

1NC R1 vs. Lake Highland PS

1NC 1 OFF: CP

CP: States ought to:

- **apply the maritime law of salvage to space debris**
- **establish a proportional share liability agreement with all relevant private and public actors for future damage to functional space objects caused by interference with unidentifiable orbital space debris.**

Salter '16 - Alexander William Salter [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://www-cdn.law.stanford.edu/wp-content/uploads/2017/11/19-2-2-salter-final_0.pdf> AT

Assuming a nation-state, even under current international space law, wished to supervise a space debris removal mission, how would it do so? A crucial question concerns the division of responsibility between the private and public sectors. Some impetus would almost certainly fall on the public sector. At a minimum, the public sector's role involves further clarification of the legal framework—the "rules of the game"—for space debris at the national level. Using the United States as an example, clarifying the framework may be as simple as announcing that **the law of salvage, as it exists in current maritime law, will apply to its own space debris.** In other words, **any private party** under the jurisdiction of the United States **that wishes to remove** US space **debris may do so and is entitled to whatever value is recovered** thereby. **Companies** such as Deep Space Industries and Planetary Resources **are planning** long-term **asteroid mining projects, which will probably require space infrastructure** for in-situ manufacturing or, at least, repairs. Because much **debris contains valuable material, the chance to access such material without bearing the costs ordinarily associated with bringing it into orbit can be a significant incentive.** Building this infrastructure would involve moving existing debris to a parking orbit rather than destroying it, of course. Most important, those companies would be able to remove clearly identifiable US space debris only, and the US government would be liable for any accidents caused by removal operations that damage other nations' space objects.

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*, 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.** In May 2021, a piece of space **debris punctured the robotic arm of the International Space Station.** This is seriously concerning, as, according to the European Space Agency, 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 with many technical tracking and removal

challenges. **None of the existing space treaties directly tackle the issue**, rendering responsibility for it ambiguous. Absent such responsibility, **legal incentives are non-existent**. Guidelines are occasionally issued by international governing bodies, but provide little legal significance and are more targeted at the practicalities of tracking and removal. 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. However, the Trump administration issued a directive in 2018, shifting the responsibility from the DoD to the Department of Commerce, and the transition has yet to materialize, leaving DoD struggling to keep pace with increasing commercial activity. **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, commentators have called for an additional regime resembling maritime law 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, **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 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.** Astroscale also stated their desire 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 in technology for space **debris removal.** A popular policy recommendation among experts is the establishment of public-private partnerships, and Astroscale has entered several such agreements including with Japan and the European Space Agency. Other **actors include ClearSpace, OneWeb, and D-Orbit.** 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. 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 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.**

Share liability forces polluters to internalize costs, and encourages remediation and mitigation

Mark **Sundahl**, Ph.D. from Brown, 2000; J.D. candidate, Hastings College of the Law, 2001; B.A., University of California, Los Angeles, 1993, **2000**, “Unidentified Orbital Debris: The Case for a Market-Share Liability Regime” 24 HastingsInt'l & Comp. L. Rev. 125

Market-**share liability will benefit the space industry by (1) providing compensation to the injured party where none existed before, (2) creating an incentive for states to mitigate debris production, (3) creating an equal incentive to remove existing debris, (4) promoting the registration and tracking of space objects, (5) encouraging states to cooperate in the prevention of collisions, and (6) ultimately lowering the economic barrier to entering the space industry.**

The immediate benefit of market-share liability will be the creation of a compensation system where none now exists. Currently, the victims of unidentified debris damage must absorb the cost of any collision while the parties who created the debris incur no liability. A market-share liability amendment will fill this gap in the Liability Convention.

Of greater importance in the long run is the fact that marketshare liability would create an incentive for states to reduce the production of large debris. The production of trackable debris will increase a state's contribution index and, hence, its liability exposure. Launching entities would therefore take measures to minimize large debris production in order to minimize liability. Venting excess fuel, for example, would reduce the risk of explosions in orbit." A state can also reduce its contribution index by deorbiting defunct satellites. This can be achieved by either retrieving the satellites or by propelling the "dead" satellites into the Earth's atmosphere so that they are vaporized. 5

Market-share liability will not only promote debris mitigation measures but also encourage the improvement of debris removal technologies. Entities will be able to reduce their contribution index, as explained above, by removing debris that is already in orbit. Currently, debris can be removed by sending the Space Shuttle to retrieve defunct satellites. Other options include using an Earthbased laser to push objects out of their orbits so that they reenter the Earth's atmosphere and are destroyed. The Orion laser is currently being developed for this purpose by the United States government.⁵⁶ One commentator has even suggested using a "giant Neff ball" to catch debris, in effect "sweeping" the orbits clean.⁵⁷ Those states and private entities that do not have easy access to debris retrieval technology or do not have a laser of their own would be able to buy these services from the United States. The United States and Russia, as well as other states, would also have a two-fold incentive to improve their systems for registering, tracking, and cataloguing space objects. First, states would strive to improve their tracking capabilities so that they would be able to show that another state owned a specific debris fragment that caused damage. Once the responsible state is identified, only that state would be liable. Second, the United States and Russia would be eager to identify as many pieces of debris as possible that belong to each other. The United States, for example, would want to increase the number of catalogued fragments identified as Russian. By doing so, the Russian contribution index would grow and the contribution index of all other states would simultaneously fall. Improvements in tracking capabilities would be beneficial because they would allow a fairer apportionment of liability and would assist in debris evasion.

Spacefaring states would also make efforts to improve debris evasion technology out of the fear of incurring liability. After all, the most effective method of avoiding liability is to ensure that collisions do not occur. More effective evasion capabilities could be achieved by establishing a communications system whereby states with tracking facilities, such as the United States, could warn other states when their satellites or spacecraft were in the path of approaching debris. Upon receiving this information, the spacecraft owner would be able to engage in evasive maneuvers. This warning system could make use of sensitive ground-based debris detection technology as well as debris-detecting satellites.

Share estimation is feasible.

