### 1

#### The plan requires clarifying international space law---causes strategic bargaining to extract concessions

Alexander William Salter 16, Assistant Professor of Economics, Rawls College of Business, Texas Tech University, "SPACE DEBRIS: A LAW AND ECONOMICS ANALYSIS OF THE ORBITAL COMMONS", 19 STAN. TECH. L. REV. 221 (2016), https://law.stanford.edu/wp-content/uploads/2017/11/19-2-2-salter-final\_0.pdf

V. MITIGATION VS. REMOVAL

Relying on international law to create an environment conducive to space debris removal initially seems promising. The Virginia school of political economy has convincingly shown the importance of political-legal institutions in creating the incentives that determine whether those who act within those institutions behave cooperatively or predatorily.47 In the context of space debris, the role of nation-states, or their space agencies, would be to create an international legal framework that clearly specifies the rules that will govern space debris removal and the interactions in space more generally. The certainty afforded by clear and nondiscriminatory48 rules would enable the parties of the space debris “social contract” to use efficient strategies for coping with space debris. However, this ideal result is, in practice, far from certain. To borrow a concept from Buchanan and Tullock’s framework,49 the costs of amending the rules in the case of international space law are exceptionally high. Although a social contract is beneficial in that it prevents stronger nation-states from imposing their will on weaker nation-states, it also creates incentives for the main spacefaring nations to block reforms that are overall welfare-enhancing but that do not sufficiently or directly benefit the stronger nations.

The 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (more commonly known as the Outer Space Treaty) is the foundation for current international space law.50 All major spacefaring nations are signatories. Article VIII of this treaty is the largest legal barrier to space debris removal efforts. This article stipulates that parties to the treaty retain jurisdiction over objects they launch into space, whether in orbit or on a celestial body such as the Moon. This article means that American organizations, whether private firms or the government, cannot remove pieces of Chinese or Russian debris without the permission of their respective governments. Perhaps contrary to intuition, consent will probably not be easy to secure.

A major difficulty lies in the realization that much debris is valuable scrap material that is already in orbit. A significant fraction of the costs associated with putting spacecraft in orbit comes from escaping Earth’s gravity well. The presence of valuable material already in space can justifiably be claimed as a valuable resource for repairs to current spacecraft and eventual manufacturing in space. As an example, approximately 1,000 tons of aluminum orbit as debris from the upper stages of launch vehicles alone. Launching those materials into orbit could cost between $5 billion and $10 billion and would take several years.51 Another difficulty lies in the fact that no definition of space debris is currently accepted internationally. This could prove problematic for removal efforts, if there is disagreement as to whether a given object is useless space junk, or a potentially useful space asset. Although this ambiguity may appear purely semantic, resolving it does pose some legal difficulties. Doing so would require consensus among the spacefaring nations. The negotiation process for obtaining consent would be costly.

Less obvious, but still important, is the 1972 Convention on International Liability for Damage Caused by Space Objects, normally referred to as the Liability Convention. The Liability Convention expanded on the issue of liability in Article VII of the Outer Space Treaty. Under the Liability Convention, any government “shall be absolutely liable to pay compensation for damage caused by its space objects on the surface of the Earth or to aircraft, and liable for damage due to its faults in space.”52 In other words, if a US party attempts to remove debris and accidentally damages another nation’s space objects, the US government would be liable for damages. More generally, because launching states would bear costs associated with accidents during debris removal, those states may be unwilling to participate in or permit such efforts. In theory, insurance can partly remediate the costs, but that remediation would still make debris removal engagement less appealing.

A global effort to remediate debris would, by necessity, involve the three major spacefaring nations: the United States, Russia, and China.53 However, any effort would also require—at a minimum—a significant clarification and—at most —a complete overhaul of existing space law.54 One cannot assume that parties to the necessary political bargains would limit parleying to space-related issues. Agreements between sovereign nation-states must be self-enforcing.55 To secure consent, various parties to the change in the international legal-institutional framework may bargain strategically and may hold out for unrelated concessions as a way of maximizing private surplus. The costs, especially the decision-making costs, of changing the legal framework to secure a global response to a global commons problem are potentially quite high.

#### The US will use that opportunity to push Artemis Accords and bilateralization – undermines multilateral space law.

Wall 20 – Senior Space Writer with Space.com, former herpetologist and wildlife biologist, Ph.D. in evolutionary biology from the University of Sydney, Australia; citing Boley (Department of Physics and Astronomy, University of British Columbia, Vancouver) and Byers (Department of Political Science, University of British Columbia, Vancouver)

Mike Wall, 10-8-2020, “US policy could thwart sustainable space development, researchers say,” Space.com, https://www.space.com/us-space-policy-mining-artemis-accords DD

The United States' space policy threatens the safe and sustainable development of the final frontier, two researchers argue.

The U.S. is pushing national rather than multilateral regulation of space mining, an approach that could have serious negative consequences, astronomer Aaron Boley and political scientist Michael Byers, both of the University of British Columbia in Vancouver, write in a "Policy Forum" piece that was published online today (Oct. 8) in the journal Science.

Boley and Byers cite the 2015 passage of the Commercial Space Launch Competitiveness Act, which explicitly granted American companies and citizens the right to mine and sell space resources. That right was affirmed this past April in an executive order signed by President Donald Trump, they note.

The researchers also point to NASA's announcement last month that it intends to buy moon dirt and soil collected by private companies, and its plan to sign bilateral agreements with international partners that want to participate in the agency's Artemis program of crewed lunar exploration.

Artemis, one of NASA's highest-profile projects, aims to return astronauts to the moon in 2024 and establish a long-term, sustainable human presence on and around Earth's nearest neighbor by the end of the decade. Making all of this happen will require the extensive use of lunar resources, such as the water ice that lurks on the permanently shadowed floors of polar craters, NASA officials have said.

