# 1NC

## OFF

#### Interpretation: The Aff must only garner substantive offense from the resolution operating under comparative worlds. To clarify, they can’t read non-resolution offense and kick it in the 1AR, but checks on abuse are fine.

#### 1] Topic ed – comparing different worlds incentivizes studying the topic while TT averts that. That’s cuz their model Topic ed oweighs because it helps us learn/debate real-world issues that help us.

#### 2] Resolvability – impossible to weigh between different truth or false claims because they don’t have any weighing mechanisms – i.e., can’t be more true or less false. That oweighs: a) predictability – topic debate is grounded in the resolution which is the only thing we all know b) engagement -- allows for deeper clash b/c topic scenarios are more developed b/c they reflect real world dilemmas

#### 3] Limits – infinite ways to prove the resolution true or false through paradoxes or spikes which destroys predictability. Unpredictable debates hurt clash and create time/strat skew.

## OFF

#### The standard is maximizing expected wellbeing.

#### Prefer:

#### 1] Actor specificity:

#### A] Aggregation -Governments must aggregate because their policies benefit some and harm others so the only non-arbitrary way to prioritize is by helping the most amount of people – that oweighs on specificity

Mack 4 [(Peter, MBBS, FRCS(Ed), FRCS (Glasg), PhD, MBA, MHlthEcon) “Utilitarian Ethics in Healthcare.” International Journal of the Computer, the Internet, and Management Vol. 12, No.3. 2004. Department of Surgery. Singapore General Hospital.] SJDI

Medicine is a costly science, but of greater concern to the health economist is that it is also a limitless art. Every medical advance created new needs that did not exist until the means of meeting them came into existence. Physicians are reputed to have an infinite capacity to do ever more things, and perform ever more expensive interventions for their patients so long as any of their patients’ health needs remain unfulfilled. The traditional stance of the physician is that each patient is an isolated universe. When confronted with a situation in which his duty involves a competition for scarce medications or treatments, he would plead the patient’s cause by all methods, short of deceit. However, when the physician’s decision involves more than just his own patient, or has some commitment to public health, other issues have to be considered. He then has to recognise that the unbridled advocacy of the patient may not square with what the economist perceives to be the most advantageous policy to society as a whole. Medical professionals characteristically deplore scarcities. Many of them are simply not prepared to modify their intransigent principle of unwavering duty to their patients’ individual interest. However, in decisions involving multiple patients, making available more medication, labour or expenses for one patient will mean leaving less for another. The physician is then compelled by his competing loyalties to enter into a decision mode of one versus many, where the underlying constraint is one of finiteness of the commodities. Although the medical treatment may be simple and inexpensive in many instances, there are situations such as in renal dialysis, where prioritisation of treatment poses a moral dilemma because some patients will be denied the treatment and perish. Ethics and economics share areas of overlap. They both deal with how people should behave, what policies the state should pursue and what obligations citizens owe to their governments. The centrality of the human person in both normative economics and normative ethics is pertinent to this discussion. Economics is the study of human action in the marketplace whereas ethics deals with the “rightness” or “wrongness” of human action in general. Both disciplines are rooted in human reason and human nature and the two disciplines intersect at the human person and the analysis of human action. From the economist’s perspective, ethics is identified with the investigation of rationally justifiable bases for resolving conflict among persons with divergent aims and who share a common world. Because of the scarcity of resources, one’s success is another person’s failure. Therefore ethics search for rationally justifiable standards for the resolution of interpersonal conflict. While the realities of human life have given rise to the concepts of property, justice and scarcity, the management of scarcity requires the exercise of choice, since having more of some goods means having less of others. Exercising choice in turn involves comparisons, and comparisons are based on principles. As ethicists, the meaning of these principles must be sought in the moral basis that implementing them would require. For instance, if the implementation of distributive justice in healthcare is founded on the basis of welfare-based principles, as opposed to say resource-based principles, it means that the health system is motivated by the idea that what is of primary moral importance is the level of welfare of the people. This means that all distributive questions should be settled according to which distribution maximises welfare. Utilitarianism is fundamentally welfarist in its philosophy. Application of the principle to healthcare requires a prior understanding of the welfarist theory as expounded by the economist. Conceptually, welfarist theory is built on four tenets: utility maximisation, consumer sovereignty, consequentialism and welfarism. Utility maximisation embodies the behavioural proposition that individuals choose rationally, but it does not address the morality of rational choice. Consumer sovereignty is the maxim that individuals are the best judge of their own welfare. Consequentialism holds that any action or choice must be judged exclusively in terms of outcomes. Welfarism is the proposition that the “goodness” of the resource allocation be judged solely on the welfare or utility levels in that situation. Taken together these four tenets require that a policy be judged solely in terms of the resulting utilities achieved by individuals as assessed by the individuals themselves. Issues of who receives the utility, the source of the utility and any non-utility aspects of the situation are ignored.

#### B] No act-omission distinction – choosing to omit is an act itself – governments have to pass yes/no bills

#### 2] Strength of obligation – they can’t explain differences in obligations and IF they do it devolves to consequences

**Sinnott-Armstrong, 09**, “How strong is this obligation? An argument for consequentialism from concomitant variation”, Oxford University Press, Walter Sinnott-Armstrong is Chauncey Stillman Professor of Practical Ethics in the Department of Philosophy and the Kenan Institute for Ethics at Duke University He has received fellowships from the Harvard Program in Ethics and the Professions, the Princeton Center for Human Values, the Oxford Uehiro Centre for Practical Ethics, the Center for Applied Philosophy and Public Ethics at the Australian National University, and the Sage Center for the Study of the Mind at the University of California, Santa Barbar. He earned his bachelor’s degree from Amherst College and his doctorate from Yale University. He has published widely on ethics (theoretical and applied as well as meta-ethics), empirical moral psychology and neuroscience, philosophy of law, epistemology, philosophy of religion, and informal logic, URL: <https://www.jstor.org/stable/40607654>, KR

Now simply apply John Stuart Mill’s method of concomitant variation. If lung cancer rates go up and down when smoking rates go up and down, but lung cancer rates do not change when atmospheric humidity goes up or down, then these data support the hypothesis that smoking rather than humidity causes lung cancer, at least if we can rule out the alternatives that cancer causes smoking, that some third factor causes both smoking and cancer, and that the correlation is accidental. Analogously, since the strength of a moral obligation goes up and down as the harms in violating it go up and down, this correlation supports the hypothesis that the harms of violating it are what make the moral obligation as strong as it is. This argu- ment assumes that (i) the strength of the moral obligation does not explain the degree of harm (it cannot explain, for example, why it is so bad to miss this flight), (ii) no third factor explains the strength, the harm, and their correlation (what would that third factor be?), and (iii) the correlation is not accidental (because consequences are at least part of what matters in morality). Thus, Mill’s method of concomitant variation supports a conse- quentialist account of the strength of moral obligations to keep promises.

