapons Proliferation,” *Annual Review of Political Science*, Vol. 14 (2011), p. 239.

Such findings indicate that security interests can be a decisive condition for states' commitment preferences.

Committing to the TPNW has differing national-security implications for different groups of states, depending primarily on what a state must give up in order to comply with it. The decision by a nuclear-armed state to reject nuclear weapons entirely would mean unilateral disarmament. Committing to the TPNW would ignore the security concerns underpinning a state's decision to possess nuclear weapons and hinder it from maintaining a credible deterrent.³⁴ For umbrella states, commitment to the TPNW would necessitate a decision to rely on conventional extended deterrence alone or to break fully from military cooperation with the nuclear-armed state that is providing the extended nuclear guarantee. Opponents of the TPNW thus argue that the treaty does not adequately address international security challenges or change the conditions that make nuclear deterrence necessary.³⁵

Research design

From the theory presented above, three pivotal hypotheses have been derived, dealing with the pathways through which norms may push states to commit to the TPNW: through regional normative pressure, through pressure from a state's civil society for nuclear disarmament, and through previous commitments to NWFZ treaties. The article then explores these hypotheses in conjunction with the conviction that states will refrain from committing to the TPNW if they perceive commitment as weakening their national security.

Altogether, there are 197 states that can commit to international treaties: 193 UN member states, two observer states,³⁶ and the Cook Islands and Niue. Some of these have refused to join the TPNW, others have voted only for its adoption, and yet others signed or ratified the treaty the day it was opened for signature. Under what conditions can normative pressure explain states' commitment preferences with respect to the TPNW? To analyze this, the research employs a two-step process through a mixed-methods research design: a QCA followed by a binomial logistic regression.

Operationalizations

QCA is an analytical technique based on set relations. In its fuzzy-set version, it allows partial set memberships. That is convenient in social sciences, where many concepts are difficult to perceive as clear dichotomies.³⁷ Using fuzzy sets allows calibration of the membership in a set by using set-membership scores between 0.0 (no membership) and 1.0 (full membership). Membership between 0.5 and 1.0 indicates that the case is more in than out of the set, whereas membership between 0.0 and 0.5 indicates more out than in.

³⁴ Williams, "Why a Nuclear Weapons Ban Is Unethical"; Matthew Harries, "The Ban Treaty and the Future of US Extended Nuclear Deterrence Arrangements," in Shatabhisha Shetty and Denitsa Raynova, eds., *Breakthrough or Breakpoint? Global Perspectives on the Nuclear Ban Treaty* (London: ELN, 2017), pp. 51–57.

³⁵ Williams, "Why a Nuclear Weapons Ban Is Unethical"; Harries, "The Ban Treaty," pp. 51–7.

³⁶ The two permanent nonmember observer states in the UN General Assembly are the Holy See and Palestine.

³⁷ See Charles C. Ragin, *Redesigning Social Inquiry: Fuzzy Sets and Beyond* (Chicago: University of Chicago Press, 2008), pp. 13–4; Carsten Q. Schneider and Claudius Wagemann, *Set-Theoretic Methods for the Social Sciences: A Guide to Qualitative Comparative Analysis* (Cambridge, UK: Cambridge University Press, 2012), p. 3.

The outcome and the four conditions have been operationalized such that they can be measured quantitatively or dichotomously. Their operationalizations are based on the idea that the indicators must capture the background concept that they are set to measure to ensure the validity of the results. However, several aspects make this ideal difficult to fulfill and represent threats that systematic biases will distort the results. To quantify or dichotomize social phenomena often implies loss of nuanced information. Therefore, the paragraphs below provide explanations of the operationalization and calibration of the outcome and the conditions, including discussions of possible threats to the validity of the results.

Outcome: commitment to the TPNW

Measurement of the degree of commitment to international treaties is most commonly done by dividing states into three groups: ratifying states, signing states, and states that neither signed nor ratified.³⁸ This article builds on these contributions and adds one level of commitment in addition to signing and ratifying: whether a state voted for the adoption of the TPNW in the UN General Assembly. By including this level of commitment, the operationalization becomes more nuanced. Even though such a vote does not bind states to the provisions of the treaty, the action indicates a clear stance and is empirically important.

In the set “states that have committed to the TPNW,” the 68 states that have ratified have been assigned full membership.³⁹ The 27 states that have signed but not ratified are *more in than out* (membership 0.67), whereas the 40 states that have voted for adoption but neither signed nor ratified are *more out than in* (membership 0.33).⁴⁰ A further 62 states have taken no action and have been assigned no membership in the set.⁴¹

Condition: regional normative pressure

Operationalizing abstract phenomena such as norms is challenging: “As abstract entities that operate at the level of social psychology or intersubjective understandings, norms are difficult to identify, and their influence is hard to track.”⁴² According to Beth A. Simmons, it is impossible to observe normative pressure directly, but it may be inferred from the extent of commitment by other states.⁴³ In an article from 2000, Simmons introduced an approach to the operationalization of norms upon which others have built.⁴⁴ The most common operationalization of regional normative pressure among these authors is the average score of the commitment variable in a given region in a given year.⁴⁵ The regions on which they base their operationalization are often seven to nine groups based on the World Bank’s regional groupings.⁴⁶

³⁸ This is usually done by using a scale from 0 to 2, where 0 indicates no action, 1 indicates signing, and 2 indicates ratifying. See Goodliffe and Hawkings, “Explaining Commitment”; Simmons, “International Law and State Behavior”; Simmons, “Why Commit?”; Hathaway, “Why Do Countries Commit.” For an interesting discussion on the differences between signature and ratification as different levels of commitment, see Herzog, “After the Negotiations,” pp. 28–61.