Boley and Byers take special aim at the planned bilateral agreements, known as the Artemis Accords. In promoting them, the U.S. "is overlooking best practice with regard to the sustainable development of space," the researchers write.

"Instead of pressing ahead unilaterally and bilaterally, the United States should support negotiations on space mining within the UN [United Nations] Committee on the Peaceful Uses of Outer Space, the same multilateral body that drafted the five major space treaties of the 1960s and '70s," they write in the Science piece. (The most important of the five is the 1967 Outer Space Treaty, which forms the basis of international space law.)

"Meanwhile, NASA’s actions must be seen for what they are — a concerted, strategic effort to redirect international space cooperation in favor of short-term U.S. commercial interests, with little regard for the risks involved," Boley and Byers add.

The researchers worry that the U.S. is setting an unfortunate precedent for other countries to follow, and that space mining and other exploration activities may therefore proceed in a somewhat careless and chaotic fashion in the not-too-distant future.

#### That returns space to might-makes-right imperial conflict.

O’Brien 20 – member of the International Institute of Space Law and founder of The Space Treaty Project, retired attorney and former member of the NASA-Hastings Law Project

Dennis O’Brien, 6-29-2020, “The Artemis Accords: repeating the mistakes of the Age of Exploration,” *The Space Review*, https://www.thespacereview.com/article/3975/1 DD

In the spring of 1493, the King and Queen of Spain sent an envoy to the Pope in Rome. Along with Portugal, Spain had just used its advanced sailing and navigation technology to reach “new worlds,” areas of the Earth that had not been previously discovered by Europeans. But they had a problem: they wanted to establish sovereign property rights in the lands they had discovered, but they weren’t sure they could do so under their own authority. So, they turned to the only international authority in Europe at that time, the Catholic Church, which held sway over governments from Portugal to Poland, from the Arctic to the Mediterranean. If the Church would establish a legal framework that granted them sovereignty, then those nations would be bound to recognize it.[2]

This is the first lesson that the current governments of the world can learn from the Age of Exploration & Empire that began five centuries ago. Even then, the most powerful nation in Europe, with the largest army and most advanced technology, realized that it could not unilaterally establish property rights or any other kind of sovereignty without the approval of an international authority. After the Church granted that authority, Spain was able to create one of the greatest empires in history. Spain and Portugal formalized the arrangement with a binding international agreement, the Treaty of Tordesillas, whose purpose was to ensure peaceful cooperation between their nations, primarily by establishing a line of demarcation that separated their areas of activity.[3]

Unfortunately, the legal framework so established was based on national dominance, not multilateral international cooperation. The grant of sovereignty was exclusive, made only to Spain and Portugal, and it required them to subjugate the “savages” in the lands they discovered by taking along Church missionaries. This exclusivity did not sit well with other nations as they also developed the technologies of exploration; it was one of the reasons many northern European nations joined the Protestant Reformation and rejected the authority of the Pope in Rome. Without a fair and equitable international agreement that honored the interests of emerging states, the Church lost its ability to act as an arbiter between nations.

Even worse, the dominance model set up centuries of conflict among the major powers in Europe. Militant nationalism and economic colonialism became the principles guiding national policy. The result was centuries of war, suffering, and neglect among the major powers and the nations they subjugated. This pattern did not end until the 20th century, when the major powers fought two world wars and finally dismantled their colonial empires: sometimes peacefully, sometimes by force.

By the mid-1960s, most countries on Earth were independent or on their way to becoming so. But a new conflict had started, one that threatened to repeat the mistakes of five centuries earlier. The great powers were once again using their advanced technology to explore new worlds, and the race was on to plant their flag on the Moon first. Under the ancient traditions, the country that did so would have a claim against all others for possession and use of the territory. The Cold War was about to expand into outer space.

But then something wonderful happened. In 1967, the United Nations proposed, and the world’s space powers accepted, an international agreement known as the Outer Space Treaty.[4] The treaty was an intentional effort to avoid the mistakes of the Age of Exploration & Empire. Article I states, “The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.” Article II is even more specific: “Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.” Because of this treaty, the United States carried a plaque to the Moon that said, “We came in peace for all mankind.”[5] When the Apollo 11 astronauts planted the US flag, they did so out of pride, but did not establish any claim or national priority.

This legal framework worked well initially, but people soon started wondering about what to do when countries or private entities wanted to start commercial activity on the Moon, or build settlements. The solution was the Moon Treaty, proposed by the United Nations and adopted by enough nations to come into force in 1984.[6] But it has not yet been adopted by any major spacefaring nation. The United States, by a recent executive order, has specifically renounced the treaty and stated its intentions to extract materials from the Moon without any international agreement.[7]

The newly announced Artemis Accords go even further. Although the actual Accords have not been released pending consultation with possible partners, the summary provided by NASA[8] indicates that the United States will unilaterally interpret the Outer Space Treaty to allow “space resource extraction,” despite the prohibition against appropriation in Article II of the Treaty. There will also be “safety zones” to avoid “harmful interference” with such operations. The effect is to establish exclusive economic zones, especially if “harmful interference” is defined to include economic harm, not just safety. Will the new Space Force be used to protect such economic interests? Will other nations be excluded if they support the Moon Treaty?[9] Will private actors be required to follow the same rules as states, as recommended in the recently drafted Moon Village Principles?[10] This is the slippery slope of using unilateral action to establish economic rights rather than an international agreement.

The Artemis Accords acknowledge many beneficial agreements and policies: The Outer Space Treaty, Rescue Agreement, and Registration Convention (though not the Liability Convention); peace, transparency, interoperability, protecting heritage sites and sharing scientific information. But its unilateral authorization of space mining is a continuation of the Trump Administration’s underlying foreign policy strategy: unilateral dominance over international cooperation. The United States has withdrawn from the Paris Accords, the Iranian nuclear deal, and, in the middle of a pandemic, the World Health Organization. Dominance has even become the theme of the administration’s domestic policy, with President Trump recently telling governors, “If you don't dominate, you're wasting your time… You have to dominate.”[11] That core philosophy is now being applied to outer space, as Vice President Mike Pence proudly announced in 2018. Despite the lessons of history, the United States is going full speed ahead with the “dominance” model of space development rather than working with the nations of the world to develop a “cooperation” model. Outer space, which so far has been preserved for peace and cooperation, is about to be spoiled, perhaps forever.