This conclusion extends as well to the existence of such moral obligations. There are two main options: we can say either (i) consequences determine both the existence and the strength of the moral obligation not the strength of the moral obligation is, instead, the consequences of breaking (or keeping) the promise. Option (i) is clearly simpler and more coherent. Why would one factor determine whether any moral obligation at all exists, while a completely separate factor (in the future rather than the past) deter- mines how strong that moral obligation is? That would be like postulating that the force of a golf club hitting a golf ball is what causes the ball to move but a different factor determines how fast or far the ball moves. Of course, dense air or a tree might explain why the ball did not go as fast or far as otherwise expected. However, in the absence of any such additional force, it would be implausible to postulate separate causes for the existence and degree of the ball’s motion. Analogously, we should reject the moral theory that one factor determines the existence of a moral obligation and a separate factor determines its strength. There might be conflicting moral reasons of all sorts (analogous to the dense air and tree), but they do not explain the existence or the strength of the original moral obligation itself. Thus, the better alternative is the consequentialist theory that one factor – the harm caused by violating the obligation – explains both the existence and the strength of the moral obligation not to break promises.

Critics might object that I have a moral obligation not to break my promise even if breaking it will not cause any harm at all. Imagine that you will have a better time at lunch with your other friends without me rather than with me. Still, I seem to have some (weak) moral obligation to keep my promise to meet you and them for lunch. However, consequentialists can explain that weak moral obligation by weak side-consequences. If I break my pro- mise, you will lose trust in me, which will complicate or even prevent later mutual arrangements and will create a risk of undermining our friendship. The risk of such side effects also explains why I need to apologize if I break my promise, since apologies reduce some harmful side effects. Even in the case of a proverbial deathbed promise, breaking it will not harm the promis- see (who is dead), but will create risks of harm to my character and of more harmful promise breaking in the future. In the very odd cases where even these effects are ruled out (such as when I will die right after breaking my promise to a dying person), then I doubt that I really do have any moral obligation to keep my promise. Why not? Because nobody at all is harmed if I break this promise in these circumstances. Besides, I am about to die, so give me a break! In any case, we should not trust our moral intuitions in such odd cases, because they did not evolve to fit such weird circumstances.

For these reasons, the best explanation of both the existence and the strength of the moral obligation to keep promises is consequentialist. Moreover, this argument applies as well to other apparently non-consequen- tialist obligations.

Consider the obligation not to lie. Some lies (such as telling a friend that you like his or her new haircut) are white lies, because they harm nobody, at least directly. As a result, they violate little or no moral obligation. Other lies (such as Bill Clinton’s lie about Monika Lewinsky) have very bad conse- quences, so they violate a very strong moral obligation. The strength of the obligation not to lie varies with the harms caused by lying. Thus, again, Mill’s method of concomitant variation suggests that the ground of the moral obligation not to lie is harmful consequences of lying.

Next consider the moral obligation to obey the law. There is a strong moral obligation not to drive on the left side of a crowded two-way road in the USA, even if the violated law happened to be passed by a very slim majority, and even if I never benefited in the past from the law requiring right-side driving rather than left-side driving. In contrast, even if I have some moral obligation not to pass a stop sign without coming to a complete stop in the middle of the night on a clearly deserted road, that moral obligation is very weak, because violating it causes no harm or risk of harm to others, even if the law that I violated was passed unanimously and even if I benefited in the past from other people stopping at that stop sign (at least during the day). Thus, as with promises and lies, the strength of the moral obligation not to break the law varies with the harms caused by breaking that law, so Mill’s method of concomitant variation again suggests that the ground of the moral obligation to obey the law is harmful consequences of breaking the law.

All of this suggests a new question and a new method in moral philosophy. Most moral philosophers and common folk have focused on the dichoto- mous questions of whether or not an act is right or wrong and whether or not someone has a moral obligation to act or not to act in a certain way. Those are important questions, but they are not the only ones worth asking. A moral theory also needs to answer the question of how strong a moral obligation is. When we ask this question, we find correlations between the strength of moral obligations and various factors that, together with Mill’s method of concomitant variation, reveal the ground of those moral obliga- tions. This brief note has tried to suggest both that this method is fruitful and also that, when we apply it, consequentialism comes out on top.

To respond, deontologists need to explain why some moral obligations are stronger than others without invoking the harmful consequences of violating those moral obligations. I would like to see them try.

#### 3] Use epistemic modesty :

#### a) clash – encourages phil and topic education which forces more realistic comparisons since the strength of obligations also matter

#### b) frameworks can be disproved through strength of obligation

**Sinnott-Armstrong, 09**, “How strong is this obligation? An argument for consequentialism from concomitant variation”, Oxford University Press, Walter Sinnott-Armstrong is Chauncey Stillman Professor of Practical Ethics in the Department of Philosophy and the Kenan Institute for Ethics at Duke University He has received fellowships from the Harvard Program in Ethics and the Professions, the Princeton Center for Human Values, the Oxford Uehiro Centre for Practical Ethics, the Center for Applied Philosophy and Public Ethics at the Australian National University, and the Sage Center for the Study of the Mind at the University of California, Santa Barbar. He earned his bachelor’s degree from Amherst College and his doctorate from Yale University. He has published widely on ethics (theoretical and applied as well as meta-ethics), empirical moral psychology and neuroscience, philosophy of law, epistemology, philosophy of religion, and informal logic, URL: <https://www.jstor.org/stable/40607654>, KR

If I promise to meet you and some other mutual friends for a casual lunch, then my moral obligation to meet you is not as strong as when I promise to drive you to the airport to catch an important flight. Why not? The natural answer is that, if I break the lunch promise, not much bad will happen. You will still have a pleasant lunch with our other friends, and you and I can still have lunch some other time. I have some moral obligation to meet you, but not a very strong one. In contrast, if I break my driving promise, then my failure will cause much more harm, assuming that you will not find another way to get to the airport in time for your flight. These harmful consequences to you seem to be what give strength to my moral obligation to keep this promise.