Justine S. Hastings, Professor of Economics and International and Public Affairs at Brown University and and Michael A. Williams Research Associate at the National Bureau of Economic Research. t

Competition Economics, LLC, '19, "Market Share Liability: Lessons from New Hampshire v. Exxon Mobil," 34 J. ENVTL. L. & LITIG. 219, 252

Growth in the amount of orbital debris has resulted in numerous collisions. 2 15 Given the rate of increase in the volume of debris, the increasing costs of collisions are likely to adversely affect the growth of the satellite industry.2 16

Applying market share liability in the context of orbital debris has been suggested, but specific methods of assigning market share liability in potential orbital debris litigation have yet to be developed.2 17 A major challenge with applying market share liability in the orbital debris context relates to determining each launching party's share in the existing problematic debris. 218 **Estimating the total mass of orbital debris through statistical and mathematical methods is feasible.**219 However, determining the percentage of the total mass attributable to a given party is difficult.220

In principle, the shares of the total mass of debris that can be tracked back to specific parties could be used to assign shares of the remaining, untraceable debris.221 Untraceable debris is composed primarily of pieces of debris generated in collisions and explosions of larger pieces of debris.222 Thus, smaller pieces of debris are the products of larger pieces of debris. Therefore, if a percentage of large pieces of traceable debris belongs to a certain party, it can be inferred that approximately the same percentage of smaller, untraceable debris likely belongs to the same party.223

According to NASA, there were 17,817 identified objects in Earth orbit as of October 4, 2016.224 Of this total, 5699 objects belonged to the United States, 6354 to Russia, and 3782 to China.225 This means that the contribution indices associated with the United States, Russia, and China were 32.0% [thirty two], 35.7 [thirty five point seven]%, and 21.2 [twenty one point two]% [percent] respectively. The remaining 11.1% was attributable to other countries including France, Japan, and India.2 26 The dollar amount of each party's damages could be calculated by multiplying the total damages amount by the share of the party's traceable debris. 227

1NC 2 OFF: DA

1 - Space Col (1:20)

Space colonies are coming now, but private companies are key --- government-led programs must prioritize space-for-earth ventures

Weinzierl and Sarang 21

[Matt Weinzierl and Mehak Sarang, 2-12-2021, "The Commercial Space Age Is Here," Harvard Business Review, <https://hbr.org/2021/02/the-commercial-space-age-is-here>]

There's no shortage of hype surrounding the commercial space industry. But while tech leaders promise us moon bases and settlements on Mars, the space economy has thus far remained distinctly local — at least in a cosmic sense. Last year, however, we crossed an important threshold: For the first time in human history, humans accessed space via a vehicle built and owned not by any government, but by a private corporation with its sights set on affordable space settlement. It was the first significant step towards building an economy both in space and for space. The implications — for business, policy, and society at large — are hard to overstate. In 2019, 95% of the estimated \$366 billion in revenue earned in the space sector was from the space-for-earth economy: that is, goods or services produced in space for use on earth. The space-for-earth economy includes telecommunications and internet infrastructure, earth observation capabilities, national security satellites, and more. This economy is booming, and though research shows that it faces the challenges of overcrowding and monopolization that tend to arise whenever companies compete for a scarce natural resource, projections for its future are optimistic. Decreasing costs for launch and space hardware in general have enticed new entrants into this market, and companies in a variety of industries have already begun leveraging satellite technology and access to space to drive innovation and efficiency in their earthbound products and services. In contrast, the space-for-space economy — that is, goods and services produced in space for use in space, such as mining the Moon or asteroids for material with which to construct in-space habitats or supply refueling depots — has struggled to get off the ground. As far back as the 1970s, research commissioned by NASA predicted the rise of a space-based economy that would supply the demands of hundreds, thousands, even millions of humans living in space, dwarfing the space-for-earth economy (and, eventually, the entire terrestrial economy as well). The realization of such a vision would change how all of us do business, live our lives, and govern our societies — but to date, we've never even had more than 13 people in space at one time, leaving that dream as little more than science fiction. Today, however, there is reason to think that we may finally be reaching the first stages of a true space-for-space economy. SpaceX's recent achievements (in cooperation with NASA), as well as upcoming efforts by Boeing, Blue Origin, and Virgin Galactic to put people in space sustainably and at scale, mark the opening of a new chapter of spaceflight led by private firms. These firms have both the intention and capability to bring private citizens to space as passengers, tourists, and — eventually — settlers, opening the door for businesses to start meeting the demand those people create over the next several decades with an array of space-for-space goods and services. Welcome to the (Commercial) Space Age In our recent research, we examined how the model of centralized, government-directed human space activity born in the 1960s has, over the last two decades, made way for a new model, in which public initiatives in space increasingly share the stage with private priorities. Centralized, government-led space programs will inevitably focus on space-for-earth activities that are in the public interest, such as national security, basic science, and national pride. This is only natural, as expenditures for these programs must

be justified by demonstrating benefits for citizens — and the citizens these governments represent are (nearly) all on earth. In contrast to governments, the private sector is eager to put people in space to pursue their own personal interests, not the state's — and then supply the demand they create. This is the vision driving SpaceX, which in its first twenty years has entirely upended the rocket launch industry, securing 60% of the global commercial launch market and building ever-larger spacecraft designed to ferry passengers not just to the International Space Station (ISS), but also to its own promised settlement on Mars.

Today, the space-for-space market is limited to supplying the people who are already in space: that is, the handful of astronauts employed by NASA and other government programs. While SpaceX has grand visions of supporting large numbers of private space travelers, their current space-for-space activities have all been in response to demand from government customers (i.e., NASA). But as decreasing launch costs enable companies like SpaceX to leverage economies of scale and put more people into space, growing private sector demand (that is, tourists and settlers, rather than government employees) could turn these proof-of-concept