#### Goes nuclear – space conflict is uniquely escalatory.

Farley 22 – PhD, Senior Lecturer at the Patterson School at the University of Kentucky

Robert Farley, 1-9-2022, “Does A Space War Mean A Nuclear War?” 1945, https://www.19fortyfive.com/2022/01/does-a-space-war-mean-a-nuclear-war/ DD

The recent Russian anti-satellite test didn’t tell the world anything new, but it did reaffirm the peril posed by warfare in space. Debris from explosions could make some earth orbits remarkably risky to use for both civilian and military purposes. But the test also highlighted a less visible danger; attacks on nuclear command and control satellites could rapidly produce an extremely dangerous escalatory situation in a war between nuclear powers. James Acton and Thomas Macdonald drew attention to this problem in a recent article at Inside Defense. As Acton and MacDonald point out, nuclear command and control satellites are the connective tissue of nuclear deterrence, assuring countries that they’re not being attacked and that they’ll be able to respond quickly if they are.

For a long time, these strategic early-warning satellites were akin to a center of gravity in ICBM warfare. Nuclear deterrence requires awareness that an attack is underway. Attacks on the monitoring system could easily be read as an attempt to blind an opponent in preparation for general war, and could themselves incur nuclear retaliation. Thus, the nuclear command and control satellites are critical to the maintenance of nuclear deterrence. They make it possible to distribute an order from the chief of government to the nuclear delivery systems themselves. Consequently, their destruction might lead to hesitation or delay in performing a nuclear launch order.

It was only later that the relevance of satellites for conventional warfare became clear. Satellites could reconnoiter enemy positions and, more importantly, provide communications for friendly forces. Indeed, the expansion of the role of satellites in conventional warfare has complicated the prospect of space warfare. States have a clear reason for targeting enemy satellites which support conventional warfare, as those satellites enable the most lethal part of the kill chain, the communications and recon networks that link targets with shooters. Thus, we now have a situation in which space military assets have both nuclear and conventional roles. In a conflict confusion and misperception could rapidly become lethal. If one combatant views an attack against nuclear command and control as a prelude to a general nuclear attack, it might choose to pre-empt.

Nuclear powers have dealt with problems in this general category for a good long while; would a conventional attack against tactical nuclear staging areas represent an escalation, for example? Would the use of ballistic missiles that can carry either conventional or nuclear weapons trigger a nuclear response? Do attacks against air defense networks that have both strategic and tactical responsibilities run the risk of triggering a nuclear response? There’s also the danger that damage to communications networks designated for conventional combat could force traffic onto the nuclear control systems, further confusing the issue.

No one has ever fought a nuclear war, and no two nuclear powers have engaged in a prolonged, high-intensity conventional conflict. Now that conventional systems have become implicated in space technologies for reconnaissance, targeting, and communications, leaders will have to make very difficult, very careful decisions on what enemy capabilities they want to disrupt. Acton and MacDonald propose a straightforward ban on attacks against nuclear satellite infrastructure, which would also require agreement to keep nuclear and conventional communications networks separate. This is the little ask; countries should plan to fight more carefully. The big ask is for a multilateral ban to prevent future anti-satellite weapons tests in space. This would reduce the danger that debris could close off, temporarily or permanently, human access to certain locations in earth orbit. But given that countries use satellites for the conduct of conventional military operations, it’s a lot to ask for warfighters to consider critical military infrastructure off-limits in any particular conflict.

### 2

#### countries ought to:

#### --Announce that appropriation of outer space by private actors violates the Outer Space Treaty and that this is a settled matter of customary international law

#### --Announce that this action is taken pursuant to *opinio juris* (the belief that the action is taken pursuant to a legal obligation) and that non-compliant actors are in violation of international law

#### --Fully comply, not appropriating outer space in a manner inconsistent with these proclamations

#### Solves the Aff.

[Fabio](https://kluwerlawonline.com/journalarticle/Air+and+Space+Law/33.3/AILA2008021) **Tronchetti 8**. Dr. Fabio Tronchetti works as a Co-Director of the Institute of Space Law and Strategy and as a Zhuoyue Associate Professor at Beihang University, “The Non–Appropriation Principle as a Structural Norm of International Law: A New Way of Interpreting Article II of the Outer Space Treaty,” Air and Space Law, Volume 33, No 3, 2008, <https://kluwerlawonline.com/journalarticle/Air+and+Space+Law/33.3/AILA2008021>, RJP, **DebateDrills**.

The non–appropriation principle represents the fundamental rule of the space law system. Since the beginning of the space era, it has allowed for the safe and orderly development of space activities. Nowadays, however, the principle is under attack. Some proposals, arguing the need for abolishing it in order to promote commercial use of outer space are undermining its relevance and threatening its role as a guiding principle for present and future space activities. This paper aims at safeguarding the non–appropriative nature of outer space by suggesting a new interpretation of the non–appropriation principle that is based on the view that this principle should be regarded as a customary rule of international law of a special character, namely ‘a structural norm’ of international law.