³⁹ This article uses the term “ratification” for both ratification and accession, as they have the same legal effect.

⁴⁰ Membership labels are adapted from Ragin, *Redesigning Social Inquiry*, p. 31.

⁴¹ The data on states’ commitment status was last updated on February 13, 2023.

⁴² Goodliffe and Hawkings, “Explaining Commitment,” p. 361.

⁴³ Simmons, “Why Commit?” p. 18.

⁴⁴ Simmons, “International Law and State Behavior.”

⁴⁵ Goodliffe and Hawkings, “Explaining Commitment”; Simmons, “International Law and State Behavior”; Simmons, “Why Commit?”; Hathaway, “Why Do Countries Commit.”

⁴⁶ The regions are East Asia and the Pacific, Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, North America, South Asia, and sub-Saharan Africa. World Bank, “Countries and Economies,” n.d., <<https://data.worldbank.org/country>>.

This article builds on the work of these authors, but it challenges the method for operationalizing regional normative pressure in two respects. First, it poses the argument that a more fine-tuned division of states is necessary to capture the effect of a regional norm, and it proposes an alternative division of states into 14 regional groups.⁴⁷ Second, in this article, the strength of the norm is measured on the basis of the states that signed or acceded to the TPNW before it entered into force.

The 14 regional groups are based on various regional organizations. Some of them facilitate comprehensive political, economic, or military cooperation; others are simply trade blocs where the existence of shared norms in other fields can be less obvious. However, Yonatan Lupu has found that the degree of trade between states is strongly associated with how similarly they behave in relation to international treaties.⁴⁸ This article poses the argument that common norms exist also within organizations with less comprehensive cooperation.

Regional normative pressure is operationalized as *the share of a state's co-members within a regional group that signed or acceded to the TPNW before it entered into force*. For example, nine out of Jamaica's 12 co-members in the Caribbean Community signed the TPNW before its entry into force. This represents a share of 0.75, which corresponds to a membership score of 0.67 in the set "states exposed to regional normative pressure."⁴⁹ During the three years and four months from the TPNW's opening for signature to its entry into force, 88 states signed or acceded to the treaty.⁵⁰ These 88 states represent an important mass of states, enabling measurement of varying strengths of normative pressure within different regions. Using only commitment to the TPNW before its entry into force to measure regional normative pressure is advantageous because this measurement is static and thus appropriate for studying a treaty to which states continue to commit.

One objection to this way of measuring regional normative pressure is that, although this condition is measured based on states that signed or acceded to the treaty, the outcome also includes states that voted for the adoption of the TPNW. However, this article argues not that the regional normative pressure was created thanks to the mass of states committing to the treaty before its entry into force, but that this wave of states is a point in time from which regional normative pressure can be measured.

⁴⁷ The regional groups (number of member states in parentheses) are Andean Community (5), Arab League (19), ASEAN Plus Three (13), Caribbean Community (13), Central American Integration System (8), Commonwealth of Independent States (10), Economic Community of Central African States (11), Economic Community of West African States (15), European Council (45), Intergovernmental Authority on Development (7), Pacific Islands Forum (17), Southern African Development Community (14), South Asian Association for Regional Cooperation (8), and Southern Common Market (6). Ten states are members of two or more organizations. They were placed in the normative group to which they were determined to be ideologically closest. Eight states have been placed in an organization where they are observers or unofficial members, or from which they have been suspended. Cuba, Iran, Israel, Mongolia, and North Korea have not been placed in any regional group, due to their lack of membership in any significant group or because it is difficult to argue that they belong to a group with a common set of regional norms. The United States has not been placed in any regional group due to its hegemonic status in recent decades.

⁴⁸ Yonatan Lupu, "Why Do States Join Some Universal Treaties but Not Others? An Analysis of Treaty Commitment Preferences," *Journal of Conflict Resolution*, Vol. 60, No. 7 (2016), p. 1242.

⁴⁹ For states with full membership (1.0), a share of at least 0.80 of a state's co-members signed the TPNW. For states that are more in than out (membership 0.67), this share is between 0.57 and 0.80. For states that are more out than in (membership 0.33), the share is between 0.20 and 0.57. For states with no membership (0.0) the share is less than 0.20. Cuba, Iran, Israel, Mongolia, North Korea, and the United States, which have not been placed in any regional group, have been assigned a value of 0.50, and are thus more out than in the set (membership 0.33).

⁵⁰ The Cook Islands and Niue were the only states that acceded to the TPNW before its entry into force without prior signature.

Future research might find the share of ratifying states to be a more appropriate measure for regional normative pressure, but at this stage of the evolution of the TPNW, commitments before its entry into force have proved to be a fruitful reference from which the strength of regional normative pressure can be inferred.