initiatives into a sustainable, large-scale industry. This model — of selling to NASA with the hopes of eventually creating and expanding into a larger private market — is exemplified by SpaceX, but the company is by no means the only player taking this approach. For instance, while SpaceX is focused on space-for-space transportation, another key component of this burgeoning industry will be manufacturing. Made In Space, Inc. has been at the forefront of manufacturing “in space, for space” since 2014, when it 3D-printed a wrench onboard the ISS. Today, the company is exploring other products, such as high-quality fiber-optic cable, that terrestrial customers may be willing to pay to have manufactured in zero-gravity. But the company also recently received a \$74 million contract to 3D-print large metal beams in space for use on NASA spacecraft, and future private sector spacecraft will certainly have similar manufacturing needs which Made In Space hopes to be well-positioned to fulfill. Just as SpaceX has begun by supplying NASA but hopes to eventually serve a much larger, private-sector market, Made In Space's current work with NASA could be the first step along a path towards supporting a variety of private-sector manufacturing applications for which the costs of manufacturing on earth and transporting into space would be prohibitive. Another major area of space-for-space investment is in building and operating space infrastructure such as habitats, laboratories, and factories. Axiom Space, a current leader in this field, recently announced that it would be flying the “first fully private commercial mission to space” in 2022 onboard SpaceX's Crew Dragon Capsule. Axiom was also awarded a contract for exclusive access to a module of the ISS, facilitating its plans to develop modules for commercial activity on the station (and eventually, beyond it). This infrastructure is likely to spur investment in a wide array of complementary services to supply the demand of the people living and working within it. For example, in February 2020, Maxar Technologies was awarded a \$142 million contract from NASA to develop a robotic construction tool that would be assembled in space for use on low-Earth orbit spacecraft. Private sector spacecraft or settlements will no doubt have need for a variety of similar construction and repair tools. And of course, the private sector isn't just about industrial products. Creature comforts also promise to be an area of rapid growth, as companies endeavor to support the human side of life in the harsh environment of space. In 2015, for example, Argotec and Lavazza collaborated to build an espresso machine that could function in the zero-gravity environment of the ISS, delivering a bit of everyday luxury to the crew. To be sure, people have dreamt of using the vacuum and weightlessness of space to source or make things that cannot be made on earth for half a century, and time and again the business case has failed to pan out. Skepticism is natural. Those failures, however, have been in space-for-earth applications. For example, two startups of the 2010s, Planetary Resources, Inc. and Deep Space Industries, recognized the potential of space mining early on. For both companies, however, the lack of a space-for-space economy meant that their near-term survival depended on selling mined material — precious metals or rare elements — to earthbound customers. When it became clear that demand was insufficient to justify the high costs, funding dried up, and both companies pivoted to other ventures. These were failures of space-for-earth business models — but the demand for in-space mining of raw building material, metals, and water will be enormous once humans are living in space (and are therefore far cheaper to supply). In other words, when people are living and working in space, we are likely to look back on these early asteroid mining companies less as failures and more as simply ahead of their time. Seizing the Space-for-Space Opportunity The opportunity presented by the space-for-space economy is huge — but it could easily be missed. To seize this moment, policymakers must provide regulatory and institutional frameworks that will enable the risk-taking and innovation necessary for a decentralized, private-sector-driven space economy. There are three specific policy areas we believe will be especially important: 1. Enabling private individuals to take on greater risk than would be tolerable for government-employed astronauts. First, as part of a general shift to that more decentralized, market-oriented space sector, policymakers should consider allowing private space tourists and settlers to voluntarily take on more risk than states would tolerate for government-employed astronauts. In the long run, ensuring high safety levels will be essential to convince larger numbers of people to travel or live in space, but in the early years of exploration, too great an aversion to risk will stop progress before it starts. An instructive analogy can be found in how NASA works with its contractors: In the mid-2000s, NASA shifted from using cost-plus contracts (in which NASA shouldered all the economic risk of investing in space) to fixed-price contracts (in which risk was distributed between NASA and their contractors). Because of

private companies' greater tolerance for risk, this shift catalyzed a burst of activity in the sector — sometimes referred to as “New Space.” A similar shift in how we approach voluntary risk-taking by private-sector astronauts may be necessary in order to launch the space-for-space economy. 2. Judiciously implementing government regulation and support. Second, as with most markets, developing a stable space economy will depend on judicious government regulation and support. NASA and the U.S. Commerce and State Departments' recent recommitment to “create a regulatory environment in [low-Earth orbit] that enables American commercial activities to thrive” is a good sign that the government is on a path of continued collaboration with industry, but there's still a long way to go. Governments should start by clarifying how property rights over limited resources such as water on Mars, ice on the Moon, or orbital slots (i.e., “parking spots” in space) will be governed. Recent steps — including NASA's offer to purchase lunar soil and rocks, last April's Executive Order on the governance of space resources, and the 2015 Commercial Space Launch Competitiveness Act — indicate that the U.S. government is interested in establishing some form of regulatory framework to support the economic development of space. In 2017, Luxembourg became the first European country to establish a legal framework securing private rights over resources mined in space, and similar steps have been taken at the domestic level in Japan and the United Arab Emirates. Moreover, nine countries (though Russia and China are notably missing) have signed the Artemis Accords, which lay out a vision for the sustainable, international development of the Moon, Mars, and asteroids. These are important first steps, but they have yet to be clearly translated into comprehensive treaties that govern the fair use and allocation of scarce space resources among all major spacefaring nations. In addition, governments should continue to fill the financial gaps in the still-maturing space-for-space economic ecosystem by funding basic scientific research in support of sending humans to space, and by providing contracts to space startups. Similarly, while excessive regulation will stifle the industry, some government incentives, such as policies to reduce space debris, can help reduce the costs of operating in space for everyone in ways that would be difficult to coordinate independently. 3. Moving beyond geopolitical rivalries. Finally, the development of the space-for-space economy must not be undermined by earthly geopolitical rivalries, such as that between the United States and China. These conflicts will unavoidably extend into space at least to some extent, and military demand has long been an important source of funding for aerospace companies. But if not kept in check, such rivalries will not only distract attention and resources from borderless commercial pursuits but also create barriers and risks that hamper private investment. On earth, private economic activity has long tied together people whose states are at odds. **The growing space-for-space economy offers exceptional potential to be such a force for unity — but it's the job of the world's governments not to get in the way.**

A collaborative, international approach to establishing — and enforcing — the rule of law in space will be essential to encouraging a healthy space-for-space economy. Visions of a space-for-space economy have been around since the dawn of the Space Age in the 1960s. Thus far, those hopes have gone largely unmet — but this moment is different. **For the first time in history, the private sector's capital, risk tolerance, and profit motive are being channeled into putting people in space.** If we seize this opportunity, we will look back on 2020 as the year when we started the truly transformational project of building an economy and a society in space, for space.

Space colonies are key to prevent extinction

Oberg 99

[James Oberg, space writer and a former space flight engineer based in Houston, 1999, Space Power Theory, http://www.jamesoberg.com/books/spt/new-CHAPTERSw_figs.pdf]

We have the great gift of yet another period when our nation is not threatened; and our world is free from opposing coalitions with great global capabilities. We can use this period to take our nation and our fellow men into the greatest adventure that our species has ever embarked upon. The United States can lead, protect, and help the rest of [hu]mankind to move into space. It is particularly fitting that a country comprised of people from all over the globe assumes that role. This is a manifest destiny worthy of dreamers and poets, warriors and conquerors. In his last book, *Pale Blue Dot*, Carl Sagan presents an emotional argument that our species must venture into the vast realm of space to establish a spacefaring civilization. While acknowledging the very high costs that are involved in manned spaceflight, **Sagan states that our very survival as a species depends on colonizing outer space. Astronomers have already identified dozens of asteroids that might someday smash into Earth. Undoubtedly, many more remain undetected. In Sagan's opinion, the only way to avert inevitable catastrophe is for mankind to establish a permanent human presence in space.** He compares humans to the planets that roam the night sky, as he says that humans will too wander through space. We will wander space because we possess a compulsion to explore, and space provides a truly infinite prospect of new directions to explore. Sagan's vision is part science and part emotion. He hoped that the exploration of space would unify humankind. We propose that mankind follow the United States and our allies into this new sea, set with jeweled stars. If we lead, we can be both strong and caring. If we step back, it may be to the detriment of more than our country.