The relevant kind of strength is measured by how much is needed to over- ride the obligation. I would need much stronger reasons to justify breaking my promise to drive you to the airport than to justify breaking my promise to meet you for lunch. The fact that my teenage child is sick at home might be enough to justify missing the lunch, even if the teenager would be safe at home for an hour without me. In contrast, I should leave my sick teenager at home while I drive you to the airport if I promise to drive you (again assuming that you will miss your flight if I do not drive you). The fact that some such reasons justify violating the lunch obligation but do not justify violating the driving obligation is what makes the driving obligation stronger.

The source of strength is not the solemn tone in which I made the promise. Even if I explicitly and solemnly promise to meet you for lunch, if nothing much bad will happen if I fail to show up, then I still do not have a very strong obligation to meet. In contrast, if I casually promise to drive you to your important flight, then, as long as I know that you are counting on me and will suffer significant harm if I fail, my obligation to drive you is strong. The strength of the moral obligation to keep a promise, thus, does not depend on solemnity while promising.

The source of strength is also not detrimental reliance, at least in one sense that is common in law. Suppose you spent a long time putting together the lunch with friends, and this effort had direct costs (phone bills) as well as opportunity costs (of not doing what you would have done if you had not put the lunch together). In contrast, you spent no time at all in response to my promise to drive you to the airport (other than getting ready for your trip, which you would have done anyway). Nonetheless, my driving promise still generates a stronger moral obligation to keep it if breaking it has worse consequences, as above. (I might have a secondary obligation to compensate you for direct and opportunity costs, but these can be seen as consequences of my joint act of making and then breaking a promise, and the strength of this compensatory obligation depends on consequences of that act.) Admittedly, by not seeking another ride to the airport, you did rely on my driving promise to your detriment, if I break it. Thus, regardless of effort and time lost, the driving promise creates more detrimental reliance of a separate kind: losses that occur only if I break the promise. However, this new kind of detrimental reliance clearly depends on the bad consequences of breaking the promise, so the strength of an obligation varies with the consequences if it varies with detrimental reliance of this new kind.

#### 4] Bindingness- only pursuing pleasure and avoiding pain can motivate action consistently- no external system of ethics has anything intrinsic that dictate it be followed.

#### 5] Intuitions: If something happens 100 times we know it will happen again because of probability and mathematical analysis – only empirical processes can allow us to accurately make deductive predictions

#### Extinction first:

**1] Moral uncertainty means preventing extinction should be our highest priority.  
Bostrom 12** [Nick Bostrom. Faculty of Philosophy & Oxford Martin School University of Oxford. “Existential Risk Prevention as Global Priority.” Global Policy (2012)]  
These reflections on **moral uncertainty suggest** an alternative, complementary way of looking at existential risk; they also suggest a new way of thinking about the ideal of sustainability. Let me elaborate.¶ **Our present understanding of axiology might** well **be confused. We may not** nowknow — at least not in concrete detail — what outcomes would count as a big win for humanity; we might not even yet **be able to imagine the best ends** of our journey. **If we are** indeedprofoundly **uncertain** about our ultimate aims,then we should recognize that **there is a great** option **value in preserving** — and ideally improving — **our ability to recognize value and** to **steer the future accordingly. Ensuring** that **there will be a future** version of **humanity** with great powers and a propensity to use them wisely **is** plausibly **the best way** available to us **to increase the probability that the future will contain** a lot of **value.** To do this, we must prevent any existential catastrophe.

#### 2] Extinction isn’t tied to util – it’s a distinct phenomena which is offense under ANY fw

Burke et al 16 Associate Professor of International and Political Studies @ UNSW, Australia, 2016 (Anthony, Stefanie Fishel is Assistant Professor, Department of Gender and Race Studies at the University of Alabama, Audra Mitchell is CIGI Chair in Global Governance and Ethics at the Balsillie School of International Affairs, Simon Dalby is CIGI Chair in the Political Economy of Climate Change at the Balsillie School of International Affairs, and, Daniel J. Levine is Assistant Professor of Political Science at the University of Alabama, “Planet Politics: Manifesto from the End of IR,” Millennium: Journal of International Studies 1–25)

8. Global ethics must respond to mass extinction. In late 2014, the Worldwide Fund for Nature reported a startling statistic: according to their global study, 52% of species had gone extinct between 1970 and 2010.60 This is not news: for three decades, conservation biologists have been warning of a ‘sixth mass extinction’, which, by definition, could eliminate more than three quarters of currently existing life forms in just a few centuries.61 In other words, it could threaten the practical possibility of the survival of earthly life. Mass extinction is not simply extinction (or death) writ large: **it is a qualitatively different phenomena that demands its own ethical categories.** It cannot be grasped by aggregating species extinctions, let alone the deaths of individual organisms. Not only does it erase diverse, irreplaceable life forms, their **unique histories** and **open-ended possibilities**, but it **threatens the ontological conditions of Earthly life**.

IR is one of few disciplines that is explicitly devoted to the pursuit of survival, yet it has almost nothing to say in the face of a possible mass extinction event.62 It utterly lacks the conceptual and ethical frameworks necessary to foster diverse, meaningful responses to this phenomenon. As mentioned above, Cold-War era concepts such as ‘nuclear winter’ and ‘omnicide’ gesture towards harms massive in their scale and moral horror. However, they are asymptotic: they imagine nightmares of a severely denuded planet, yet they do not contemplate the **comprehensive negation** that a mass extinction event entails. In contemporary IR discourses, where it appears at all, extinction is treated as a problem of scientific management and biopolitical control aimed at securing existing human lifestyles.63 Once again, this approach fails to recognise the reality of extinction, which is a **matter of being and nonbeing**, not one of life and death processes.

Confronting the enormity of a possible mass extinction event requires a total overhaul of human perceptions of what is at stake in the disruption of the conditions of Earthly life. The question of what is ‘lost’ in extinction has, since the inception of the concept of ‘conservation’, been addressed in terms of financial cost and economic liabilities.64 Beyond reducing life to forms to capital, currencies and financial instruments, the dominant neoliberal political economy of conservation imposes a homogenising, Western secular worldview on a planetary phenomenon. Yet the **enormity, complexity, and scale** of mass extinction is so huge that humans need to **draw on every possible resource in order to find ways of responding**. This means that they need to mobilise multiple worldviews and lifeways – including those emerging from indigenous and marginalised cosmologies. Above all, it is crucial and urgent to realise that extinction is a **matter of global ethics**. It is not simply an issue of management or security, or even of particular visions of the good life. Instead, it is about staking a claim as to the goodness of life itself. If it does not fit within the existing parameters of global ethics, then it is these boundaries that need to change.