#### That competes ---

#### 1] Widespread support for OST overhaul means a new treaty is likely---top military leaders are pushing it.

Theresa **Hitchens 21**. Theresa Hitchens is the Space and Air Force reporter at Breaking Defense. The former Defense News editor was a senior research associate at the University of Maryland’s Center for International and Security Studies at Maryland (CISSM). Before that, she spent six years in Geneva, Switzerland as director of the United Nations Institute for Disarmament Research (UNIDIR). “US Should Push New Space Treaty: Atlantic Council,” Breaking Defense, April 12, 2021, <https://breakingdefense.com/2021/04/us-should-push-new-space-treaty-atlantic-council/>, RJP, **DebateDrills**

WASHINGTON: The US should push hard to overhaul the entire international legal framework for outer space — including replacing the foundational [1967 Outer Space Treaty (OST),](https://breakingdefense.com/tag/outer-space-treaty/) a new report from the Atlantic Council says.

As it moves to do so, the US also should more aggressively court allies with an eye to establishing a “collective security alliance for space” among likeminded countries to “deter aggression” and defend “key resources and access.”

“The 1967 Treaty is dated. It was written, literally, in a different era,” said former Air Force Secretary Deborah Lee James in an Atlantic Council briefing today. “At present it is too broad, and in some cases it’s probably overly specific.”

The year-long study, [“The Future of Security In Space: A Thirty-Years US Strategy”](https://www.atlanticcouncil.org/wp-content/uploads/2021/04/TheFutureofSecurityinSpace.pdf)was co-chaired by James and retired Marine Corps Gen. Hoss Cartwright, former vice chair of the Joint Chiefs of Staff. In essence, it argues that the US needs to lead international efforts to craft a new rules-based regime to govern all space activities — from exploration to commercial ventures to military interactions. As the two argued in a recent [op-ed in Breaking D,](https://breakingdefense.com/2021/03/the-space-rush-new-us-strategy-must-bring-order-regulation/) “Great-power competition among the United States, China, and Russia has launched into outer space without rules governing the game.”

“The international law of space, centered on the 1967 Outer Space Treaty, is outdated and insufficient for a future of space in which economic activity is primary. The international community needs a new foundational space treaty, and the United States should precipitate its negotiation,” the study argues.

James elaborated that the idea would be to craft a more expansive treaty that covers emerging issues like debris mitigation and removal and [commercial extraction of resources](https://breakingdefense.com/tag/space-resource-extraction/) from the Moon and/or asteroids. That said, she stressed that the US should not abandon the OST — which has been signed by 193 nations — unless and until something new is there to replace it.

#### 2] Space law is typically treaty-based---Russian and Chinese proposals prove.

Stephanie **Nebehay 8**. Reporter, Reuters, “China, Russia to Offer Treaty to Ban Arms in Space,” Reuters, January 26, 2008, <https://www.reuters.com/article/us-arms-space/china-russia-to-offer-treaty-to-ban-arms-in-space-idUSL2578979020080125>, RJP, **DebateDrills**

GENEVA (Reuters) - China and Russia will submit a joint proposal next month for an international treaty to ban the deployment of weapons in outer space, a senior Russian arms negotiator said on Friday.

Valery Loshchinin, Russia’s ambassador to the United Nations-sponsored Conference on Disarmament, said the draft treaty would be presented to the 65-member forum on February 12.

Russian Foreign Minister Sergei Lavrov is due to address the Geneva forum, which constitutes the world’s main disarmament negotiating body, on that day. Loshchinin gave no details on the proposal which has been circulated to some senior diplomats.

Tensions between Russia and the United States have deepened in recent years over U.S. plans to revive its stalled “Star Wars” program from the 1980s with a new generation of missile defense shields.

Nuclear and other weapons of mass destruction are banned from space under a 1967 international treaty. But Washington’s plans have stirred concerns about non-nuclear arms in space.

#### 3] Treaties are the foundation of space law.

Sophie **Goguichvili et. al 21**. Program Associate, the Wilson Center, “The Global Legal Landscape of Space: Who Writes the Rules on the Final Frontier?” The Wilson Center, October 1, 2021, <https://www.wilsoncenter.org/article/global-legal-landscape-space-who-writes-rules-final-frontier>, RJP, **DebateDrills**

As previously mentioned, a series of treaties adopted by the U.N. General Assembly (UNGA) form the foundation of the global space governance system. The first and most significant of these treaties is the “Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space including the Moon and Other Celestial Bodies,” more commonly known as the **Outer Space Treaty**or**OST** for short (1967). The Outer Space Treaty is considered the most comprehensive space treaty and provides the basic framework for international space law, namely: the exploration and use of outer space for peaceful purposes by all States for the benefit of mankind (Art. I); the outlaw of national appropriation or claims of sovereignty of outer space or celestial objects (Art. II); a ban on the placement of weapons of mass destruction in orbit or on celestial bodies (Art. IV); that astronauts should be regarded as the envoys of mankind (Art. V); and that States are required to supervise the activities of their national entities (Art. VI).

#### We solve better, since CIL is far superior to treaties for space AND causes follow-on.

Koplow, 9 – Professor of Law, Georgetown University Law Center.

David A. Koplow, “ASAT-isfaction: Customary International Law and the Regulation of Anti-Satellite Weapons,” Michigan Journal of International Law. Volume 30, Summer 2009. <http://scholarship.law.georgetown.edu/cgi/viewcontent.cgi?article=1452&context=facpub>

Finally, the Article concludes with some policy recommendations, suggesting mechanisms for the world community to press forward with autonomous efforts to promote stability and security in outer space, even in the face of recalcitrance from the leading space powers. I would certainly support the negotiation and implementation of a comprehensive new treaty to prevent an arms race in outer space, and a carefully drafted, widely accepted accord could accomplish much, well beyond what customary law alone could create. But the treaty process, too, has costs and disadvantages, and the world need not pursue just one of these alternatives in isolation.

If the absence of global consensus currently inhibits agreements that countries could already sign, perhaps the world community can nevertheless get some "satisfaction" via the operation of CIL, constructing a similar (although not completely equivalent) edifice of international regulation of ASATs based simply on what countries do.