Colonies solve overcrowding

Bloomfield 06

[National Space Society, Book Review: The High Frontier: Human Colonies in Space, Masse Bloomfield, 2006, http://www.nss.org/resources/books/non_fiction/review_008_highfrontier.html]

O'Neill's solution in 1976 was "We now have the technological ability to set up large communities in space — communities in which manufacturing, farming, and all other human activities could be carried out." In a caption under the famous drawing of an O'Neill cylinder it says, "Human colonies in space — not a luxury, but a necessity. Earth is overcrowded, running out of raw materials, in desperate need of a growing energy supply, and being ecologically destroyed. The problems are worse with each passing day, and there are no solutions to be found on Earth itself. Mankind's destiny — its very survival — is in space.... But a commitment is needed, a decision to go for it and the determination to see it through."

Colonizing space is key to stimulate growth, protect the environment, and prevent resource wars.

Collins & Autino 08

[Patrick Collins, Adrienne Autino. 7/7/08. Space Future Journal, What the Growth of a Space Tourism Industry Could Contribute to Employment, Economic Growth, Environmental Protection, Education, Culture and World Peace.

http://www.spacefuturejournal.com/archive/what_the_growth_of_a_space_tourism_industry_could_contribute_to_employment_economic_growth_environmental_protection_education_culture_and_world_peace.shtml]

Vehicles capable of supplying low-priced sub-orbital passenger space travel services could have been produced as early as 1950 if German rocket technology had not been used solely for military purposes by the USA and USSR. If that had happened, orbital passenger flight services could have started during the 1960s. In this case passenger space travel could have grown into a major industry by today. In growing to large scale, space travel would also have reduced the cost of space travel far below that of the expendable rockets still in use today, of which the first orbital vehicle, the R-7 / Soyuz, is still the cheapest and most reliable 50 years later. Several decades of growth of space travel and related space activities could have had a major beneficial influence on the modern world. The paper discusses the scope for new employment, stimulating economic growth, reducing environmental damage, encouraging education particularly in the sciences, stimulating cultural growth, and preserving peace by eliminating any need for "resource wars".

Case

AT: CHP

The Plan is vague at best; there's no mechanism for how sustained investment is ensured or how states redistribute things.

LT - Their faith in the state is misplaced – it's the root cause of oppression and existential insecurity – private space exploration is key - CHP legitimizes state oppression over the masses

Block and Nelson 18 [Nelson, Peter Lothian, and Walter E. Block. Space capitalism: how humans will colonize planets, moons, and asteroids. Springer, 2018.]

A **primary reason for** proposing **space exploration** stems from man's inhumanity to man and our love for human beings.¹ **We greatly fear nuclear, chemical, or biological warfare, where all people on the planet are wiped out.**² If some of our fellow creatures can locate to other planets, such as Mars, or the Moon, then at least a few of our relations will survive.³ **We also advocate that this initiative be undertaken entirely by private enterprise.** Why not leave such matters to the government? Why, at least, not call for the state along with the private sector, whether in tandem or separately, to engage in this process? Why, insist, not only that this be done, but, also, under the auspices of individual initiative? The answer is simple. **The state apparatus is responsible for the plight in which it has placed the human race in the first place. If this conflagration** God forbid, **occurs, it will be due to the acts of those with a monopoly on the use of power. Asking them for help is thus like inviting the fox to guard the proverbial chicken coop. It is the state, not the private individual, that is most likely to create a nuclear Armageddon.**⁴ **It is armed regimes that inflicted the chemical nightmare of trench warfare** (Taylor, A. 2014). **Throughout history the worst atrocities have always come from coercive governments** (Rothbard, M. 1973, pp. 56–57):

For centuries the State has committed mass murder and called it 'war'; then ennobled the mass slaughter that 'war' involves. For centuries the State has enslaved people into its armed battalions and called it 'conscription' in the 'national service.' For centuries the State has robbed people at bayonet point and called it 'taxation.' In fact, if you wish to know how libertarians regard the State and any of its acts, simply think of the State as a criminal band, and all of the libertarian attitudes will logically fall into place. **This is not to say that private individuals cannot inflict grave injury on their neighbors; they can and do. But bullying people into a desired behavior is the preeminent modus operandi of governments.** To initiate brute force against the citizens and experience the exhilaration of imposing one's will on others is the motivation for the despotically inclined to enter governmental employment. The school bully beats his classmates and all too often enjoys the feelings he derives from his action. Perhaps his victim suffers some bruises or at worst a broken bone. Most people grow up and eschew playground brawls. Tyrants, never do. Sociopaths relish the hurts they inflict so much that they make schoolyard whacking their career. That is to say they become bureaucrats, politicians,⁵ presidents, etc. **Genocide only comes from the state.** That a

human being might be free to act according to his own will grates on the thugs' nerves. **By their way of thinking, the biggest problem with space travel and colonization is that the astronaut cannot be oppressed: he is too far away and unreachable. Mass killings from the nineteenth century to the recent murders in Darfur have been all too common.**

Table 2.1 presents but a partial list⁶ of such atrocities.⁷ **Aside from those mass murders, states also indulge in day-to-day inhumanity which, while relatively minor on a per incident basis when compared to the above sorry episodes, add up to major abuse when taken in aggregate.** Even those governments which are supposed to be relatively free cannot escape condemnation for

the wholesale cruelty they inflict on people. **The United States has less than 5% of the world's population while somewhat short of 25% of the world's prisoners are oppressed therein** (ACLU 2015; Ye He Lee 2015). The question is: Why are these prisoners being held? What is to be accomplished by this outrage, and whom does it serve? According to the Federal Bureau of Prisons