In the set “states exposed to regional normative pressure,” the crossover point of whether a state is more in or more out has been set as a share of 0.57 of a state’s co-members that signed or acceded to the TPNW. For a peer group to exert significant regional normative pressure, a share well above half should uphold a norm.⁵¹ A crossover point of 0.57 has been chosen to avoid splitting cases with similar values in different set-membership scores. There are 32 states that have been assigned full membership, 59 states that are more in than out of the set (membership 0.67), 25 states that are more out than in (membership 0.33), and 81 states that have been assigned no membership in the set.⁵²

Condition: civil society for nuclear disarmament

The condition “civil society for nuclear disarmament” is operationalized dichotomously as *whether states have at least one ICAN partner organization*. This way of operationalizing partly coincides with the way Simmons operationalizes non-state external pressure (number of groups worldwide associated with Amnesty International) and the way Oona A. Hathaway operationalizes internal pressure from human-rights organizations (number of nongovernmental organizations actively working in each state).⁵³

By examining every country profile on the ICAN website, 106 countries with at least one partner organization have been identified.⁵⁴ These have been assigned full membership in the set “states with civil society for nuclear disarmament.” The 91 states that do not have any ICAN partner organization have been assigned no membership in the set.

There are some weaknesses associated with this method of operationalizing the pressure from civil society for disarmament. Pressure from civil society does not have an equal impact on all states. Democracies with an open political culture will experience higher levels of pressure from disarmament organizations than will autocracies.⁵⁵ Moreover, this way of measuring civil society does not account for how influential each organization is. However, despite such shortcomings, there is something to be said in defense of this measure. ICAN’s partner organizations must agree to promote the full implementation and universalization of the TPNW and can thus be expected to represent a real force within a state.⁵⁶ Although the operationalization is not perfect, it captures important variations between states with regard to the presence of pressure from the civil society.

Condition: previous commitment to NWFZ treaties

The condition “previous commitment to NWFZ treaties” is operationalized as *whether the state has committed to an NWFZ treaty*. Currently, there are five NWFZ treaties in

⁵¹ See Finnemore and Sikkink, “International Norm Dynamics,” p. 901.

⁵² See note 49.

⁵³ Simmons, “Why Commit?”; Hathaway, “Why Do Countries Commit.”

⁵⁴ ICAN, “Partner Organizations.” Data collected late 2020.

⁵⁵ Sauer and Reveraert, “The Potential Stigmatizing Effect,” p. 451; Roberts, *Ban the Bomb?*, p. 2. See also Mekata, “How Transnational Civil Society Realized the Ban Treaty,” p. 89.

⁵⁶ ICAN, “Become a Partner,” n.d., <https://www.icanw.org/become_a_partner>.

existence, covering Africa, Central Asia, Latin America and the Caribbean, Southeast Asia, and the South Pacific. In addition, Mongolia has unilaterally declared itself a single-state NWFZ. In total, 116 states are located within an area covered by an NWFZ treaty. All of them have committed to their respective NWFZ treaties, except for South Sudan, which remains a non-signatory state to the Pelindaba Treaty, governing the African NWFZ. The 105 states that have ratified an NWFZ treaty have been assigned full membership in the set “states committed to an NWFZ treaty.” Ten states have only signed (not ratified) an NWFZ treaty and are more in than out of the set (membership 0.67).⁵⁷ All 81 states outside an NWFZ, as well as South Sudan, have been assigned no membership in the set.

Condition: perceived weakening of national security

The condition “perceived weakening of national security” is operationalized dichotomously as *whether the state possesses nuclear weapons or is covered by a nuclear umbrella*.⁵⁸ Under this approach, 44 states have been assigned full membership and 153 have been assigned no membership in the set “states where commitment to the TPNW implies a perceived weakening of national security.” There are obvious limitations in this way of operationalizing the perceived weakening of national security that commitment to the TPNW implies. The operationalization indeed does not cover all facets of the background concept; this condition is rather meant to capture the states where commitment implies a change of behavior for the committing state.

Initial steps to facilitate QCA

As part of the QCA, the raw data are summarized in a truth table in which all logically possible combinations of presence and absence of the conditions are listed. Such combinations are called “configurations” or “causal recipes” for the outcome. The cases that represent a given configuration are called a “grouping.”

To analyze the truth table, a consistency threshold and a frequency threshold must be set. Consistency measures the extent to which the states in a given grouping agree in displaying the outcome—in this case, how consistently they commit to the TPNW.⁵⁹ A consistency of 1 means that all the set-membership scores of the conditions are lower than or the same as the score of the outcome. Causal conditions that always deliver a certain outcome without being trivial are exceptions rather than the rule in societal affairs, and a consistency threshold indicates how much relaxing of the reliability criterion is allowed. The consistency threshold is used to determine the share of states in a grouping that must commit to the TPNW to be able to say that the configuration consistently leads to commitment.⁶⁰

Configurations that have a consistency above the consistency threshold are labeled “reliable recipes” for the outcome. Charles Ragin argues that an absolute minimum to

⁵⁷ These states are all within the African NWFZ.

⁵⁸ This operationalization covers the nine nuclear-armed states and 35 non-nuclear-armed states with a security guarantee from a nuclear-armed state: NATO member states, Japan, South Korea, and Australia, which are covered by the United States; and member states of the CSTO, which are covered by Russia.

⁵⁹ Ragin, *Redesigning Social Inquiry*, p. 44.

⁶⁰ Olav Schram Stokke, *Disaggregating International Regimes: A New Approach to Evaluation and Comparison* (Cambridge, MA: MIT Press, 2012), p. 67.

be able to say that a set relation exists is a consistency of 0.75.⁶¹ To be able to trust the results of the analysis, a consistency threshold as close to 1 as possible should be set. This analysis has sought to achieve a consistency threshold of 0.85.