9. An Earth-worldly politics. Humans are worldly – that is, we are fundamentally worldforming and embedded in multiple worlds that traverse the Earth. However, the Earth is not ‘our’ world, as the grand theories of IR, and some accounts of the Anthropocene have it – an object and possession to be appropriated, circumnavigated, instrumentalised and englobed.65 Rather, it is a complex of worlds that we share, co-constitute, create, destroy and inhabit with countless other life forms and beings.

The formation of the Anthropocene reflects a particular type of worlding, one in which the Earth is treated as raw material for the creation of a world tailored to human needs. Heidegger famously framed ‘earth’ and ‘world’ as two countervailing, conflicting forces that constrain and shape one another. We contend that existing political, economic and social conditions have pushed human worlding so far to one extreme that it has become almost entirely detached from the conditions of the Earth. Planet Politics calls, instead, for a mode of worlding that is responsive to, and grounded in, the Earth. One of these ways of being Earth-worldly is to embrace the condition of being entangled. We can interpret this term in the way that Heidegger66 did, as the condition of being mired in everyday human concerns, worries, and anxiety, to prolong existence. But, in contrast, we can and should reframe it as authors like Karen Barad67 and Donna Haraway68 have done. To them and many others, ‘entanglement’ is a radical, indeed fundamental condition of being-with, or, as Jean-Luc Nancy puts it, ‘being singular plural’.69 This means that no being is truly autonomous or separate, whether at the scale of international politics or of quantum physics. World itself is singular plural: what humans tend to refer to as ‘the’ world is actually a multiplicity of worlds at various scales that intersect, overlap, conflict, emerge as they surge across the Earth. World emerges from the poetics of existence, the collision of energy and matter, the tumult of agencies, the fusion and diffusion of bonds.

Worlds erupt from, and consist in, the intersection of **diverse forms of being** – material and intangible, organic and inorganic, ‘living’ and ‘nonliving’. Because of the tumultuousness of the Earth with which they are entangled, ‘**worlds’ are not static, rigid or permanent. They are permeable and fluid**. They can be **created**, **modified** – and, of course, destroyed. Concepts of violence, harm and (in)security that focus only on humans ignore at their peril the destruction and severance of worlds,70 **which undermines the conditions of plurality that enables life on Earth to thrive.**

## OFF

#### CP: The appropriation of outer space except for Active Debris Removal done explicitly by private entities is unjust.. Governments ought to permit the appropriation of outer space for designated safety zones and tech stationing for active debris removal by private entities.

#### Guidelines by COPUOS provide a framework for mitigation

Freeland, Handmer, 21, “DEBRIS REMOVAL: SPACE LAW IS AN IMPORTANT PART IN THE FIGHT AGAINST SPACE JUNK”, Conversation, Steven Freeland, Professorial Fellow, Bond University / Emeritus Professor of International Law, Western Sydney University, Western Sydney University and Annie Handmer, PhD candidate, School of History and Philosophy of Science, University of Sydney, URL:, KR

Experts are working to recognise and determine the appropriate regulatory “rules of the road”. The United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) deals with space governance, and it has had “legal mechanisms relating to space debris mitigation and remediation measures” on its agenda for years. There are already some widely-accepted and practical guidelines for debris mitigation and long-term sustainability of space activities, but each proposed solution brings with it other questions.

In the end, any debris remediation activity will require a negotiated agreement between each of the relevant parties to ensure these legal and other questions are addressed. Eventually, we might see a standardised process emerge, in coordination with an international system of space traffic management.

#### Debris removal is necessary and only private entities have the incentive and capability to do it.

**Giordano 21** (David Giordano is the Vice President of Mentorship for CBLA. Elsewhere at Columbia Law School, he serves on the Columbia Journal of Transnational Law, and is the Treasurer of Columbia OutLaws. During his 1L Summer, David was an intern at the Securities and Exchange Commission’s Division of Corporation Finance. Prior to law school, David worked as a Corporate Paralegal at the New York office of Cleary Gottlieb Steen & Hamilton LLP. David attended The George Washington University where he obtained a B.A. in psychology. “Space Debris: Another Frontier in the Commercialization of Space”. October 31, 2021.)