(2015), **48.7% of the inmates in the United States are there for drug offences.** These victimless crimes do not constitute misconduct at all.⁹ Almost half the prisoners have been locked up for non-crimes, or mere political "crimes" that did not violate anyone's rights. That of course is what makes an act criminal: the perpetrator has mens rea; he deliberately injures his victim for gain. But it gets worse than that. The next most common "offences" of inmates are, in order: weapons, explosives, arson (16.2%); immigration (9.3%); sex offences (7.1%); and extortion, fraud, and bribery (6.3%) (Federal Bureau of Prisons 2015). Many of these are not crimes either. With few exceptions, weapons and explosives at worst can be called political "crimes" but are not wrongdoings in and of themselves.¹⁰ In like manner, immigration is non-criminal under libertarian law.¹¹ There are of course criminals (sometimes called "coyotes") who take money from poor people contracting to transport them across a national border only to abandon them in the desert.¹² They are guilty of kidnapping; but they are not the immigrants. And so it goes with many non-offenders being lumped together with a few real criminals. The objective of these assaults on humanity is akin to that of the primary school bully: to feel superior to one's neighbors and to assuage one's fears. By defining vast numbers of people as criminals the tyrannically inclined can control them. As Rand (1957) observed: 'Did you really think we want those laws observed?' said Dr. Ferris. 'We want them to be broken... There's no way to rule innocent men. The only power any government has is the power to crack down on criminals. Well, when there aren't enough criminals one makes them. One declares so many things to be a crime that it becomes impossible for men to live without breaking laws. Who wants a nation of law-abiding citizens? What's there in that for anyone? But just pass the kind of laws that can neither be observed nor enforced or objectively interpreted—and you create a nation of law-breakers—and then you cash in on guilt. Now that's the system, Mr. Reardon, that's the game, and once you understand it, you'll be much easier to deal with.' "Much easier to deal with," that is to say, much easier to control. The perpetrators of ordinances defining non-criminal offenses desire the kind of power Dr. Ferris sought in the preceding passage. Who gains from having so many people in prison? Legislators, state employees, lawyers, "law" enforcement agents, border guards, and

generally anyone able to adopt superior airs and compel those around him to bow, scrape, and do as he commands. To sum up, **the overwhelming majority of inmates have violated no one's rights but are innocent victims of state malfeasance.** On top of that, there is enforcement. The outrage that is civil asset forfeiture (Rothschild and Block 2016) corrupts police departments across the

United States and other common law countries. This misguided policy encourages outright theft on the part of uniformed people who are charged with preventing theft. Small store owners are at particular risk. They sell many inexpensive items and end up with cash. When they deposit these funds on a regular basis in a bank, the hoodlums acting in an official capacity call it illegal structuring and steal the contents of the bank account (Hoover 2015; WND 2014). Motorists are at risk. Corrupt police officers encourage other men in blue to engage in this type of theft and brag about it (Brandon 2014). Brutes often burst into the wrong house to inflict harm on innocent residents. One example is the case of a baby seriously injured by a flash-bang grenade during a no-knock raid. A SWAT¹³ team tried to break down a door without notice and, without first looking, tossed the explosive into the face of a 19-month-old sleeping toddler. These geniuses, who are "well trained" in how to handle weapons, will not be charged with assault or with child abuse, at least not locally (McLaughlin 2014). And what was the supposed warrant for this premeditated attack? There was a drug deal made earlier, although no drugs were found on the premises. Even if there were, it would still be a victimless act as far as libertarianism is concerned. In other words, there was no real offence and the officer in question and his comrades were conducting an unprovoked mugging of the residents. In Denver, Colorado, a SWAT team dashed into the house of an innocent man named Ismael Mena and shot him to death (ACLU 1999). Once again, non-existent drugs were offered as justification—i.e. not genuine misconduct. Officers even like to shoot pets as in the case in Whitehall, Ohio (McCormack 2015). Oh wait—that is man's inhumanity to animals not man. That is unless you count the fact that while in his rush to kill a dog, one of the policemen shot a four-year old child in the leg.¹⁴ The supposedly acceptable reason why the foregoing perps have not been locked in prison with long sentences is that they made understandable mistakes. They were only doing their jobs. They were trained¹⁵ to act so. They were in fear of their lives. We are sure all those reasons are true. So, why do we decry their behavior? Their conduct was criminally blameworthy because they were enforcing unjust laws.¹⁶ They had no business being in the locations and situation where these "mistakes" could occur. Let us consider an analogy. A gang goes into a jewelry store to conduct a robbery. During the implementation, one of their members is confronted with a guard who draws his weapon. Fearing for his life, he shoots and kills that sentinel. Is he therefore justified because he is scared? No, he should not have been in that position in the first place. He is guilty because he

was already in the process of committing a crime. The same applies to the preceding wrongdoers. Who does this cruelty serve? **The innumerable and appalling barbarisms perpetrated by governments benefit the control freaks and sociopaths who man the reins of power. Such savage behavior inflicts a deep and lasting depression¹⁷ on victims extending far beyond their immediate injuries. When people do not know they are in violation of some obscure ordinance and live in constant fear of attack by those who are charged to provide protection, they tend to become passive and sedentary.** Why risk starting a new enterprise just

to have it despoiled by the savages? Alas, because of surveillance by government agents and their NIMBY¹⁸ friends, many a would-be innovator, entrepreneur, or adventurer never develops his full potential. **Regarding space exploration, this despair is potentially fatal.** It serves as a reason for us to

offer an insurance policy against the very disappearance of the human race and to disdain state participation. **We eschew state power in space**

because we want to restrict governmental inhumanity to the narrowest sphere possible if not eliminate this scourge altogether.

We hope free adventurers will lead the way into the deep. On the other hand, we do not advocate state subsidies of space exploration. Bureaucratic meddling inevitably results in mal-investment.¹⁹ Furthermore, in exchange for the “aid,” the tyrants demand free benefits and, more seriously, cooperation in achieving political goals. Far from being a boon to the enterprise,²⁰ the recipients are often saddled with heavy moral and financial burdens. The

worst part of this is that poor folks who cannot afford it, as well as people with no interest in the project, are forced to pay. **Space exploration funded by**

the private sector is self-financing and does not involve oppression. The concerned individual does it for one of three reasons.²¹ Either he is, one, curious and explores out of personal enjoyment; two, expects to make a profit; or three, is a humanitarian and agrees with the thesis of this book (or all three). If the state stays away, far away, he is free to pursue his dreams as he sees fit. If he is mistaken about the efficacy of the project, he alone, along with his voluntary partners, suffers

the loss. No one is shot either. No one is oppressed under **laissez-faire capitalism** since it **necessarily involves volitional**

commercial acts between consenting adults. A further advantage follows when governments keep out. **Historically,**

private exploration initiatives tend to encourage liberty in the old world as well as in the new. From the seventeenth through the nineteenth centuries, based on the private settlements on the frontier in North America, a new commitment to freedom spread worldwide. At first it consisted of small gradual steps. Settlers, on their own far away from their place of birth, figured out how to live in their new environments. Lacking the ready resources of their homeland, they could not afford misguided political theories. As a result, they quickly learned the advantages of liberty; or they perished (Rothbard 1975a, b). With this liberty, and without their former rulers micro-managing their every act, they prospered and became the envy of the world.²² In a kind of symbiotic relationship with the pioneers, others in the old world emulated these freedom-loving people. Observing these realities, philosophers wrote treatises explaining how freedom works. Liberty spread into many lands wherein previously the people had been terribly

oppressed. That is **in stark contrast to state exploration initiatives.**²³ **Starting with Columbus**

(financed by Queen Isabella), Spanish and Portuguese **conquistadores despoiled native lands, killed**

inhabitants,²⁴ **and stole their valuables.**²⁵ **The writers of this book hope that the**

tyrants will stay at home²⁶ **that the free spirits will explore the planets and the**

stars as they see fit, and that the new-found freedom will spread back

throughout the Earth. We look forward to the day when the **space initiative will**

mightily reduce man's inhumanity to man by limiting governments and inspiring

liberty. If not, then with colonization of other heavenly bodies, at least some people will escape. In the following chapters, we explore how this ingenuity might unfold.