A frequency threshold is used to determine the number of cases in a grouping necessary to say that there is substantial basis for claiming any association with the outcome. When the total number of cases included in an analysis is large, such as in this one, it would not be prudent to claim that one or two cases will be enough to say something about a configuration consistently leading to an outcome. Ragin argues that, in analyses with many cases, a frequency threshold of 10 might be reasonable to secure robust results.⁶² Configurations that are represented by a total of cases under the frequency threshold are treated as unobserved configurations—that is, combinations of conditions that do not exist among any cases.

Findings

After having identified, operationalized, and calibrated four conditions for commitment to the TPNW, the raw data are summarized in a truth table.⁶³ This truth table contains two reliable recipes for commitment, one reliable recipe for noncommitment, four contradictory configurations, and nine configurations represented by a total of states below the frequency threshold.⁶⁴ The first configuration that represents a reliable recipe for commitment covers 39 states that, according to the model, are expected to commit to the TPNW. They (i) have been exposed to considerable regional normative pressure; (ii) have a civil society for nuclear disarmament; (iii) have committed to an NWFZ treaty; and (iv) do not perceive committing as entailing a weakening of national security. The configuration covers 15 states from Latin America, 18 states from sub-Saharan Africa, and four island states from Southeast Asia, as well as Fiji and New Zealand. The configuration has a consistency of 0.86, with five deviant cases. Among the states that have acted contrary to the expectations, Singapore has neither ratified, signed, nor voted for the adoption of the TPNW; Argentina, Liberia, Mauritius, and Senegal have voted for the adoption of the treaty but have neither signed nor ratified it.

The other configuration in the truth table that represents a reliable recipe for commitment covers 44 states with the same attributes as the above except that they do not have a civil society for nuclear disarmament. In this grouping, there are 11 states from sub-Saharan Africa, 10 island states from the Caribbean, 10 island states from the Pacific, six states from Southeast Asia, and five states from South America, as well as Belize and Panama. The configuration has a consistency of 0.84; the deviant cases are Papua New Guinea, the Solomon Islands, Suriname, and Tonga, all of which voted for the adoption of the TPNW, as well as the Bahamas, Eswatini, Guinea, and Mali, which did not.

The two reliable recipes for commitment are placed next to each other in Solution Formula 1.1. Here, each condition has been labeled as follows: regional normative pressure (n), civil society for nuclear disarmament (c), commitment to an NWFZ treaty (z), perceived weakening of national security (s). Upper-case letters represent

⁶¹ Ragin, *Redesigning Social Inquiry*, p. 46.

⁶² Ragin, p. 133.

⁶³ See Table A1.

⁶⁴ Consistency threshold of 0.80 and frequency threshold of 10 are applied.

presence of the condition, while lower-case letters represent absence. The symbol * represents the logical AND, while + represents the logical OR.

Solution Formula 1.1:

$$N*C*Z*s + N*c*Z*s \rightarrow \text{Commitment}$$

Logically minimizing the truth table

Each of the two combinations of conditions in Solution Formula 1.1 is called a “primitive expression.” By applying the tools of logical minimization to the truth table, the aim is to reformulate the same logical truth as expressed in Solution Formula 1.1 in a less complex manner, yielding a stronger, more parsimonious recipe for the outcome.⁶⁵

The first principle of logical minimization is a pairwise comparison. If two primitive expressions that are both linked to the outcome differ in only one condition, then this condition can be considered logically redundant and irrelevant to producing the outcome. The logically redundant condition can be omitted, and the two expressions can be merged into a simpler sufficient conjunction of conditions.⁶⁶ This is the case for the two primitive expressions in Solution Formula 1.1; it may be illustrated by the cases of two comparable states, Ecuador and Chile, which have identical membership scores on all conditions except for civil society for disarmament. Whereas Ecuador had no ICAN partner organizations at the time of commitment, Chile had two: the World Center for Humanist Studies and the Institute of Political Ecology. It seems reasonable to argue that these two organizations were not the reason for Chile to commit to the TPNW. However, after voting for the adoption of the treaty, both states referred to the importance of civil society. Chile denoted the civil society as a moral compass during the negotiations, and Ecuador’s representative went so far as to say that “delegates would not be present today if not for the tenacity of civil society.”⁶⁷

The pairwise comparison of the two primitive expressions in Solution Formula 1.1 has indicated that whether states have an ICAN partner organization is redundant and can be omitted. The two primitive expressions from Solution Formula 1.1 have been merged into what is called a prime implicant:

Solution Formula 1.2:

$$N*Z*s \rightarrow \text{Commitment}$$

Further minimizing steps include the Standard Analysis.⁶⁸ This tool utilizes logical remainders: configurations that are represented by a total of states below the frequency threshold and thus for which not enough empirical evidence is available. Simplifying assumptions can be made about the logical remainders, with the distinction between easy and difficult counterfactuals. Using easy counterfactuals lets us assume, on the basis of the empirical evidence at hand and existing theoretical knowledge, that some

⁶⁵ Schneider and Wagemann, *Set-Theoretic Methods*, p. 105.

⁶⁶ Schneider and Wagemann, p. 105.

⁶⁷ United Nations, “Conference to Negotiate Legally Binding Instrument Banning Nuclear Weapons Adopts Treaty by 122 Votes in Favour, 1 Against, 1 Abstention,” <<https://www.un.org/press/en/2017/dc3723.doc.htm>>.