### Case

#### Their wrong about space regimes being ad-hoc. CIL regimes fill Outer Space Treaty gaps and solves international space conflict

**Koplow 09** (David Koplow is a professor and the co-director of the Center on National Security and the Law at the Law Center. He joined the Georgetown faculty in 1981. His government service has included stints as Special Counsel for Arms Control to the General Counsel of the Department of Defense (2009-2011); as Deputy General Counsel for International Affairs at the Department of Defense (1997-1999); and as Attorney-Advisor and Special Assistant to the Director of the U.S. Arms Control and Disarmament Agency (1978-1981). He is a graduate of Harvard College and Yale Law School and a Rhodes Scholar. “ASAT-isfaction: Customary International Law and the Regulation of Anti-Satellite Weapons”. 2009.)

Remarkably, the **CIL** version of the law **of outer space** **would achieve even more comprehensive** geographic **coverage than the treaty** version. **Half of the** countries in the **world have not** yet **gotten** around **to ratify**ing **the OST**; even larger cohorts have not acted to affiliate themselves with the other important space-related instruments. **In contrast, all countries would be bound by the CIL of outer space**; it is hard to imagine any "persistent objectors" who have exempted themselves from any aspect of the now-entrenched custom, and any **new States** that emerge onto the world scene **would automatically be covered by the body of space-related CIL, even if they do not affirmatively join the treaties**. Third, outer space also illustrates the law-making role of the UNGA. When the legal regime for space was first emerging, many countries opted to employ the UNGA as the most apt mechanism for expressing themselves about the putative rules for exo-atmospheric interaction; their statements in this "global town meeting" carry weight in the evaluation of emerging CIL. Successive UNGA resolutions, especially the 1963 Outer Space Declaration' 153 (which initiated and expressed many of the principles that were later cast into treaty vocabulary in the OST) were prepared with a solemnity (and adopted via unanimous vote) suggesting a conscious legislative function. As the Restatement notes, [t]he Outer Space Declaration, for example, might have become law even if a formal treaty had not followed, since it was approved by all, including the principal "space powers." ... A spokesman for the United States stated that his Government considered that the Declaration "reflected international law as accepted by the members of the United Nations," and both the United States and the U.S.S.R. indicated that they intended to abide by the Declaration.154 Of course, not every enactment of the UNGA (still less, the actions of the CD) is automatically entitled to the status of CIL, but **the elusive mechanisms of customary law**-making sometimes **do repose special respect to the weightiest resolutions of those global instrumentalities.** 155

Adv 1

#### Substitutes solve – multiple breakthroughs being made

Adam Currie, market writer, 3/18/13 [“Rare Earth Recycling: Risk to Sector or Investment Opportunity?” Rare Earth Investing News, 2013, http://rareearthinvestingnews.com/9255-rare-earth-recycling-risk-to-sector-or-investment-opportunity.html]

While Honda has impressed investors by succeeding in its recycling goals and its plans to commercialize this recycling process, it is not the only company focused on innovation. Since the industry underwent a severe shake up in 2008, more and more manufacturers have begun seeking alternative solutions aimed at either decreasing their dependence on rare earths, or securing their own REE supply.¶ In 2012, Toyota (TSE:7203) announced that it had developed a method to manufacture hybrid and electric vehicles (EVs) without the use of rare earth metals, while General Motors Company (NYSE:GM) confirmed it was “close to a breakthrough” that would reduce its need for dysprosium, a rare earth in especially high demand. Japan’s Hitachi (TSE:6501) has been clear of its intentions to move away from the use of REEs, announcing in April last year a highly-efficient permanent magnet synchronous motor that employs an iron-based amorphous metal in the core – and, crucially, no REEs.¶ Also, Ford (NYSE:F) announced that its nickel-metal-hydride batteries will be replaced with lithium-ion alternatives in a move that could see the company cut 500,000 pounds of REEs from its manufacturing process annually, while the US Department of Energy’s (DOE) Ames Laboratory confirmed that it too is working towards creating a method to remove neodymium from the mix of other materials in magnets.

#### New DOE research resolves rare earth shortage for clean tech

Anne M. Stark, Public Information Officer at the Lawrence Livermore National Laboratory, 13 [“DOE launches rare earth metals research hub,” January, https://www.llnl.gov/news/aroundthelab/2013/Jan/ATL011113\_hub.html]

The Department of Energy has launched a research hub that focuses on solutions to the domestic shortages of rare earth metals and other materials critical for U.S. energy security.¶ Housed at Ames Laboratory in Iowa, Lawrence Livermore has been involved in establishing this Energy Innovation Hub since its conception more than two years ago. In 2010, on behalf of DOE, LLNL hosted the first U.S.-Japan workshop on rare earths elements. Ed Jones and Adam Schwartz have been closely tied to the initiative.¶ The initial team, made up of Ames, LLNL, Colorado School of Mines and Molycorp Inc., established a 'national network' that eventually resulted in the proposal team; helped DOE on its critical materials strategy; and continued interactions on behalf of DOE at the international level.¶ The rare earths comprise 17 elements in the periodic table -- scandium, yttrium and the 15 lanthanides (lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium and lutetium). Despite their name, the rare earths (with the exception of promethium) are not all that rare, but are actually found in relatively high concentrations across the globe. However, because of their geochemical properties, they seldom occur in easily exploitable deposits.¶ Rare earth elements are essential for American competitiveness in the clean energy industry because they are used in many devices important to a high-tech economy and national security, including computer components, high-power magnets, wind turbines, mobile phones, solar panels, superconductors, hybrid/electric vehicle batteries, LCD screens, night vision goggles, tunable microwave resonators -- and, at the Laboratory, NIF's neodymium-glass laser amplifiers.¶ A DOE report said in 2011 that supply problems associated with five rare earth elements (dysprosium, terbium, europium, neodymium and yttrium) may affect clean energy development in coming years.¶ The new research center, which will be named the Critical Materials Institute (CMI), will bring together leading researchers from academia, four DOE national laboratories, as well as the private sector.¶ "Rare earth metals and other critical materials are essential to manufacturing wind turbines, electric vehicles, advanced batteries and a host of other products that are essential to America's energy and national security, " said David Danielson, assistant secretary for Energy Efficiency and Renewable Energy. "The Critical Materials Institute will bring together the best and brightest research minds from universities, national laboratories and the private sector to find innovative technology solutions that will help us avoid a supply shortage that would threaten our clean energy industry as well as our security interests."¶ The hub will address challenges across the entire life cycle of these materials. This ranges from enabling new sources; improving the economics of existing sources; accelerating material development and deployment; more efficient use in manufacturing; recycling and reuse; and developing strategies to assess and address the life cycles of new materials.¶ In addition to LLNL and Ames, other partners include Idaho National Laboratory, Oak Ridge National Laboratory, Brown University, the Colorado School of Mines, Purdue University, Rutgers University, University of California-Davis, Iowa State University, and Florida Industrial and Phosphate Research Institute, General Electric, OLI Systems Inc., SpinTek Filtration Inc., Advanced Recovery, Cytec Inc., Molycorp Inc. and Simbol Materials.