AT: Debris

1] Counterplan Solves our Giordano ev from 2021 thumps their Krekonian 18 because it shows G7 countries are willing to invest and create legal frameworks in allowing debris cleanup. 2] Planck 2 solves debris because it creates a huge incentive for private entities to clean up their own debris.

2] Time frame – Kessler effect 200 years away

Stubbe 17 [(Peter, PhD in law @ Johann Wolfgang Goethe University Frankfurt) “State Accountability for Space Debris: A Legal Study of Responsibility for Polluting the Space Environment and Liability for Damage Caused by Space Debris,” Koninklijke Brill Publishing, ISBN 978-90-04-31407-8, p. 27-31] TDI

The prediction of possible scenarios of the future evolution of the debris population involves many uncertainties. Long-term forecasting means the prediction of the evolution of the future debris environment in time periods of decades or even centuries. Predictions are based on models⁸⁴ that work with certain assumptions, and altering these parameters significantly influences the outcomes of the predictions. Assumptions on the future space traffic and on the initial object environment are particularly critical to the results of modeling efforts.⁸⁵ A well-known pattern for the evolution of the debris population is **the so-called Kessler effect**, which assumes that there is a certain collision probability among space objects because many satellites operate in similar orbital regions. These collisions create fragments, and thus additional objects in the respective orbits, which in turn enhances the risk of further collisions. Consequently, the number of objects and collisions increases exponentially and eventually results in the formation of a self-sustaining debris belt around the Earth. While it has long been assumed that such a process of collisional cascading is likely to occur only in a very long-term perspective (meaning a time span of several hundred years),⁸⁷ a consensus has evolved in recent years that an uncontrolled growth of the debris population in certain altitudes could become reality much sooner.⁸⁸ In fact, a recent cooperative study undertaken by various space agencies in the scope of i a d c shows that the current LEO debris population is unstable, even if current mitigation measures are applied. The study concludes: Even with a 90% implementation of the commonly-adopted mitigation measures [...] the LEO debris population **is expected to increase by an average of 30% in the next 200 years**. The population growth is primarily driven by catastrophic collisions between 700 and 1000 km altitudes and such collisions are likely to occur every 5 to 9 years.

No risk of a debris impact---

Stuff blows up in space all the time, and almost none of it involves objects we care about---robust modeling found a .001% chance of collisions---that's Wein

Probability – 0.1% chance of a collision.

Salter 15 – Assistant Professor of Economics & Comparative Economics Research Fellow at Texas Tech University

Alexander W. Salter, Space Debris: A Law and Economics Analysis of the Orbital Commons, Mercatus Working Paper, Mercatus Center at George Mason University, 19 STAN. TECH. L. REV. 221 (2016), https://law.stanford.edu/wp-content/uploads/2017/11/19-2-2-salter-final_0.pdf

*numbers replaced with English words

The probability of a collision is currently low. Bradley and Wein estimate that **the maximum probability in LEO of a collision over the lifetime of a spacecraft remains below one in one thousand**, conditional on continued compliance with NASA's deorbiting guidelines.³ However, the possibility of a future "snowballing" effect, whereby debris collides with other objects, further congesting orbit space, remains a significant concern.⁴ Levin and Carroll estimate the average immediate destruction of wealth created

by a collision to be approximately \$30 million, with an additional \$200 million in damages to all currently existing space assets from the debris created by the initial collision.⁵ The expected value of destroyed wealth because of collisions, currently small because of the low probability of a collision, can quickly become significant if future collisions result in runaway debris growth.

Space is huge---nothing will collide

Albrecht 16 – Chairman of the board of USSpace LLC & fmr. head of the National Space Council

Mark Albrecht, chairman of the board of USSpace LLC, head of the White House National Space Council from 1989 to 1992, and Paul Graziani, CEO and founder of Analytical Graphics, a company that develops software and provides mission assurance through the Commercial Space Operations Center (ComSpOC), Congested space is a serious problem solved by hard work, not hysteria, 2016, <https://spacenews.com/op-ed-congested-space-is-a-serious-problem-solved-by-hard-work-not-hysteria/>

There are over a half million pieces of human-made material in orbit around our planet. Some are the size of school buses, some the size of BB gun pellets. They all had a function at some point, but now most are simply space debris littered from 100 to 22,000 miles above the Earth. Yet, all behave perfectly according to the laws of physics. Many in the space community have called the collision hazard caused by space debris a crisis. Popular culture has embraced the risks of collisions in space in films like Gravity. Some participants have dramatized the issue by producing graphics of Earth and its satellites, which make our planet look like a fuzzy marble, almost obscured by a dense cloud of white pellets meant to conceptualize space congestion. Unfortunately, for the sake of a good visual, satellites are depicted as if they were hundreds of miles wide, like the state of Pennsylvania (for the record, there are no space objects the size of Pennsylvania in orbit). Unfortunately, this is the rule, not the exception, and almost all of these articles, movies, graphics, and simulations are exaggerated and misleading. Space debris and collision risk is real, but it certainly is not a crisis. So what are the facts? On the positive side, space is empty and it is vast. At the altitude of the International Space Station, one half a degree of Earth longitude is almost 40 miles long. That same one half a degree at geostationary orbit, some 22,000 miles up is over 230 miles long. Generally, we don't intentionally put satellites closer together than one-half degree.

3] No Space War

Alt Cause - Solar Storms

Wild 15 (Jim Wild, Professor of Space Physics at Lancaster University, "With So Much Vested In Satellites, Solar Storms Could Bring Life To A Standstill," July 30, 2015, <https://theconversation.com/with-so-much-vested-in-satellites-solar-storms-could-bring-life-to-a-standstill-45204>)

These can disrupt satellite operations by depositing electrical charge within the on-board electronics, triggering phantom commands or overloading and damaging sensitive components. The effects of space weather on the

Earth's upper atmosphere disrupts radio signals transmitted by navigation satellites, potentially introducing positioning errors or, in more severe cases, rendering them unusable.

These are not theoretical hazards: in recent decades, solar storms have caused outages for a number of satellites services – and a handful of satellites have been lost altogether. These were costly events – satellite operator losses have run into hundreds of millions of dollars. The wider social and economic impact was relatively limited, but even so it's unclear how our growing amount of space infrastructure would fare against the more extreme space weather that we might face.