⁶⁸ Ragin, *Redesigning Social Inquiry*.

configurations that are represented by a total of states below the frequency threshold would also have led to the outcome if enough empirical evidence were available. Difficult counterfactuals, in contrast, allow us to make assumptions of all logical remainders without paying attention to theoretical expectations.⁶⁹ The Standard Analysis consists of producing a conservative solution (no assumptions about logical remainders), the most parsimonious solution (all simplifying assumptions), and the intermediate solution (only easy counterfactuals).⁷⁰

Intermediate solutions are the most interpretable because they strike a balance between complexity and parsimony and incorporate theoretical hunches in the form of easy counterfactuals.⁷¹ Based on the theoretical knowledge, none of the logical remainders in this analysis can be treated as an easy counterfactual. Solution Formula 1.2 thus represents both the conservative and the intermediate solution.⁷²

According to Solution Formula 1.2, states exposed to regional normative pressure will consistently commit to the TPNW, provided that they have committed to an NWFZ treaty and that they do not perceive commitment to the TPNW as entailing a weakening of national security. Solution Formula 1.2 has a consistency of 0.85—reaching the desired consistency threshold, and thus high enough to say that a set relation exists. The coverage is 0.60, which indicates a rather high empirical relevance and importance of the solution.

Solution Formula 1.2 covers four large geographic areas: Mexico and all states in Central America, South America, and the Caribbean, except for Cuba; all states in Southeast Asia, except for East Timor; 29 states in sub-Saharan Africa; and 12 island states in Oceania. Among these 83 states, 13 deviant cases have been identified. Whereas Argentina, Liberia, Mauritius, Papua New Guinea, Senegal, the Solomon Islands, Suriname, and Tonga voted for the adoption of the TPNW, the Bahamas, Eswatini, Guinea, Mali, and Singapore did not.

Among the deviant cases, Singapore is particularly interesting. It is the only state that participated in the negotiation of the TPNW but abstained from voting. All other member states of the Association of Southeast Asian Nations (ASEAN) have signed the TPNW, indicating that Singapore has been exposed to high regional normative pressure.⁷³ All of Singapore's co-members in ASEAN also voted for the adoption of the TPNW, while Singapore cited the limited time available for the negotiations and the failure to include in the final text its own proposal regarding transit.⁷⁴ Singapore has one ICAN partner organization: the United Nations Association of Singapore. At

⁶⁹ Schneider and Wagemann, *Set-Theoretic Methods*, pp. 167–68.

⁷⁰ The conservative solution is also known as the “complex solution.” See Schneider and Wagemann, *Set-Theoretic Methods*, p. 175.

⁷¹ Schneider and Wagemann, p. 175; Ragin, *Redesigning Social Inquiry*, pp. 171–75.

⁷² The most parsimonious solution is given as Solution Formula 1.3: $N \rightarrow \text{Commitment}$. This solution often rests on assumptions about logical remainders that contradict theoretical expectations, common sense, or both (see Schneider and Wagemann, *Set-Theoretic Methods*, p. 175; Ragin, *Redesigning Social Inquiry*, pp. 171–75). The most parsimonious solution is nevertheless important because it defines the extremes of how far an introduction of simplifying assumptions can go without conflicting with the empirical evidence.

⁷³ In the operationalization of “regional normative pressure,” Singapore is placed in the group ASEAN Plus Three, which also includes China, Japan, and South Korea. Singapore's membership score in the set is more in than out (0.67). However, this may be an understatement of the real regional normative pressure that Singapore has experienced.

⁷⁴ Gaukhar Mukhatzhanova, “The Nuclear Weapons Prohibition Treaty: Negotiations and Beyond,” *Arms Control Today*, Vol. 47, No. 7 (2017), pp. 14–16. See also Mely Caballero-Anthony and Julius Cesar Trajano, “Examining Southeast Asia's Diplomacy on Nuclear Disarmament and Nuclear Security: Shared Norms and a Regional Agenda,” *Asian Journal of Peacebuilding*, Vol. 10, No. 2 (2022), p. 10.

the first meeting of states parties to the TPNW, held in Vienna in June 2022, Singapore attended as an observer.⁷⁵

The question of prohibiting the transit of nuclear weapons has emerged as one of the most sensitive aspects of the TPNW, with differing positions among negotiating states. A prohibition of transit would also be one of the few aspects that would impact directly on the policies and practices of the nuclear-armed states. A direct prohibition on transit would primarily affect the United States, whose strategic nuclear submarines routinely patrol the Atlantic and Pacific Oceans. None of the existing NWFZs prohibits the transit of nuclear weapons. The treaty governing the Southeast Asian NWFZ, which Singapore has ratified, is particularly clear: it includes an article explicitly stating that this is up to each state to decide.⁷⁶ Singapore proposed similar language in the TPNW but did not gain its acceptance. The final text makes no reference to transit; Singapore subsequently declared that the treaty was not clear.⁷⁷

In 2005, Singapore entered into a bilateral strategic-framework agreement allowing the United States to use naval bases in Singapore.⁷⁸ Committing to a treaty prohibiting nuclear weapons, which some states interpret as also covering transit, may weaken the flexibility of Singapore, thus weakening Singapore's security interests. This aspect is not covered by the operationalization of perceived weakening of national security, but it illustrates how various considerations are taken into account when states consider committing to the TPNW. This apparently deviant case indicates no weakness of the model used in this analysis, but rather a weakness in how the condition "perceived weakening of national security" is operationalized.