As **satellites** and other projectiles blast into orbit, upon collision they **can disintegrate into** shards, sometimes just centimeters wide, that remain in orbit, risking further collision. Hollywood captured the potential perils of **fairly large pieces of space debris** in the opening minutes of the 2013 film [*Gravity*](https://www.warnerbros.com/movies/gravity), where space junk threatens the lives of astronauts on a mission. Outside the realms of fictional space-thrillers, even the smallest pieces of space junk can present real danger. In 2016, a tiny piece of **space junk**, believed to be a paint chip or a piece of metal no more than a few thousandths of a millimeter across, [cracked the window of the International Space Station](https://www.popsci.com/paint-chip-likely-caused-window-damage-on-space-station/). In May 2021, a piece of space **debris** [punctured](https://www.nbcnews.com/science/space/space-junk-damages-international-space-stations-robotic-arm-rcna1067) **the robotic arm of the I**nternational **S**pace **S**tation. This is seriously concerning, as, [according to the European Space Agency](https://www.esa.int/Safety_Security/Clean_Space/How_many_space_debris_objects_are_currently_in_orbit), there are 670,000 pieces of space debris larger than 1cm and 170,000,000 between 1mm and 1cm in width. Unfortunately, **public action and policy struggles to keep up with these risks**. International law affords little clarity on the problem, as its control is a novel, [emerging field](https://www.technologyreview.com/2021/08/23/1032386/space-traffic-maritime-law-ruth-stilwell/) with many technical [tracking](https://www.space.com/space-situational-awareness-house-hearing-february-2020.html) and [removal](https://www.scientificamerican.com/article/space-junk-removal-is-not-going-smoothly/#:~:text=There%20is%20no%20doubt%20that,antisatellite%20weapon%2C%E2%80%9D%20she%20says.) challenges. None of the existing space treaties [directly tackle the issue](https://oxfordre.com/planetaryscience/view/10.1093/acrefore/9780190647926.001.0001/acrefore-9780190647926-e-70), rendering [responsibility for it](https://scholarship.law.upenn.edu/jil/vol41/iss1/6/) ambiguous. Absent such responsibility, [legal incentives are non-existent](https://www.courthousenews.com/lack-of-space-law-complicates-growing-debris-problem/)**.** [Guidelines are occasionally issued](https://www.unoosa.org/pdf/limited/l/AC105_2014_CRP14E.pdf) by international governing bodies, but provide little legal significance and are [more targeted at the practicalities of tracking and removal](https://scholarship.law.upenn.edu/jil/vol41/iss1/6/). The nation best positioned to notify space actors of collision risks is the United States, and the burden of that task currently falls on the [Department of Defense](https://www.govexec.com/media/d1-mission-space.pdf). However, the Trump administration issued a [directive in 2018](https://www.cnbc.com/2018/06/18/national-space-council-trump-signs-space-debris-directive.html), shifting the responsibility from the DoD to the Department of Commerce, and the [transition has yet to materialize](https://www.govexec.com/media/d1-mission-space.pdf), leaving DoD struggling to keep pace [with increasing commercial activity](https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/look-out-below-what-will-happen-to-the-space-debris-in-orbit). In the face of public paralysis, **addressing the problem through industry looks more and more attractive.** This has led some to call for a new legal order that still leaves room for government, but reframes who the rules exist to serve. Rather than our current, rudimentary treaty regime designed to [prevent international conflict](https://www.theverge.com/2017/1/27/14398492/outer-space-treaty-50-anniversary-exploration-guidelines), [commentators](https://space.nss.org/wp-content/uploads/NSS-Position-Paper-Space-Debris-Removal-2019.pdf) have called for an additional regime resembling [maritime law](https://www.technologyreview.com/2021/08/23/1032386/space-traffic-maritime-law-ruth-stilwell/) that preserves the interests of a more diverse set of stakeholders, including those in the future that can bring technology and interests to space that may not yet exist. These commentators shun the common conception that space regulation should resemble air-traffic control, which is suited to a narrower set of uses (transport). Under such a “maritime” regime, the light touch of central regulatory bodies, and perhaps their non-existence, is preferred, just as it has been on the seas. This way, individual nations have a degree of flexibility in instituting controls they see fit while leaving room for industry to address problems and introduce new uses for space. Furthermore, **governments seem ready and willing to construct the legal and incentive framework in concert with such private action.** [In a joint statement this summer](https://www.gov.uk/government/news/g7-nations-commit-to-the-safe-and-sustainable-use-of-space), **G7 members expressed openness to resolving** the technical aspects of the **debris** problem **with private institutions, and there is** some **promising progress**. Apple co-founder [Steve Wozniak](https://www.space.com/apple-cofounder-steve-wozniak-space-junk-company) signaled his plans to address the problem through a new company with a telling name: Privateer Space. **Astroscale**, a UK-based company, successfully **launched a pair of satellites** in the Spring of 2021 [that will remove certain space debris from orbit](https://astroscale.com/astroscale-celebrates-successful-launch-of-elsa-d/)**.** Astroscale also [stated their desire](https://astroscale.com/space-sustainability/) to work with governments and international governing bodies to craft policy with private efforts to control the problem top of mind. In light of public policy’s silence on space debris, the initiative of actors like Astroscale involving themselves in policy may be advised, as it could [promote further private investment](https://docs.google.com/document/d/1NCO5Vvjf-kgoZLNfgaOn4bDj_CAfyD1Qhz2oW3TrcHc/edit) in technology for space **debris removal**. A popular [policy recommendation](https://reason.org/policy-brief/u-s-space-traffic-management-and-orbital-debris-policy/) among experts is the establishment of public-private partnerships, and Astroscale has entered several such agreements including with [Japan](https://www.satellitetoday.com/in-space-services/2021/07/27/space-clean-up-company-astroscale-signs-partnerships-with-mhi-and-japanese-government/) and the [European Space Agency](https://spacenews.com/astroscale-clearspace-aim-to-make-a-bundle-removing-debris/). Other **actors include** [ClearSpace](https://www.space.com/esa-startup-clearspace-debris-removal-2025)**,** [OneWeb](https://www.hou.usra.edu/meetings/orbitaldebris2019/orbital2019paper/pdf/6077.pdf)**, and** [D-Orbit](https://www.satellitetoday.com/in-space-services/2021/09/10/esa-awards-d-orbit-uk-contract-for-debris-removal-demonstration/)**.** Some may want to push back against further private involvement. The congestion of space is, in part, industry’s fault, and if we conceptualize orbital space as a common resource, it might be right to fear the effects of the [Tragedy of the Commons](https://www.britannica.com/science/tragedy-of-the-commons). Critics may seek to bolster international treaties, give legal teeth to the guidelines occasionally issued by the UN, and preserve the public posture of the heavens. These may be welcome adjustments, but unlike a pond that industry overfishes or a well that industry dries up, here industry is working to add more fish and water. Moreover, governments stand to benefit from this private decluttering, as well, as [they are expected](https://astroscale.com/wp-content/uploads/2020/02/Reg-V-Development-of-Global-Policy-for-Active-Debris-Removal-Services-v2.0.pdf) to be major customers of some of these private actors. As for the public posture, space has long been a commercial place. Telecommunications companies and government contractors historically depend on space. As the number of commercial satellites set to launch skyrockets, it seems natural to craft policies that are responsive to their interests and provide incentives to remedy issues created in the course of spacefaring, such as space debris. **In light of the** long silence of international law on such issues and the demonstrated **motivation by private actors**, **space debris represents the latest frontier in the abdication of space from the public concern to the private.**

## OFF

#### 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.

#### Russia will demand concessions over Ukraine – it’s their top priority and violates Ukraine’s sovereignty.

Maynes 1/24 – NPR Moscow correspondent, reporting in Russia for over a decade

Charles Maynes, last updated at time of cutting: 1-24-2022, “4 things Russia wants right now,” *NPR*, https://www.npr.org/2022/01/12/1072413634/russia-nato-ukraine DD

MOSCOW — First U.S. and Russian diplomats faced off in Geneva. Then NATO received a Russian delegation in Brussels. The Organization for Security and Cooperation in Europe sponsored talks in Vienna. And finally, the U.S. and Russian chief diplomats met, again in Geneva, last week.