When Space Weather Becomes A Hurricane

The largest solar storm on record was the Carrington event in September 1859, named after the British astronomer who observed it. Of course there were no Victorian satellites to suffer the consequences, but the telegraph systems of the time were crippled as electrical currents induced in the copper wires interfered with signals, electrocuted operators and set telegraph paper alight. The geomagnetic storm it triggered was so intense that the northern lights, usually a polar phenomenon, were observed as far south as the Bahamas.

Statistical analysis of this and other severe solar storms suggests that we can expect an event of this magnitude once every few hundred years – it's a question of "when" rather than "if". A 2007 study estimated a Carrington event today would cause US\$30 billion in losses for satellite operators and threaten vital infrastructure in space and here on the ground. It's a risk taken sufficiently seriously that it appears on the UK National Risk Register and has led the government to draw up

No space war—interdependence checks AND commercial entanglement reduces the risk.

Bragg et al 18 [Principle research scientist at NSI, Inc. Lecturer in polisci @ Texas A&M, July 2018. Allison Astorino-Courtois. Robert Elder. Belinda Bragg. "Contested Space Operations, Space Defense, Deterrence, and Warfighting: Summary Findings and Integration Report," NSI, <https://nsiteam.com/social/wp-content/uploads/2018/11/Space-SMA-Integration-Report-Space-FINAL.pdf>] brett

Everyone needs space While the US may be relatively more dependent on space for national security than are other states, it is far from alone in relying on space. Nuclear armed states are dependent on space for important command and control functions, and major powers are increasingly using space for battlefield situational awareness and communications. China and Russia were identified as having significant (and fairly equal) levels of strategic risk in space (VITTA Q16), although their regional security priorities and (to date) less spacedependent economies place them at an advantage to the US. They may, therefore, see the strategic risk of conflict in space as lower than does the US. Still, space capabilities remain a source of economic expansion and national pride for both, and their calculations of the cost of conflict involving space may include consideration of these factors. Even now, there is a general consensus that the US and other actors have more to gain from space than they have from the loss of space-based capabilities (VITTA Q3). This suggests that, although the US is more vulnerable in the space domain than are other states, the likelihood that aggressive action against an adversary's space assets would be reciprocated may provide a degree of security. It also creates another incentive for actors to use diplomacy and international law to reduce risk and increase transparency in the space domain.

No one's going to war over a downed satellite

Bowen 18 [Bleddyn Bowen, Lecturer in International Relations at the University of Leicester. The Art of Space Deterrence. February 20, 2018. <https://www.europeanleadershipnetwork.org/commentary/the-art-of-space-deterrence/>]

Space is often an afterthought or a miscellaneous ancillary in the grand strategic views of top-level decision-makers. A president may not care that one satellite may be lost or go dark; it may cause panic and Twitter-based hysteria for the space community, of course. But the terrestrial context and consequences, as well as the political stakes and symbolism of any exchange of hostilities in space matters more. The political and media dimension can magnify or minimise the perceived consequences of losing specific satellites out of all proportion to their actual strategic effect.

Won't go nuclear – seen as a normal conventional attack because of integration with ground forces

Firth 7/1/19 [News Editor at MIT Technology Review, was Chief News Editor at New Scientist. How to fight a war in space (and get away with it). July 1, 2019. MIT Technology Review]

Space is so intrinsic to how advanced militaries fight on the ground that an attack on a satellite need no longer signal the opening shot in a nuclear apocalypse. As a result, “deterrence in space is less certain than it was during the Cold War,” says Todd Harrison, who heads the Aerospace Security Project at CSIS, a think tank in Washington, DC. Non-state actors, as well as more minor powers like North Korea and Iran, are also gaining access to weapons that can bloody the noses of much larger nations in space.

AT: Asteroids

1] Cross Ap the Space Col DA, is we undergo space col, that solves asteroids thats Oberg 99

2] No decreased international coop- privatization makes government programs more efficient- frees up resources

Privatization is key to space exploration and maximizing public sector efficiency.

Answers the Krekonian Link, Private sector is necessary to help NASA focus on observation, already happens in the squo

Houser 17 [(Kristen, staff writer at Freethink, where she covers science and tech. Her written work has appeared in Business Insider, NBC News and Futurism), “Private Companies, Not Governments, Are Shaping the Future of Space Exploration,” June 12, 2017,

<https://futurism.com/private-companies-not-governments-are-shaping-the-future-of-space-exploration>]
TDI

Private Companies, Not Governments, Are Shaping the Future of Space Exploration The power is in our hands. / Off World/ Blue Origin/ NASA/ Space Race 2.0 SpaceX / Flickr Image by SpaceX / Flickr SPACE RACE 2.0 Sixty years ago, the Soviet Union launched the first artificial satellite into orbit. The event served as the starting pistol in what would come to be known as the Space Race, a competition between the U.S.S.R. and the United States for spaceflight supremacy. In the decades that followed, the first human reached space, a man walked on the Moon, and the first space stations were built. The U.S.S.R. and the U.S. were soon joined by other world powers in exploring the final frontier, and by the time the Soviet Union was dissolved in 1991, the contentious Space Race was something of a distant memory. The World's Top Space Agencies [INFOGRAPHIC] Click to View Full

Infographic In recent years, however, a new Space Race has taken shape—Space Race 2.0. Rather than powerful nations guided by presidents and premiers, however, the competitors in this race are tech startups and private businesses spearheaded by billionaire entrepreneurs. And while the current atmosphere is far less contentious than that of the first Space Race (save the odd tweet or two), the competition is just as fierce. A CROWDED FIELD SpaceX, Blue Origin, Bigelow Aerospace, Virgin Galactic, Boeing,