Argentina is another interesting deviant case. It participated in the negotiations of the TPNW and voted for its adoption but has neither signed nor ratified the treaty. Since 2018, Argentina has consistently abstained from voting on UN General Assembly resolutions on the TPNW that welcome the adoption of the treaty and call upon all states to sign, ratify, or accede to it "at the earliest possible date."⁷⁹ Argentina declared, in a 2019 statement to the General Assembly, that it shared the "spirit underlying the treaty" and was "analyzing the impact of the treaty."⁸⁰ In 2020, Argentina followed up by stating that it was continuing its analysis of the treaty.⁸¹

Despite having only two ICAN partner organizations, Argentina is reportedly among the countries with the greatest popular support for the elimination of all nuclear weapons.⁸² It has been exposed to considerable regional normative pressure. All of

⁷⁵ ICAN, "Singapore," n.d., <<https://www.icanw.org/singapore>>.

⁷⁶ Southeast Asian Nuclear-Weapon-Free Zone Treaty, December 15, 1995, Article 7.

⁷⁷ Mukhatzhanova, "The Nuclear Weapons Prohibition Treaty," pp. 14–16; Stuart Casey-Maslen, "The Nuclear Weapons Prohibition Treaty: Interpreting the Ban on Assisting and Encouraging," *Arms Control Today*, Vol. 48, No. 8 (2018), p. 11; Alyn Ware, "The Ban Treaty, Transit and National Implementation: Drawing on the Aotearoa-New Zealand Experience," *Aotearoa Lawyers for Peace*, June 27, 2017, <<http://www.unfoldzero.org/wp-content/uploads/The-ban-treaty-transit-and-national-implementation-revised-final.pdf>>.

⁷⁸ William Tow, "U.S.-Southeast Asia Relations in the Age of the Rebalance," in Malcolm Cook and Daljit Singh, eds., *Southeast Asian Affairs 2016* (Singapore: ISEAS–Yusof Ishak Institute, 2016), pp. 35–55.

⁷⁹ ICAN, "Argentina," n.d., <<https://www.icanw.org/argentina>>.

⁸⁰ Statement by Argentina to the UN General Assembly, September 26, 2019, <<http://statements.unmeetings.org/media/21998556/argentina.pdf>>.

⁸¹ Reaching Critical Will (@RCW) "Argentina abstained on L.6 on #TPNW because it hasn't yet signed. Participated in negotiations of #nuclearban and is continuing its analysis of the Treaty," Twitter, November 4, 2020, 4:54 p.m., <https://twitter.com/RCW_/status/1324017147434147840?s=20>.

⁸² The share is 85 percent. World Public Opinion, "World Publics on Eliminating All Nuclear Weapons," December 9, 2008, <https://worldpublicopinion.net/wp-content/uploads/2017/12/WSI_NucElim_Dec08_quaire.pdf>.

Argentina's co-members in the South American trade bloc Southern Common Market (Mercosur) voted for the adoption of the TPNW, and four out of five of Argentina's co-members have signed the treaty, including Argentina's regional rival for some 60 years, Brazil.⁸³ Argentina, along with Brazil, joined the NPT during the 1990s, and both states have acceded to the Treaty of Tlatelolco, which governs the NWFZ of Latin America and the Caribbean.

Beatrice Fihn, the executive director of ICAN, points to pressure from the United States when explaining why Argentina has not signed the TPNW: "Argentina is quite interesting. It has been part of the negotiations but it hasn't yet signed it. What we see [is] a lot of pressure on Argentina from the United States. But at the same time we're working very hard on getting them to sign it, so we'll see. I think they'll sign it in the end but it might take some time."⁸⁴ Argentina remains a deviant case whose behavior cannot be fully explained. It represents a challenge for the model of the analysis and indicates that there are conditions that this model does not capture.

Analysis of states that do not commit

Set relations are asymmetrical. Although a certain combination of conditions may lead to commitment, that does not mean that the opposite combination of conditions will lead to noncommitment. To investigate what combination of conditions must be present or absent for the outcome *not* to occur is useful in three respects and is a recommended part of every QCA.⁸⁵ First, negative cases may provide information on why an outcome does not occur. Second, this examination may reveal theoretical inconsistencies between recipes that lead to the outcome and recipes that do not. Third, it may reveal whether recipes that lead to a positive or negative outcome are too similar to logically be able to result in different outcomes. An analysis of negative cases thus functions as an assessment of the validity of the model.⁸⁶

The raw data are summarized in a new truth table where the outcome is noncommitment to the TPNW.⁸⁷ With a consistency threshold of 0.85 and a frequency threshold of 3, the truth table consists of three reliable recipes for the negative outcome, seven contradictory configurations, and six configurations represented by a total of states below the frequency threshold.⁸⁸ As with the former analysis, a descriptive solution formula based on the three reliable recipes for noncommitment has been generated.

Solution Formula 2.1:

$$n * C * Z * S + n * c * z * S + N * C * z * S \rightarrow \text{Noncommitment}$$

⁸³ The other members of Mercosur are Brazil, Paraguay, Uruguay, and Suriname. Venezuela is suspended from Mercosur but is here treated as a member. The other non-signatory state to the TPNW in Mercosur is Suriname.

⁸⁴ As quoted in Mekata, "How Transnational Civil Society Realized the Ban Treaty," p. 86.