Russia courted all this attention by massing some 100,000 troops and military equipment near Ukraine, raising fears of a Russian invasion. Analysts read Russia's buildup as an attempt to pressure the U.S. and its European allies into concessions on a series of far-reaching "security guarantees" sought by Moscow.

1. Russia wants a guarantee Ukraine can never join NATO

Russia's main demand is a commitment from NATO to end its further expansion into former Soviet republics — especially Ukraine. Russia wants NATO to rescind a 2008 promise that Ukraine could someday join the defense alliance. Many observers see it as a distant prospect that Ukraine could join NATO because it doesn't meet membership requirements. But Moscow doesn't see it that way. "We don't trust the other side," Russia's chief negotiator, Deputy Foreign Minister Sergei Ryabkov, said after bilateral talks with the U.S. finished. "We need ironclad, waterproof, bulletproof, legally binding guarantees. Not assurances. Not safeguards. Guarantees. With all the words — 'shall, must' — everything that should be put in."

Russia's reasoning: President Vladimir Putin views Ukraine as an extension of what he calls "historical Russia" — a part of the Russian Empire and Soviet Union, and within Moscow's "sphere of influence" today. The threat of Ukraine's westward turn after a street revolution ousted the country's pro-Russian president in 2014 was the driving force behind Russia's annexation of Crimea later that year. Ukraine's desire to join the Western alliance also led to Russia's sponsorship of separatists in the country's eastern Donbas region — in effect sabotaging its path to membership by fueling a civil war.

NATO's counter: The U.S. argues that countries have a right to choose their own alliances and NATO has a long-standing "open door policy" for potential membership. "NATO has never expanded through force or coercion or subversion. It is countries' sovereign choice to choose to come to NATO and say they want to join," Deputy Secretary of State Wendy Sherman said after a meeting between Russian and NATO officials in Brussels earlier this month. Russia's actions are making the idea of NATO membership more appealing to Ukrainians, according to opinion polls. It is unlikely, however, that Ukraine will meet the requirements anytime soon.

#### Concessions on sovereignty spark global allied prolif.

Gawthorpe 14 – teaching fellow at the Defence Academy of the United Kingdom

Andrew Gawthorpe, 3-14-2014, “Could Ukraine Drive Nuclear Proliferation in Asia?” *The Diplomat*, https://thediplomat.com/2014/03/could-ukraine-drive-nuclear-proliferation-in-asia/ DD

Recent events in Eastern Europe raise the issue not only of Russia’s future actions but also the lessons that will be drawn regarding other revisionist states. In East Asia, a China that is nurturing territorial ambitions of its own and has recently become less shy about asserting them will watch to see how the West reacts to Vladimir Putin’s expansionism. So will China’s East Asian neighbors, who fear they may become the next Ukraine.

One of the most potentially disturbing effects of the situation in Ukraine is the possibility it may drive nuclear proliferation. The present crisis in that country could well have been a nuclear nightmare. When the USSR was unraveling in the early 1990s, a sizeable portion of its strategic forces, along with tactical nuclear weapons, were deployed in Ukraine. Had the new Ukrainian government in Kiev taken control of these weapons upon becoming independent, it would have been the third-largest nuclear power in the world. behind only the U.S. and the Russia.

Concerned about nuclear proliferation throughout Europe if new nuclear powers were created by the Soviet Union’s demise, the U.S. pressured Ukraine to denuclearize and to return its nuclear forces to Russia. Basking in a post-independence glow and seeking U.S. support on other issues, Kiev went along. This was the origin of the so-called Budapest Memorandum of 1994, in which Ukraine promised to give up its nuclear weapons in return for Russia, Britain and the U.S. guaranteeing its sovereignty and territorial integrity. With the wholesale invasion of Crimea by Russian forces in recent days, Kiev can be forgiven for asking if the agreement is any longer worth the paper it’s written on.

Since Russia’s occupation of Crimea, a former Ukrainian foreign minister has called for his country to restock its nuclear arsenal

and some Western analysts have questioned whether Putin would have acted so boldly if Ukraine still had its nuclear deterrent. The question can be expected to occur to leaders of other countries who are concerned about the territorial ambitions of their neighbors or the sincerity of Western security assurances.

The issue is of particular salience in East Asia, where China has recently been flexing its muscles in a range of territorial disputes. Regional powers such as Japan and Taiwan must be watching America’s unwillingness to forcefully confront a nuclear-armed Russia and wondering how much backbone the exhausted and drained superpower would have if China made similar moves. This is especially the case since the Obama administration’s so-called “pivot” to the Asia-Pacific seems to be much more an excuse for disengaging from the Middle East than it is a real exercise in strengthening the American alliance system in the Asia-Pacific.

Any such moves towards proliferation would be unwise. Acquiring nuclear weapons may appear to provide an effective way for countries worried about their neighbors’ territorial ambitions to deter them, but the truth is not so simple. While nuclear weapons provide an effective deterrent against an all-out attack, they are not necessarily effective in deterring lower-level conflict. Just as it is implausible to imagine that Ukraine would have responded to the appearance of balaclaved soldiers in Crimea with a first strike, so it is equally implausible to imagine any country responding to the Chinese declaration of an Air Defense Identification Zone in the same manner.

Revisionist powers are adept at nibbling away at international norms and agreements slowly and avoiding big, sweeping gestures. Countries responding to such a nibble with nuclear brinksmanship risk making their adversaries look reasonable by comparison, giving nuclear weapons questionable utility in territorial disputes. And if their use is indeed threatened and taken seriously, the result can be a dangerous cycle of escalation.

