### 1

#### TEXT: The Outer Space Treaty ought to be amended to establish an international legal trust system governing outer space.

#### CP solves aff –

#### Completely bans militarization of outer space, so it resolves Russia-China militarization.

#### Facilitates international cooperation that decreases the risk of conflict

#### Don’t let them claim circumvention – if the aff can get China to unilaterally self-sabotage, then the neg can fiat compliance with a counterplan that limits their power

Finoa 21 [Ivan Finoa (Department of Law University of Turin), “Building a New Legal Model for Settlements on Mars,” A. Froehlich (ed.), Assessing a Mars Agreement Including Human Settlements, Studies in Space Policy 30, 2021. <https://doi.org/10.1007/978-3-030-65013-1_7>]CT

7.5 A Proposal for an International Legal Trust System

Since several legal and policy issues may arise from the actual legal framework, a new international legal regime for outer space shall: (a) Provide for property rights or a lease allocation system, both incentivising investments in the space sector. The system would be supervised and led by the United Nations (UN) through the United Nations Office for Outer Space Affairs (UNOOSA). (b) Establish the rule of law in outer space. A laissez faire system could turn into anarchy whereby countries and companies could race to grab as many resources as possible bringing considerable potential conflict. (c) Recognise outer space as common heritage of mankind, instead of res communis.24 (d) Provide a sustainable exploitation of celestial bodies, to avoid the uncontrolled production of space debris or to prevent the complete exhaustion of the celestial bodies’ masses or their natural orbits.25 The United Nations should manage the ordered and sustainable economic development in outer space for the present and future generations. (e) Prevent the militarisation of outer space and favours the international collaboration, which are the same aims of the Outer Space Treaty’ drafters. (f) Consider the weak points of the Moon Agreement which led to nations’ refusal to sign. Only a widely accepted agreement would have the power of law in the international context.

The abovementioned requirements could be met by establishing an international Legal Trust System (ILTS). A trust is an arrangement that assigns assets to one or more trustees that will manage them in the interest of one or more beneficiaries. The latter may include the trustee or the settlor.26 Translated in the ILTS, mankind would assume the role of settlor and beneficiary of the outer space resources. The UNOOSA would act as main trustee of outer space resources and trading property rights and leases to companies and countries. The rights over the celestial bodies or over its resources would depend on the nature of the celestial body itself. For example, property rights are preferable to a lease over asteroids, as they could just disappear after the exploitation. Both leases and property rights can be provided over lands and mining sites on Mars. Leases or defeasible titles are preferable for some land mass on those celestial bodies which could hypothetically be used by humankind pending an Earth disaster. In the case of lucrative activities, such as mining, companies will choose whether to get the exclusive use over the resource through payment of the lease or through annual payment linked to net proceeds or to production charges.

7.6 The Functioning of the International Legal Trust System

When a company is interested in leasing or buying an outer space resource, before starting any operations, it must send a plan of work to the United Nations. The plan of work shall include all the details of the activity that would be carried out; it shall be consistent with pre-established parameters of sustainability and shall not interfere with other space activities. If the UN approves the company plan of work, the country of the company assumes the role of co-trustee for the specific resource. Thus, as a cotrustee, countries must investigate whether all activities of their national companies are consistent with the plan of work authorised by the UN. These supervisory duties would be added to the responsibility of nations for all space objects that are launched within their territory.27 The UN, as main trustee, would oversee that countries are performing their duties. This model would be the ordinary one. There would be also an extraordinary model, in which the UN would be the only trustee. This model would be possible in two instances: when the country of the applicant for a private company is not technologically able to act as a trustee or when the applicant of the activity is a country itself. Furthermore, as stated previously, the beneficiaries of this trust are the countries of the world and their citizens; hence all mankind would take concrete profit from lease transactions and benefit sharing.

The income from the sales, leases and benefit sharing can be distributed to mankind by financing international global goals, following a similar model of the 17 Sustainable Development Goals adopted by the United Nations in 2015, which addressed poverty, inequality, climate change, environmental degradation, and peace and justice. Finally, the International Legal Trust System would meet acceptance because every country would obtain benefit sharing to improve its living standard and space faring nations would rely on property rights.

### 2

#### The People’s Republic of China should ban the appropriation of outer space by private entities except for asteroid mining.