⁸⁵ Carsten O. Schneider and Claudius Wagemann, "Standards of Good Practice in Qualitative Comparative Analysis (QCA) and Fuzzy-Sets," *Comparative Sociology*, Vol. 9, No. 3 (2010), pp. 12–13.

⁸⁶ Kim Sass Mikkelsen, "Negative Case Selection: Justifications and Consequences for Set-Theoretic MMR," *Sociological Methods & Research*, Vol. 46, No. 4 (2017), p. 739; Olav Schram Stokke, "Qualitative Comparative Analysis, Shaming, and International Regime Effectiveness," *Journal of Business Research*, Vol. 60, No. 5 (2007), pp. 509–10.

⁸⁷ See Table A2.

⁸⁸ Frequency threshold of 3 is chosen in order to include one configuration that is represented by three empirically interesting states that did *not* commit to the TPNW. These states are China, Japan, and South Korea, all of which have the following combination of conditions: N * C * z * S.

Initial examination of the three primitive expressions in Solution Formula 2.1 reveals that the condition “perceived weakening of national security” is present in all expressions and that the condition “commitment to an NWFZ treaty” is absent in all expressions. By utilizing pairwise comparison, the three primitive expressions from Solution Formula 2.1 have been merged into two prime implicants:⁸⁹

Solution Formula 2.2:

$$n*z*S + C*z*S \rightarrow \text{Noncommitment}$$

The first prime implicant in Solution Formula 2.2 covers states that have not been exposed to regional normative pressure, have not committed to an NWFZ treaty, and in which commitment is perceived as entailing a weakening of national security. That this combination of conditions leads to noncommitment is consistent with the theoretical assumptions. The other prime implicant covers states that have a civil society for nuclear disarmament but have not committed to an NWFZ treaty, where commitment is perceived as entailing a weakening of national security. This prime implicant contains one surprising element: having ICAN partner organizations is part of one reliable recipe for noncommitment, a result that is contrary to the one that might be expected—namely, that having a civil society for disarmament would increase the likelihood of committing to the TPNW.

Solution Formula 2.2 is the conservative solution with no assumptions about logical remainders and is thus exceedingly intricate. However, six logical remainders exist, of which one can be treated as an easy counterfactual.⁹⁰ This counterfactual is taken to the next round where pairwise comparison is again applied. This leaves us with an intermediate solution formula:

Solution Formula 2.3:

$$z*S \rightarrow \text{Noncommitment}$$

Solution Formula 2.3 consists of only one prime implicant, which covers states that have not committed to any NWFZ treaty and in which commitment is perceived as entailing a weakening of national security. The solution has a consistency of 1 and a coverage of 0.41. It covers all nuclear-armed states and all umbrella states, except for Australia, Kazakhstan, Kyrgyzstan, and Tajikistan, which are all parts of NWFZs. With perfect consistency, no deviant cases are present. The rather low coverage indicates that only a small portion of the states that have not committed to the TPNW can be explained by the solution. However, the solution is consistent with the theoretical assumptions and indicates high validity of the model. For states that have not committed to any NWFZ treaty, having nuclear weapons or being under a nuclear umbrella represents a reliable recipe for noncommitment.

Solution Formula 2.4 is the most parsimonious solution, and one should be careful about drawing conclusions from it. Still, there are some points that are worth noting.

⁸⁹ The pairwise comparison has been done in the following manner: $n*C*z*S$ and $n*z*S$ reduced to $n*z*S$; $n*C*z*S$ and $N*C*z*S$ reduced to $C*z*S$.

⁹⁰ The easy counterfactual is $N*C*z*S$.

Solution Formula 2.4:

S → Noncommitment

Solution Formula 2.4 consists of one prime implicant, covering all states possessing nuclear weapons and all states covered by a nuclear umbrella. A noteworthy point is that, with a consistency of 0.98, the only deviant case is Kazakhstan, which is part of the NWFZ in Central Asia but also part of the Collective Security Treaty Organization (CSTO) and has a security guarantee from Russia. Kazakhstan is the only state under a nuclear umbrella that has ratified the TPNW.

Statistical analysis

The analysis for this article included a binomial logistic regression, with commitment to the TPNW as the dichotomous dependent variable. The 68 states that have ratified the treaty are coded 1, and the other 129 states, including those that have signed or voted for the adoption of the treaty, are coded 0. Signing and voting for the adoption of the TPNW have been excluded in the operationalization of the dependent variable, to test whether the conclusions from the QCA regarding the role of regional normative pressure are also robust when only the strongest form of committing—ratification—is included. The independent variables here are regional normative pressure, civil society for disarmament within a state, previous commitment to an NWFZ treaty, and perceived weakening of national security. The membership scores of the conditions from the QCA have been used as values of the independent variables. However, the variable on commitment to an NWFZ has been dichotomized, so that all 105 states that have ratified an NWFZ treaty are coded 1, and all others are coded 0.

Table 1 shows the results from the binomial logistic regression. Positive coefficients suggest that an increase in the independent variable will increase the likelihood of ratification. On the other hand, negative coefficients indicate that the chances of ratification decrease with an increase in the independent variable. All coefficients are consistent with the expectations and statistically significant at a satisfactory level, except for the coefficient for a state's civil society for disarmament, thus indicating no explanatory credibility of the hypothesis that states with a civil society in favor of disarmament are more likely to ratify the TPNW.