#### East Asian prolif breaks deterrence and escalates.

Cimbala 15 – Stephen J., Distinguished Professor of Political Science at Pennsylvania State University Brandywine, “New Nuclear Disorder: Challenges to Deterrence and Strategy” Ashgate Publishing Ltd

Failure to contain proliferation in Pyongyang could spread nuclear fever throughout Asia. Japan and South Korea might seek nuclear weapons and missile defenses. A pentagonal configuration of nuclear powers in the Pacific basin (Russia, China, Japan, and the two Koreas—not including the United States, with its own Pacific interests) could put deterrence at risk and create enormous temptation toward nuclear preemption. Apart from actual use or threat of use. North Korea could exploit the mere existence of an assumed nuclear capability in order to support its coercive diplomacy.1'' A five-sided nuclear competition in the Pacific would be linked, in geopolitical deterrence and proliferation space, to the existing nuclear deterrents of India and Pakistan, and to the emerging nuclear weapons status of Iran. An arc of nuclear instability from Tehran to Tokyo could place US proliferation strategies into the ash heap of history and call for more drastic military options, not excluding preemptive war, defenses and counter-deterrent special operations. In addition, an unrestricted nuclear arms race in Asia would increase the likelihood of accidental or inadvertent nuclear war. It would do so because: (1) some of these states already have histories of protracted conflict; (2) states may have politically unreliable or immature command and control systems, especially during a crisis involving a decision for nuclear first strike or retaliation; unreliable or immature systems might permit a technical malfunction that caused an unintended launch, or a deliberate, but unauthorized, launch by rogue commanders; and (3) faulty intelligence and warning systems might cause one side to misinterpret the other's defensive moves to forestall attack as offensive preparations for attack, thus triggering a mistaken preemption.

## CASE

### Phil Offense

#### Acquisition of property can never be unjust – to create rights violations, there must already be an owner of the property being violated, but that presupposes its appropriation by another entity.

Feser 1, (Edward Feser, 1-1-2005, accessed on 12-15-2021, Cambridge University Press, "THERE IS NO SUCH THING AS AN UNJUST INITIAL ACQUISITION | Social Philosophy and Policy | Cambridge Core", Edward C. Feser is an American philosopher. He is an Associate Professor of Philosophy at Pasadena City College in Pasadena, California. [https://www.cambridge.org/core/journals/social-philosophy-and-policy/article/abs/there-is-no-such-thing-as-an-unjust-initial-acquisition/5C744D6D5C525E711EC75F75BF7109D1)[brackets](https://www.cambridge.org/core/journals/social-philosophy-and-policy/article/abs/there-is-no-such-thing-as-an-unjust-initial-acquisition/5C744D6D5C525E711EC75F75BF7109D1)%5bbrackets) for gen lang]//phs st

There is a serious difficulty with this criticism of Nozick, however. It is just this: There is no such thing as an unjust initial acquisition of resources; therefore, there is no case to be made for redistributive taxation on the basis of alleged injustices in initial acquisition. This is, to be sure, a bold claim. Moreover, in making it, I contradict not only Nozick’s critics, but Nozick himself, who clearly thinks it is at least possible for there to be injustices in acquisition, whether or not there have in fact been any (or, more realistically, whether or not there have been enough such injustices to justify continual redistributive taxation for the purposes of rectifying them). But here is a case where Nozick has, I think, been too generous to the other side. Rather than attempt —unsatisfactorily, in the view of his critics—to meet the challenge to show that initial acquisition has not in general been unjust, he ought instead to have insisted that there is no such challenge to be met in the first place. Giving what I shall call “the basic argument” for this audacious claim will be the task of Section II of this essay. The argument is, I think, compelling, but by itself it leaves unexplained some widespread intu- itions to the effect that certain specific instances of initial acquisition are unjust and call forth as their remedy the application of a Lockean proviso, or are otherwise problematic. (A “Lockean proviso,” of course, is one that forbids initial acquisitions of resources when these acquisitions do not leave “enough and as good” in common for others.) Thus, Section III focuses on various considerations that tend to show how those intuitions are best explained in a way consistent with the argument of Section II. Section IV completes the task of accounting for the intuitions in question by considering how the thesis of self-ownership itself bears on the acqui- sition and use of property. Section V shows how the results of the previ- ous sections add up to a more satisfying defense of Nozickian property rights than the one given by Nozick himself, and considers some of the implications of this revised conception of initial acquisition for our under- standing of Nozick’s principles of transfer and rectification. II. The Basic Argument The reason there is no such thing as an unjust initial acquisition of resources is that there is no such thing as either a just or an unjust initial acquisition of resources. The concept of justice, that is to say, simply does not apply to initial acquisition. It applies only after initial acquisition has already taken place. In particular, it applies only to transfers of property (and derivatively, to the rectification of injustices in transfer). This, it seems to me, is a clear implication of the assumption (rightly) made by Nozick that external resources are initially unowned. Consider the following example. Suppose an individual A seeks to acquire some previously unowned resource R. For it to be the case that A commits an injustice in acquiring R, it would also have to be the case that there is some individual B (or perhaps a group of individuals) against whom A commits the injustice. But for B to have been wronged by A’s acquisi- tion of R, B would have to have had a rightful claim over R, a right to R. By hypothesis, however, B did not have a right to R, because no one had a right to it—it was unowned, after all. So B was not wronged and could not have been. In fact, the very first person who could conceivably be wronged by anyone’s use of R would be, not B, but A himself, since A is the first one to own R. Such a wrong would in the nature of the case be an injustice in transfer—in unjustly taking from A what is rightfully his—not in initial acquisition. The same thing, by extension, will be true of all unowned resources: it is only after some- one has initially acquired them that anyone could unjustly come to possess them, via unjust transfer. It is impossible, then, for there to be any injustices in initial acquisition.7

#### Turn – violates the freedoms of private companies since it restricts their involvement of space

#### Fails the universality test since other violations of appropriation can take place --- nothing intrinsic about space

### Util

1] other satellites check – their johnson ev is about loss of many satellites but debris would only hit one at a time allowing for new ones to take place

2] beachump is terrible ev – its about a chinese test being bad but that’s because the US knew it was from china which the plan can’t solve

3] public pressure makes no sense – most people don’t want the US to randemoly go to nuke war over china because of misperception

#### There’s no space debris impact

Park 18

Ye Joo Park, citing NASA studies on orbital debris, How Dangerous is Space Debris?, Research Association for Interdisciplinary Studies, RAIS Conference Proceedings, November 19-20, 2018, DOI: 10.5281/zenodo.1572516, <https://ssrn.com/abstract=3303541>

Other factors to consider concerning collisions in Space

While it’s true that there are thousands of space objects directly above Earth in an 800-kilometer band, space is so vast that it’s helpful to pause for a moment and reflect... in the area directly above the entire continental U.S., there are typically only three or four items orbiting above 3.1 million square miles. Therefore, the likelihood of collisions between satellites, spacecraft and orbiting objects is very small (NASA 2018).