Adv 2

#### Legal frameworks such as the EU Horizon 2020 will be able to prevent space wars.

**Villarino 19**, José-Miguel Bello Y Villarino, 6-7-2019, "Preventing a Cold War in Space Using European Research and Innovation Programs," Science & Diplomacy,<https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs> Livingston RB

In 2018, the United States President proposed a Space Force [1](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note1) as a sixth branch of the US military.[2](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note2) In 2019, the President of India announced that his country had shot down a low-orbit satellite,[3](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note3) becoming the fourth country to test an anti-satellite (ASAT) technology in a span of twelve years. These events should come as no surprise. **There is a space cold war in the making. Russia, China, and the United States are leading the way, racing to ensure that their space-related asset**s, which play an increasingly essential role in modern warfare, can match, surpass, or counterbalance the capabilities of others. These developments present a greater threat of military confrontation than the 1983 launch of the U.S. Strategic Defense Initiative, better known as “Star Wars”. Since 1983, there had been an unspoken Pax Americana in outer space. An informal global moratorium on the testing of anti-satellite weapons had been initiated by Russia[5](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note5) and generally supported by the international community. There was a global understanding of the benefits of avoiding a weapons escalation in, and towards, space.[6](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note6) Each year, the General Assembly of the United Nations (UNGA) passed nearly unanimous[7](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note7) resolutions on the “Prevention of an Arms Race in Outer Space” (PAROS) (Res. 36/97C). There were even attempts to give these efforts legal force. In 2008, Russia and China submitted a draft Treaty on the Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects (PPWT) to the Conference on Disarmament. Article II is clear about the treaty’s objective: “The States Parties undertake not to place in orbit around the Earth any objects carrying any kinds of weapons, not to install such weapons on celestial bodies and not to place such weapons in outer space in any other manner, [and] not to resort to the threat or use of force against outer space objects”.[8](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note7) These declarations reflected a desire to keep space peaceful, meaning either “not militarised” [9](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note9) or “non aggressive”. Ironically, this proposal was tabled shortly after China’s confirmation in 2007 that it had destroyed one of its own satellites with a guided missile, as a test.[11](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note11) In addition to the resulting space debris problem that was generated, this action forced global powers to rethink the challenges of space security.[12](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note12) The United States quickly followed, demonstrating in 2008 its own anti-satellite system (Aegis Ballistic Missile Defense System) by shooting down its own errant spy satellite as it was falling out of orbit.[13](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note13) [14](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note14) The United States has since acknowledged having an anti-satellite system, the Counter Communications Satellite System, and it has several latent capabilities, notably its ground-based missile defense interceptors.[15](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note15) Russia has also repeatedly tested the PL-19 Nudol ballistic missile,[16](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note16) which can strike objects in orbit.[17](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note17) **There is also clear evidence that other capabilities are being developed to cripple space assets and make space infrastructure useless, including cyberattacks on satellites,**[18](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note18) lasers capable of knocking down space objects,[19](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note19) and methods to jam signals from space. As a result of this dynamic, we have today a militarized space, where a quarter of the active satellites have some military use.[21](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note21%20rel=) Space is today a theatre in war plans. From a legal point of view, this militarization was made possible through a particular interpretation of article IV of the 1967 Outer Space Treaty.[22](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note22%20rel=) This interpretation distinguishes between “peaceful purposes” – applicable to space in general – and “exclusively peaceful purposes” – restricted to certain celestial bodies. Military uses of the moon and other celestial bodies are then outrightly prohibited, but the “empty space” between celestial bodies can be militarized. This line of reasoning could also justify weaponization of that empty space, for example, placing weapons in a satellite. The only legal limit would be the ban on weapons of mass destruction in space established by the same article IV. To prevent it, the UN Assembly General passed in December 2014 UN Resolution 69/32 calling for “[n]o first placement of weapons in outer space”. This attempt to collectively agree on the non-weaponization of space received more limited support than previous PAROS resolutions. Four states voted against it and another forty-two abstained.[23,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note23%20rel=)[24](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note24%20rel=) It cannot even be excluded that militarization may have already happened. All of this is leading military actors to consider the Earth’s orbit a new “warfighting domain”.[26](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note26%20rel=) The U.S. Air Force’s “Transformation Flight Plan” of 2003 acknowledged that future adversaries could attack space assets, mainly from the ground, and that weapons in orbit may eventually be required to protect those assets.[27](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note27%20rel=) The current U.S. National Security Space Strategy refers to systems to “deny and defeat an adversary’s ability” to successfully carry out “attacks targeted at the U.S. space systems”.[28](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note28%20rel=) The most recent threat assessment of the U.S. intelligence community notes that both Russia and China “aim to have nondestructive and destructive counterspace weapons” to “reduce US and allied military effectiveness” and points to a military trend in China and Russia “designed to integrate attacks against space systems and services with military operations in other domains”. Some believed that the weaponization of space,[30](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note30%20rel=) the establishment of a space force,[31](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note31%20rel=) and other non-peaceful space-related activities were inevitable steps in the decades-long development of space warfare capabilities by the United States, China, and Russia. For these authors, this is not a race “to dominate space” but an incremental development of “a range of options to control or deny outer space in a time of open conflict”.