#### Chinese private companies are essential for asteroid mining. Cohen 21:

Ariel Cohen, 21 - ("China’s Space Mining Industry Is Prepping For Launch – But What About The US?," Forbes, 10-26-2021, https://www.forbes.com/sites/arielcohen/2021/10/26/chinas-space-mining-industry-is-prepping-for-launch--but-what-about-the-us/?sh=6d03b9072ae0)//marlborough-wr/

In April of this year, China’s Shenzen [Origin Space](https://www.washingtontimes.com/news/2020/oct/1/china-determined-to-dominate-future-mining-with-or/) Technology Co. Ltd. [launched the NEO-1](https://origin.space/#/detail?id=27), the first commercial spacecraft dedicated to the mining of space resources – from asteroids to the lunar surface. Falling costs of space launches and spacecraft technology alongside existing infrastructure provides a unique opportunity to explore extraterrestrial resource extraction. Current technologies are equipped to analyze and categorize asteroids within our solar system with a limited degree of certainty. One of the accompanying payloads to the NEO-1 was the Yuanwang-1, or “little hubble” satellite, which searches the stars for possible asteroid mining targets. The NEO-1 launch marks another milestone in private satellite development, adding a new player to space based companies which include Japan’s [Astroscale](https://astroscale.com/space-debris_/). Private asteroid identification via the Sentinel Space Telescope was [supported by NASA until 2015](https://b612foundation.org/b612-official-statement-nasa-following-canceled-space-agreement-act/). As private investment in space grows, the end goal is to be capable of harvesting resources to bring to Earth. According to Shenzen [Origin Space](https://www.washingtontimes.com/news/2020/oct/1/china-determined-to-dominate-future-mining-with-or/) Technology company website: “Through the development and launch of the spacecraft, Origin Space is able to carry out low-Earth orbit space junk cleanup and prototype technology verification for space resource acquisition, and at the same time demonstrate future asteroid defense related technologies.” In the end, it will come down to progressively lowering the cost of launched unit of weight and booster rocket reliability – before fundamentally new engines may drive the launch costs even further down. The April launch demonstrates that China is already succeeding while the West is spinning its wheels. The much touted Planetary Resources and Deep Space Industries (DSI) [DSI](https://www.forbes.com/investment-funds/dsi/) [-1.6%](https://www.forbes.com/investment-funds/dsi/) were [supposed to be](https://www.technologyreview.com/2019/06/26/134510/asteroid-mining-bubble-burst-history/) the vanguard of extra-terrestrial resource acquisition with major backers including Google’s [GOOG](https://www.forbes.com/companies/google) [-2.6%](https://www.forbes.com/companies/google) Larry Page. But both have since been acquired, the former by block chain company [ConsenSys](https://consensys.net/) and the latter by [Bradford Space](https://www.bradford-space.com/), neither of which are prioritizing asteroid mining.

#### Asteroid mining can happen with private sector innovation and is key to solve a laundry list of impacts--climate change, economic decline and asteroid collisions. Taylor 19

Chris Taylor [journalist], 19 - ("How asteroid mining will save the Earth — and mint trillionaires," Mashable, 2019, accessed 12-13-2021, https://mashable.com/feature/asteroid-mining-space-economy)//ML