Since it is difficult to interpret the magnitude of the effects from the logistic regression, Table 2 shows coefficients that have been converted into predicted probabilities. In each case, all the other variables are held constant at values for a hypothetical

Table 1. Determinants of committing to the TPNW

Independent variables	Model 1	
Regional normative pressure	1.778 (0.640)	***
Civil society for nuclear disarmament	-0.060 (0.361)	
Previous NWFZ commitment	0.919 (0.514)	*
Perceived weakening of national security	-2.316 (1.067)	**
Constant	-1.798 (0.419)	***
<i>N</i>	197	

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Note: Binomial logistic regression. Figures are coefficients with standard error in parentheses.

Table 2. Probability of committing to the TPNW

Variable	Probability of committing
Regional normative pressure	
Low ($x = 0$)	0.281
High ($x = 1$)	0.698
Change in probability	0.417
Civil society for nuclear disarmament	
Absence ($x = 0$)	0.428
Presence ($x = 1$)	0.413
Change in probability	-0.015
Previous NWFZ commitment	
Absence ($x = 0$)	0.219
Presence ($x = 1$)	0.413
Change in probability	0.194
Perceived weakening of national security	
No ($x = 0$)	0.413
Yes ($x = 1$)	0.065
Change in probability	-0.348

Note: Probabilities are calculated for independent variables while holding other variables constant at a hypothetical median.

median case.⁹¹ The clear-cut results from the logistic regression should not be understood as exact values of the probability that a given state, compared with another, will have ratified the TPNW. They should, rather, be interpreted based on theoretical knowledge as implying the relative effect of different determinants on commitment compared with a hypothetical reference state.

Overall, the results from the binomial logistic regression confirm the findings from the QCA. The probability of ratifying the TPNW increases significantly when a state is exposed to regional normative pressure from its peers. States that have previously ratified an NWFZ treaty are more likely to ratify the TPNW than others are, indicating that NWFZ treaty commitment has the expected “lock-in” effect on non-nuclear postures and thus works as a stepping stone to TPNW commitment. Furthermore, the probability of TPNW ratification is significantly reduced among states that perceive ratification to entail a weakening of national security. Viewed in isolation, these tendencies cannot explain TPNW commitment. However, when they all pull in the same direction, they indicate a consistent route to commitment.

The analyses have also revealed more nuanced findings. On the one hand, not all states under a nuclear umbrella have refrained from committing to the TPNW. With its CSTO membership, Kazakhstan stands out as the salient exception. On the other hand, some states not covered by a nuclear umbrella also have security concerns that prevent them from committing, as may be the case for Singapore. The model has proved insufficient to explain some cases, such as Argentina. This calls for more intensive case studies of the reasons for noncommitment among certain states.

A potentially more difficult question concerns the role of a state’s civil society favorable to nuclear disarmament. While there is no doubt about the importance of global civil society in the establishment of the TPNW, the analysis found no evidence for the effect of a state’s civil society on commitment. This may be partly explained by the fact that many

⁹¹ The values for this median case are regional normative pressure (0.33), civil society (1), NWFZ treaty commitment (1), and perceived weakening of national security (0).

nuclear-armed states and states under a nuclear umbrella have active civil societies favorable to disarmament—precisely because of the value these states attach to nuclear weapons. Among ICAN’s 650 partner organizations, well over 400 are located in the United States or in countries allied with it. However, the effect of a state’s civil society might be obscured because domestic norm transformation is a process that needs time before concrete results on state commitment can be achieved. The effect of civil society is generally time lagged and may require years or decades to become visible as concrete legal commitment decisions.⁹²

Conclusions

This article has sought to shed light on why states commit to the TPNW. Under what conditions, it asks, can regional normative pressure explain whether states commit? The study employed a mixed-methods research design, using both QCA and statistical analysis. In addition, it explored hypotheses on how civil-society pressure and previous nonproliferation commitments affect commitment preferences with regard to the TPNW. States’ security considerations were also included in the analyses. The empirical findings indicate that regional normative pressure has a significant effect on state commitment—but only among states that have already committed to an NWFZ treaty and in which commitment is not perceived as entailing a weakening of national security.

The strong, albeit limited, evidence for the effect of regional normative pressure on decisions about the TPNW reinforces research on regional normative pressure and state commitment in other contexts, such as international finance and human rights, indicating that the effect is robust across issue areas. However, as found in previous studies of commitment to nuclear treaties, normative pressure is trumped by security concerns in the context of disarmament.⁹³

These findings have important implications for debates underway in NATO member states on whether committing to the TPNW can strengthen a norm that will put pressure on other member states and ultimately push nuclear-armed states to commit. The findings indicate that this is unlikely to be the case as long as states perceive committing to the TPNW as weakening national security. If nuclear-armed states or umbrella states do not feel that a credible guarantee of their security can satisfactorily substitute for the value they attach to nuclear weapons, normative pressure alone cannot push them to commit to the TPNW. This, however, does not mean that normative pressure cannot alter state behavior in the nuclear field. Many umbrella states find categorical rejection of the TPNW politically uncomfortable, owing to the desire to conform to international norms.⁹⁴

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⁹² See Mekata, “How Transnational Civil Society Realized the Ban Treaty.”

⁹³ See Herzog, “After the Negotiations”; Sagan, “The Causes of Nuclear Weapons Proliferation.”

⁹⁴ Harries, “The Ban Treaty,” p. 51.

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