[32](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note32%20rel=) Regardless of the view, space assets will doubtless play a role in future non-peaceful relations between space-faring nations and are already playing a deterrence role. However, a continued and escalating space-based cold war need not occur if more trust can be established among the key players. The European Union as a Broker of Trust. The mistrust that exists among China, Russia, and the United States regarding space-related activities is a logical consequence of the role of space in modern warfare described above. The inability of the participants in these weapons races to adequately assess one another’s capabilities and intentions is driving them to develop even greater capabilities to pre-empt potential adversaries. Yet it is possible to restore a certain degree of trust by allowing space powers to better assess risks, capabilities, and intentions, and break the cycle of escalation. This article contends that cooperation on space-related global challenges can build that trust. Unfortunately, leadership in the domain of space by any one of these three actors is unlikely to be accepted by the others, even if the potential results are beneficial for all. These countries too often present themselves using adversarial language, with media supporting such views.[33](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note33%20rel=) The European Union (EU) is the only global actor that has all of the tools necessary to assist in the establishment of confidence-building measures between China, Russia, and the US in the domain of space. The EU is a key actor in space [34,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note34%20rel=)[35](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note35%20rel=) despite lacking a space agency as such. Other international organization, the European Space Agency (ESA), provides technical support for the flagship EU programs.[36](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note36%20rel=) The EU has asserted its presence in international space-related policy-making and acted as a diplomatic hinge, for example, in the development of guidelines for an International Code of Conduct for Outer Space from 2008 onwards.[37](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note37%20rel=) Even though other global actors could offer similar or superior combinations of space-related technology, a skilled workforce, and budgetary capacity, only the EU has the appropriate institutional framework – a multi-country, compromise-driven system of governance – combined with a civilian-only research and innovation program.[38](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note38%20rel=) Other non-state entities, such as the ESA or the United Nations, are unable to undertake cooperative efforts to build trust among the three nations because they lack either the budgetary capacity or an adequate institutional framework to push forward a foreign affairs agenda. The EU in particular can offer a civilian, research-driven, diplomatic tool. Such a tool is already within its current legal and policy framework and would build upon previous EU-sponsored actions in space research and innovation. It would not require significant legislative change or a critical rise in expenditure. The main requirement is a clear commitment to its objectives and the political willingness to engage with international actors that may be seen as more inclined to hostile discourse or behavior than is normally promoted by the EU. An EU-driven approach would offer the image of a peace-loving, supranational entity reluctant to or incapable of acting militarily. Its decision-making process already builds in the different sensitivities among its members in relation to the other three actors. Among the EU countries some are closer to China,[39,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note39%20rel=)some to the United States,[40,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note40%20rel=)and some to Russia.[41,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note41%20rel=) While the EU might be expected to cooperate closely with the United States opposite China and Russia, the EU has in the past “recast problems the US interprets as solvable solely with the hammer of military intervention as problems of trade or diplomacy […] forging its own path in service of its ambition to be considered a global player”. [42,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note42%20rel=) Along with the ability to lead, the EU has every reason to act. Against the backdrop of escalating tensions in space, the EU and its member states appear to be peaceful bystanders. However, as one of the leaders in outer space activities, especially commercial satellite activities, the EU and its members have much to lose from an outright conflict. By bringing the three space powers together, the EU could achieve better security and reliability of space assets, which would benefit its population as well as the whole planet. Additionally, it could project its economic and research power as a powerful diplomatic tool, casting itself as a key international player and global broker in space affairs. The “smart” strategy[43,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note43%20rel=) envisioned here would combine both hard and soft power under a humble leadership that only the EU seems able to exercise. Europe would not be a resolute leader in the usual sense. Confrontation is beyond its power and not in its DNA. Instead, “[i]n a dangerous world, Europe is the holder of the balance”.[44,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note44%20rel=) In the context of space, the EU “represents a natural bridge between space competitors and possesses the track record and credibility to serve as the principal ‘middle diplomat’ of the global space community”.[45,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note45%20rel=) The European Framework for Enhancing Cooperation. **The framework needed to foster cooperation in space between China, Russia, and the United States** (as well as other nations) **is already in place in the EU**. **The** EU’s official **position** regarding the international projection of its research and innovation **is formalized in Horizon 2020** (H2020), the Framework Programme for Research and Innovation (2014-2020).[46](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note46%20rel=) The H2020 Regulation envisions large-scale projects, carried out with international cooperation.[47](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note47%20rel=) It anticipates working with partners in third countries to address many of its objectives, particularly those relating to the Union’s external and development policies and international commitments.[48](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note48%20rel=) **It further establishes that space activities should “support the European research and innovation contribution to long term international space partnerships,” acknowledging that “space undertakings have a fundamentally global character”**.[49](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note49%20rel=)

**There will be no “space war” – space war is just an extension of terrestrial war that deterrence and global alliances check. Nobody wants space to go nuclear – the development of space means the development of global deterrence.**

Bowen 18 (Bleddyn Bowen is a lecturer in International Relations at the University of Leicester. Bowen, Bleddyn. “The Art of Space Deterrence.” European Leadership Network, 20 Feb. 2018, www.europeanleadershipnetwork.org/commentary/the-art-of-space-deterrence/.)//DebateDrills AY