How much, exactly? We’re only just beginning to guess. [Asterank](http://www.asterank.com/" \t "_blank), a service that keeps track of some 6,000 asteroids in NASA’s database, prices out the estimated mineral content in each one in the current world market. More than 500 are listed as “>$100 trillion.” The estimated profit on just the top 10 asteroids judged “most cost effective” — that is, the easiest to reach and to mine, subtracting rocket fuel and other operating costs, is around $1.5 trillion.¶ Is it ours for the taking? Well, here’s the thing — we’re taking it already, and have been doing so since we started mining metals thousands of years ago. Asteroid strikes are the only reason rare metals exist in the Earth’s crust; the native ones were all sucked into our planet’s merciless iron core millions of years ago. Why not go to the source?¶ As a side project, space mining can grab water from the rocks and comets — water which, with a little processing makes rocket fuel. Which in turn makes even more currently unimaginable space operations possible, including ones that could give the planet all the energy it needs to avert climate catastrophe. Cislunar space — the bit around us and the moon, the local neighborhood, basically — is about to get very interesting.¶ It’s hard, even for the most asteroid-minded visionaries, to truly believe the full scope of this future space economy right now. Just as hard as it would have been in 1945, when an engineer named Vannevar Bush first proposed [a vast library of shared knowledge that people the world over would access via personal computers](https://en.wikipedia.org/wiki/Memex), to see that mushroom into a global network of streaming movies and grandmas posting photos and trolls and spies who move the needle on presidential elections. ¶ No technology’s pioneer can predict its second-order effects.¶ The space vision thing is particularly difficult in 2019. Not only do we have plenty of urgent problems with democracy and justice to keep us occupied, but the only two companies on the planet to have gone public with asteroid-mining business plans, startups that seemed to be going strong and had launched satellites already, were just bought by larger companies that are, shall we say, less comfortable executing on long-term visions.¶ Planetary Resources was founded in 2012 in a blaze of publicity. Its funding came from, among others, Larry Page, Eric Schmidt, Ross Perot, and the country of Luxembourg. It had inked an orbital launch deal with Virgin Galactic. And it was sold last October to a blockchain software company. (To 21st century readers, this paragraph would look like I’m playing tech world mad libs.)¶ In January, the other company, Deep Space Industries, also partly funded by Luxembourg (way to get in the space race, Luxembourg!), was sold to Bradford Space, owned by a U.S. investment group called the American Industrial Acquisition Corporation. Maybe these new overlords plan on continuing their acquisitions' asteroid mining endeavors rather than stripping the companies for parts. Both companies have been notably silent on the subject. “The asteroid mining bubble has burst,” [declared The Space Review](http://www.thespacereview.com/article/3633/1), one of the few online publications to even pay attention.¶ That’s also to be expected. After all, anyone trying to build Google in 1945 would go bankrupt. Just as the internet needed a half-dozen major leaps forward in computing before it could even exist, space industry needs its launch infrastructure.¶ Currently, the world’s richest person and its most well-known entrepreneur, Jeff Bezos and Elon Musk, respectively, are working on the relatively cheap reusable rockets asteroid pioneers will need. (As I was writing this, Bezos announced in an email blast that one of his New Shepherd rockets had flown to space and back five times like it was nothing, delivering 38 payloads for various customers while remaining entirely intact.) ¶ Meanwhile, quietly, Earth’s scientists are laying the groundwork of research the space economy needs. Japan’s Hayabusa 2 spacecraft has been in orbit around asteroid Ryugu for the last year and a half, learning everything it can. (Ryugu, worth $30 billion according to Asterank, is the website's #1 most cost-effective target.) The craft dropped [tiny hopping robot rovers](https://www.space.com/41941-hayabusa2-asteroid-rovers-hopping-tech.html) and a [small bomb](https://www.space.com/japan-hayabusa2-asteroid-bomb-video.html) on its target; pictures of the small crater that resulted were released afterwards.¶ Officially, the mission is to help us figure out how the solar system formed. Unofficially, it will help us understand whether all those useful metals clump together at the heart of an asteroid, as some theorize. If so, it’s game on for asteroid prospectors. If not, we can still get at the metals with other techniques, such as optical mining (which basically involves sticking an asteroid in a bag and drilling with sunlight; sounds nuts to us, but [NASA has proved it in the lab](https://www.nasa.gov/directorates/spacetech/niac/2017_Phase_I_Phase_II/Sustainable_Human_Exploration/)). It’ll just take more time.¶ Effectively, we’ve just made our first mark at the base of the first space mineshaft. And there’s more to come in 2020 when Hayabusa 2 returns to Earth bearing samples. If its buckets of sand contain a modicum of gold dust, tiny chunks of platinum or pebbles of compressed carbon — aka diamonds — then the Duchy of Luxembourg won’t be the only deep-pocketed investor to sit up and take notice.¶ The possibility of private missions to asteroids, with or without a human crew, is almost here. The next step in the process that takes us from here to where you are? Tell us an inspiring story about it, one that makes people believe, and start to imagine themselves mining in space. How would you explain the world-changing nature of the internet to 1945? How would you persuade them that there was gold to be mined in Vannevar Bush’s idea? You’d let the new economy and its benefits play out in the form of a novel.¶ As Hayabusa dropped a bomb on Ryugu, Daniel Suarez was making the exact same asteroid the target of his fiction. Suarez is a tech consultant and developer turned New York Times bestselling author. His novels thus far have been techno-thrillers: his debut, [Daemon](https://www.amazon.com/dp/B003QP4NPE/ref=dp-kindle-redirect?_encoding=UTF8&btkr=1), a novel of Silicon Valley’s worst nightmare, AI run rampant, made more than a million dollars.¶ So it was a telling shift in cultural mood that Suarez’s latest thriller is also a very in-depth description of — and thinly-disguised advocacy for — asteroid mining. In [Delta-v](https://www.amazon.com/Delta-v-Daniel-Suarez-ebook/dp/B07FLX8V84/ref=sr_1_1?crid=UMNUUSR3NCBX&keywords=delta-v&qid=1556930756&s=digital-text&sprefix=delta-v%2Cdigital-text%2C204&sr=1-1), published in April, a billionaire in the 2030s named Nathan Joyce recruits a team of adventurers who know nothing about space — a world-renowned cave-diver, a world-renowned mountaineer — for the first crewed asteroid mission.¶ Elon Musk fans might expect this to be Joyce’s tale, but he soon fades into the background. The asteroid-nauts are the true heroes of Delta-v. Not only are they offered a massive payday — $6 million each for four years’ work — they also have agency in key decisions in the distant enterprise. Suarez deliberately based them on present-day heroes. The mission is essential, Joyce declares, to save Earth from its major problems. First of all, the fictional billionaire wheels in a fictional Nobel economist to demonstrate the actual truth that the entire global economy is sitting on a [mountain of debt](https://www.washingtonpost.com/opinions/the-247-trillion-global-debt-bomb/2018/07/15/64c5bbaa-86c2-11e8-8f6c-46cb43e3f306_story.html?noredirect=on&utm_term=.5fb3ff1155d9). It has to keep growing or it will implode, so we might as well take the majority of the industrial growth off-world where it can’t do any more harm to the biosphere.¶ Secondly, there’s the climate change fix. Suarez sees asteroid mining as the only way we’re going to build [solar power satellites](https://en.wikipedia.org/wiki/Space-based_solar_power). Which, as you probably know, is a form of uninterrupted solar power collection that is theoretically more effective, inch for inch, than any solar panels on Earth at high noon, but operating 24/7. (In space, basically, it’s always double high noon). ¶ The power collected is beamed back to large receptors on Earth with large, low-power microwaves, which researchers think will be harmless enough to let humans and animals pass through the beam. A space solar power array like [the one China is said to be working on](https://www.forbes.com/sites/scottsnowden/2019/03/12/solar-power-stations-in-space-could-supply-the-world-with-limitless-energy/#2d3f78a54386) could reliably supply 2,000 gigawatts — or over 1,000 times more power than the largest solar farm currently in existence. ¶ “We're looking at a 20-year window to completely replace human civilization's power infrastructure,” Suarez told me, citing the report of the Intergovernmental Panel on Climate Change on the coming catastrophe. Solar satellite technology “has existed since the 1970s. What we were missing is millions of tons of construction materials in orbit. Asteroid mining can place it there.