Lockheed Martin... Not only has the number of private companies engaged in space exploration grown remarkably in recent years, these companies are quickly besting their government-sponsored competitors. ADVERTISEMENT “We’re starting to see advances made by private entities that are more significant than any advances in the last three years that were made by the government,” Chris Lewicki, CEO and President of Planetary Resources, tells Futurism. Amazon CEO Jeff Bezos’s Blue Origin and Tesla CEO Elon Musk’s SpaceX are arguably the two companies that are setting the pace. In November 2015, the former completed the first successful vertical rocket landing after sending their New Shepard 100 kilometers (62 miles) into the air. SpaceX landed its own rocket a month later, only they did so with a craft twice as heavy as Blue Origin’s and traveled all the way into space first. A month after that, in January 2016, Bezos’s company became the first entity to re-launch and re-land a previously used rocket. SpaceX followed suit in 2017. “The government was never able to [build reusable rockets], but now, two private companies within the space of the same year have done that,” points out Lewicki. Not only are private companies already surpassing their government counterparts, several are poised to widen their lead in the coming months and years. ADVERTISEMENT If all goes according to plan, when SpaceX’s Falcon Heavy launches in September, it’ll take the title of the world’s most powerful rocket away from NASA’s Saturn V. Virgin Galactic is already selling tickets for what it expects to be the first private spaceflights, which will take place aboard the sleek VSS Unity. SpaceX plans to send space tourists to the Moon in 2018, and then in 2024, the company hopes to launch a system that will take people all the way to Mars...roughly 5-15 years before NASA expects to do the same. ALL ON THE SAME TEAM Private companies may be in the lead, but the finish line for this Space Race isn’t exactly clear. The first iteration was arguably “won” when Neil Armstrong took his first steps on the Moon, so does this sequel end when we establish the first Moon base? When a human walks on Mars? When we leave the solar system? Truthfully, the likelihood of humanity ever calling it a day on space exploration is slim to none. The universe is huge, with galaxy estimates in the trillions, so the goalpost will continue moving back (to bring another sport into the analogy). Rather than focusing on competing in what is ultimately an unwinnable race, private and government-backed space agencies can actually benefit from collaboration thanks to their inherent differences. “The way that SpaceX, Planetary Resources, or Virgin Galactic approaches space exploration is going to be very different from NASA or the Air Force,” explains Lewicki. Private companies aren’t beholden to the same slow processes that often stall government projects, and they can secure or reallocate funding much more swiftly if need be. However, unlike agencies like NASA, they do have shareholders to keep happy and a need to constantly pursue profitability. ADVERTISEMENT The two sectors, therefore, have a tremendous opportunity to help one another. Private companies can generate revenue through government contracts—for example, NASA has contracted Boeing to transport astronauts to the International Space Station (ISS), and SpaceX just closed a deal with the U.S. Air Force to launch its secretive space drone. This leaves the government agencies free to pursue the kind of forward-thinking, longer-term research that might not immediately generate revenue, but that can be later streamlined and improved upon in the private sector. Ultimately, Space Race 2.0 has no losers. The breakthroughs happening in space exploration benefit us all, and truly, a little friendly competition never hurt anyone (unless you count the egos bruised by those tweets).

Newest research from NASA proves any threat is at least a thousand years away

Mack 19 (Eric, “NASA says city-smashing asteroids aren't so common,” 6-27,
<https://www.cnet.com/news/nasa-says-city-smashing-asteroids-arent-so-common/>)

Asteroids are all around us, but we shouldn't be losing sleep over the big buggers. A small space rock was spotted just before slamming into the atmosphere last weekend, and over 20,000 near-earth asteroids have been cataloged, but new research from NASA finds impacts that could do serious damage aren't very frequent. Perhaps the last time an asteroid large enough to inflict serious hurt on a limited part of the Earth's surface

(we're not talking about an extinction-level space rock like the one that ended the dinosaurs) came knocking was in 1908. In June of that year, the so-called Tunguska Event impacted an unpopulated part of Siberia and was witnessed by only a handful of people, but it flattened 500,000 acres of forest, scorched the Earth and knocked people out of their chairs 40 miles away (64 km). It's easy and terrifying to imagine what the result might have been had chance dictated the impact occurred over a major metropolitan area instead. "Tunguska is the largest cosmic impact witnessed by modern humans," David Morrison, a planetary science researcher at NASA's Ames Research Center in Silicon Valley, said in a release. "It also is characteristic of the sort of impact we are likely to have to protect against in the future." But when researchers revisited the Tunguska Event with the help of computer models and took into account the latest data on the population of asteroids in our neighborhood, they found that such major impacts are exceedingly rare. The results, published in the journal *Icarus*, find that such a powerful impact should only be expected roughly every thousand years or longer rather than once every century or so, as was previously thought. While this is certainly good news for all earthly life forms, the threat of an asteroid impact is still very real and worth preparing for, as the 2013 bolide explosion over Russia reminded us. "A lot of uncertainty remains about how large asteroids break up in the atmosphere and how much damage they could cause on the ground," said NASA researcher and co-author Lorian Wheeler. "However, recent advancements in computational models, along with analyses of the Chelyabinsk and other meteor events, are helping to improve our understanding of these factors so that we can better evaluate potential asteroid threats in the future."

They are not likely or avoidable enough to justify allowing other existential risks

Kent 4 [Department of Applied Mathematics and Theoretical Physics, Centre for Mathematical Sciences, University of Cambridge. A Critical Look at Risk Assessments for Global Catastrophes. 2004. https://onlinelibrary.wiley.com/doi/full/10.1111/j.0272-4332.2004.00419.x?casa_token=7YtWdAgcOtEA AAAA%3ALsFF220rqWTeap5nJ2SLRIOFEsQkxvr1NCR5JVPEuMyrF6EbaYs7wxArpuxejPYs2D_sKqC6f8PSr7c]

Large asteroid impact seems to be the greatest known natural extinction risk that can be reasonably well estimated. The risk of the Earth being hit by an asteroid of diameter 10 km is estimated to be 10⁻⁸ per year.⁽¹⁷⁾ Such an impact would be so devastating that it is generally thought very likely that it would cause mass extinctions of species, and very plausible that we would be among the species extinguished. Accepting that last hypothesis, perhaps at the price of another order of magnitude, gives an estimate of 10⁻⁸–10⁻⁹ per year for this natural extinction risk. Following the argument of dominant risk leads to the so-called asteroid test, according to which an artificial extinction risk is acceptable if smaller than ≈10⁻⁹ per year, or in the more conservative version, very small compared to 10⁻⁹ per year.¹⁰ My impression from discussions is that many thoughtful people find some version of the argument of dominant risk reasonable, but that many equally thoughtful people find this line of argument entirely irrational. My sympathies are with the latter. Why should the existence of one risk, which may be distressingly high, justify taking another easily avoidable risk, which, even if much lower, may still be unacceptably high? Unavoidable natural risks are not normally believed to justify wilfully inflicting avoidable risks on third parties. Everyone now living is very likely to die within the next 120 years and would be very likely to die of natural causes in that timespan even if exposed to no other risks. An industry that added slightly to the natural risk level, annually killing 10,000 people who had made no choice to accept the

extra risk, would not find much sympathy for the defense that these extra deaths were more or less lost in the noise compared to natural wastage.

AT: UV

No 1AR Theory cross-ap their own warrant my opponent can check abuses in cx

1AR theory is fundamentally unfair and makes it impossible to win since they will make new responses on the c/i which I don't get to respond to.

They say no RVI either which makes it impossible to check neg abuse since there's no implication in my only response