Fourth, the ubiquity of space infrastructure and the fragility of the space environment may create a degree of existential deterrence. As space is so useful to modern economies and military forces, a large-scale disruption of space infrastructure may be so intuitively escalatory to decision-makers that there may be a natural caution against a wholesale assault on a state’s entire space capabilities because the consequences of doing so approach the mentalities of total war, or nuclear responses if a society begins tearing itself apart because of the collapse of optimised energy grids and just-in-time supply chains. In addition, the problem of space debris and the [political-legal hurdles to conducting debris clean-up](https://doi.org/10.1080/14777622.2014.890489) operations mean that even a handful of explosive events in space can render a region of Earth orbit unusable for everyone. This could caution a country like China from excessive kinetic intercept missions because its own military and economy is increasingly reliant on outer space, but perhaps not a country like North Korea which does not rely on space. The usefulness, sensitivity, and fragility of space may have some existential deterrent effect. [China’s catastrophic anti-satellite weapons test in 2007](https://defenceindepth.co/2017/01/11/chinas-space-weapons-test-ten-years-on-behemoth-pulls-the-peasants-plough/) is a valuable lesson for all on the potentially devastating effect of kinetic warfare in orbit.

#### Space war is too risky for China to engage in.

MacDonald 13 (MacDonald, Bruce W. “Deterrence and Crisis Stability in Space and Cyberspace.” Defense Technical Information Center, 2013, discover.dtic.mil/.)//DebateDrills AY

Worst cases of space and cyber warfare may be avoidable, just as nuclear warfare was avoided during the Cold War. The United States, China, Russia and other developed countries should have a common interest in avoiding strategic conflict in the space and cyber domains, which would threaten crippling direct and indirect economic consequences in a way that the world has never experienced. Beijing, which has struggled to achieve levels of economic security previously unknown in Chinese history, should be reluctant to risk the economic advances of two generations of progress, as well as the promise of more progress to come. The demographic and other challenges facing China, where a high rate of economic growth has been deemed necessary to tamp down political unrest, would seem to offer cautionary notes against space and cyber warfare. Chinese leaders might, however, throw caution to the wind if they feared dire consequences for a failure to act in a severe crisis, or if they were unable to maintain tight control over a PLA that may not share their calculus of decision. China’s lack of a National Security Council-type decision-making body leaves open the possibility of a civil-military divide in a deep crisis. As was the case during the Cold War nuclear standoff, massive “bolt-out-of-blue” space or cyberattacks are unlikely. Generally speaking, it would be prudent to assume that any seeming offensive action of more than nuisance impact is a one-off, possibly accidental or even rogue event, or at most a way to demonstrate capabilities and send a signal. Some modest increase in defensive alert level also would be prudent, accompanied by a priority inquiry at an appropriate level to the suspected country of origin for explanation. This would be easier to accomplish if there would be some modality comparable to the US-Russian Risk Reduction Center or Hotline in existence, particularly between Washington and Beijing. Improved communication channels might 96 usefully accompany an international code of conduct for responsible spacefaring nations, if one can be agreed to, and is worthy of consideration even if it not. The US alliance structure can promote deterrence and crisis stability in space, as with nuclear deterrence. China has no such alliance system. If China were to engage in large-scale offensive counter-space operations, it would face not only the United States, but also NATO, Japan, South Korea and other highly aggrieved parties. Given Beijing’s major export dependence on these markets, and its dependence upon them for key raw material and high technology imports, China would be as devastated economically if it initiated strategic attacks in space. In contrast to America’s nuclear umbrella and extended deterrence, US allies make a tangible and concrete contribution to extended space deterrence through their multilateral participation in and dependence upon space assets. Attacks on these space assets would directly damage allied interests as well as those of the United States, further strengthening deterrent effects.

#### Terrestrial war won’t escalate to space – no reward or the amount of risk it poses, and deterrence checks all scenarios.

Triezenberg 17 (Triezenberg, Bonnie L., Deterring Space War: An Exploratory Analysis Incorporating Prospect Theory into a Game Theoretic Model of Space Warfare. Santa Monica, CA: RAND Corporation, 2017. https://www.rand.org/pubs/rgs\_dissertations/RGSD400.html.) //DebateDrills AY

A first observation to make regarding the above results is that when our future opponent builds redundancy and resilience and refrains from building weapons, we achieve deterence in all cases. That is, no matter how the U.S. invests or how much more dependent on space the U.S. is than the opponent, terrestrial war will not expand to space if the opponent has invested in resilience and does not initially have space weapons. Although the opponent may build space weapons during the game, he is deterred from using them either because the U.S. assets are resilient to them or because the U.S. has weapons to counter with. The U.S. is deterred from attack primarily by the fact that our opponent’s resilience means we have little to gain.113 This observation holds under both rational decision making and under prospect theory. A second related observation is that a U.S. decision to build redundancy in lieu of weapons is NOT a deterrent over the entire range of cases studied here. If the U.S. is more dependent on space to project power into a ground theater of war, then the increased redundancy and resilience studied here are inadequate to deter our opponent from attacking our space assets. I will also point out that this is more true under prospect theory than under rational choice. Under prospect theory, opponents are emboldened by their advantage in possessing space weapons. Closely related to this observation is the third: If the U.S. objective is to deter space warfare, investing in resilience and redundancy over investment in weapons is always the better strategy. While the investments studied here were inadequate to fully deter space war in all cases, the intensity of conflict is always less if the U.S. favors building resilience over building weapons. This can be seen by observing the columns for each level of U.S. offensive/defensive balance – as we move from left to right across the diagrams (i.e. an increasing U.S. investment in weapons), space war becomes more intense. This is true under rational theory and under prospect theory. A fourth and final observation is that parity in dependence on space is always stabilizing. When players are equally dependent on space, even under rational decision theory the U.S. can achieve deterrence simply by investing in redundancy and resilience. In fact, if both sides are equally dependent on space to project power, then a unilateral decision by either side to forego building weapons in favor of investments in resilience will always result in deterrence. In Figure 9, these are the green cases along the leftmost and bottom rows of the rational cases for 1:1 dependency.