In fact, in 2013 it was reported that the probability of a collision between an orbiting asset and space debris larger than 1 cm (0.4in.) will be once every 1.5-2 years, according to the Head of the Russian Hall/ History of Space Debris 8 Figure 5 [NASA] Space Agency. This compares with a 2010 estimate giving the likelihood of once every 5 years (Sorokin 2013).

The Feasibility of Practically Reducing Space Debris

Reducing orbital debris is incredibly difficult. Therefore, the most important action that space experts and policy makers currently recommend is to prevent the unnecessary creation of additional orbital debris. This can be done through prudent vehicle design and operations ((UNOOSA 2014).

The International Academy of Astronautics or IAA is a significant, global organization of scientists and space experts from many countries who meet regularly to discuss the importance of space debris as a policy issue. The subject-matter experts of the IAA published their fifth update Situation Report on Space Debris in August 2017 (Bonnal and McKnight 2017). In the executive summary, the IAA reported that if an orbiting satellite impacts with small bits of debris - even as small as 5 mm - the result will be grave, e.g. the collision would likely disrupt or terminate a satellite’s operations (Bonnal and McKnight 2017, 5).

The serious warnings expressed in this conclusion are offset by the positive findings of the IAA that there has been a reduction of the space debris created from the two extraordinary satellite destruction events (2007 and 2009) cited earlier in this paper. According to the IAF report, a large amount of debris from the satellite explosions were frictionally burned when reaching the Earth’s atmosphere after gradually sinking due to the scientific principle of atmospheric drag (in the science of Physics), which is a deterioration in the strength of an orbit because of an object hitting gas molecules in space. Small bits of space junk sink as the orbit gets weaker... then they burn. This is a positive trend “for keeping the short-term collision hazard under control at the lower altitudes (i.e., less than 650 km)” (Bonnal and McKnight 2017, 7).

#### Kessler’s Syndrome wrong and super long timeframe---he’s adjusted it recently

Kurt 15 – JD-William & Mary

Joseph Kurt, JD- William & Mary School of Law, BA-Marquette University, NOTE: TRIUMPH OF THE SPACE COMMONS: ADDRESSING THE IMPENDING SPACE DEBRIS CRISIS WITHOUT AN INTERNATIONAL TREATY, 40 Wm. & Mary Envtl. L. & Pol'y Rev. 305 (2015)

A. Practical Considerations: Feasible Solutions to the Space Debris Problem Are on Their Way

One key question in assessing whether an international treaty is a requisite for solving the space debris problem is just how difficult it will be to fashion a remedy. The more complex and costly are feasible solutions, the more likely it is that a comprehensive regime is necessary to bind the various actors together. 93Link to the text of the note

A good place to begin is to determine just how imminent is the onset of the cascade of exponentially more frequent debris-creating collisions, known as the Kessler Syndrome. 94Link to the text of the note To be certain, no one can be sure--this phenomenon being subject to highly complex probabilities. 95Link to the text of the note Indeed, experts' estimates of when such a cascade will become irreversible vary [\*316] widely. 96Link to the text of the note The National Research Council produced a report in 2011 that suggested that "space might be just 10 or 20 years away from severe problems." 97Link to the text of the note In fact, the cascading effect has already begun, albeit at a modest pace. 98Link to the text of the note However, Donald Kessler, who first described the eponymous effect in 1978, has significantly recalibrated his own outlook over the years. 99Link to the text of the note Originally, Kessler predicted that catastrophe would result by the year 2000. 100Link to the text of the note That date long passed, Kessler now speaks of a century-long process that "we have time to deal with." 101Link to the text of the note

#### Squo tracking, shielding, and removal plans solve

Dr. Brian Koberlein 16, Professor of Physics at the Rochester Institute of Technology and PhD in Astrophysics from the University of Connecticut, “Cascade Effect”, 5-4, https://archive.briankoberlein.com/2016/05/04/cascade-effect/index.html

In the movie Gravity the driving force of the plot is a catastrophic cascade of space debris. An exploding satellite sends high speed debris into the path of other satellites, and the resulting collisions create more space debris until everything from a space shuttle to the International Space Station faces an eminent threat of destruction. Not unexpectedly, the movie portrayal of such a situation is not particularly accurate, but the risk of a debris cascade is very real.

It’s known as the Kessler syndrome, after Donald Kessler, who first imagined the scenario in the 1970s. The problem comes down to the fact that small objects in Earth orbit can stay in orbit for a very long time. If an astronaut drops a bolt, it can stay in orbit for decades or centuries. Because the relative speed of two objects in orbit can be quite large, it doesn’t take a big object to pose a real threat to your spacecraft. On the highway a small pebble can chip your car windshield. In space it can be done by a chip of paint traveling at thousands of kilometers per hour. In the history of the space shuttle missions, there were more than 1,600 debris strikes. Because of such strikes, more than 90 space shuttle windows had to be replaced over the lifetime of shuttle missions.

While that might sound alarming, it’s actually quite manageable. Upgrades and maintenance were quite common on the shuttle missions, and we tend to err on the side of caution when it comes to replacing parts. Modern spacecraft also have ways to mitigate the risk of small impacts, such as Whipple shields made of thin layers of material spaced apart so that objects disintegrate when hitting the shield rather than the spacecraft itself. We also have a tracking system that currently tracks more than 300,000 objects bigger than 1 cm, so we can make sure that most spacecraft avoid these objects.

But the risk of big collisions isn’t negligible. In 2009 the Iridium 33 and Kosmos-2251 satellites collided at high speed, destroying both spacecraft and creating more dangerous debris. It wouldn’t take many collisions like this for the debris numbers to rise dramatically, and more debris means a greater risk of collisions. In Gravity the cascade happens very quickly, triggered by a single event. The reality is not quite so grave. Instead of happening overnight, Kessler syndrome would occur gradually, raising collision risks to the point where certain orbits become logistically impractical. It could occur so gradually that we might not notice it early on, and there are some that argue it’s already underway.

The good news is that we’re aware of the threat. And, as the old saying goes, knowing is half the battle. Already we take steps to limit the amount of debris created. New spacecraft include end of life plans to remove them from orbit, either by sending them into Earths atmosphere to burn up, or sending them to a “graveyard orbit” that poses little risk to other spacecraft. There are also plans on the drawing board to clear orbits of debris, particularly in low-Earth orbit where the risk is greatest. The cascade effect is a real risk, but it’s also one we can likely manage with a bit of ingenuity.