”¶ The Earth-centric early 21st century can’t really wrap its brain around this, but the idea is not to bring all that building material and precious metals down into our gravity well. Far better to create a whole new commodities exchange in space. You mine the useful stuff of asteroids both near to Earth and far, thousands of them taking less energy to reach than the moon. That’s something else we’re still grasping, how relatively easy it is to ship stuff in zero-G environments. ¶ Robot craft can move 10-meter boulders like they’re nothing. You bring it all back to sell to companies that will refine and synthesize it in orbit for a myriad of purposes. Big pharma, to take one controversial industry, would [benefit by taking its manufacturing off-world](https://medium.com/fitch-blog/why-is-big-pharma-interested-in-the-space-economy-c078ac1bf67c). The molecular structure of many chemicals grows better in microgravity.¶ The expectation is that a lot of these space businesses — and all the orbital infrastructure designed to support them — will be automated, controlled remotely via telepresence, and monitored by AI. But Suarez is adamant that thousands if not millions of actual human workers will thrive in the space economy, even as robots take their jobs in old industries back on Earth.¶ “Our initial expansion into space will most likely be unsettled and experimental. Human beings excel in such environments,” he says. “Humans can improvise and figure things out as we go. Robots must be purpose-built, and it's going to take time and experience for us to design and build them.”¶ Which is another way startups back on Earth will get rich in the new economy: designing and building those robots, the nearest thing to selling picks and shovels to prospectors in the space gold rush. Thousands of humans in space at any one time will also require the design and construction of stations that spin to create artificial gravity. Again, this isn’t a great stretch: Using centrifugal force to simulate gravity in space was first proposed by scientists in the 19th century. NASA has had workable designs for spinning cislunar habitats called [O’Neill cylinders](https://en.wikipedia.org/wiki/O%27Neill_cylinder) since the 1970s. We just haven’t funded them. ¶ But the trillionaires clearly will.¶ In short, Suarez has carefully laid out a vision of the orbital economy that offers something for everyone in our divided society. For Green New Deal Millennials, there’s the prospect of removing our reliance on fossil fuels at a stroke and literally lifting dirty industries off the face of the planet. For libertarians and other rugged individualists, there’s a whole new frontier to be developed, largely beyond the reach of government. ¶ For those who worry about asteroids that could wipe out civilization — though luckily, [this isn't likely to happen any time soon](https://mashable.com/article/armageddon-asteroid-threat) — here is a way for humanity to get proficient in moving them out of the way, fast. Indeed, the National Space Society has offered [a proposal](https://space.nss.org/technologies-for-asteroid-capture-into-earth-orbit/) to capture the asteroid Aphosis (which is set to miss Earth in the year 2029, but [not by a very comfortable margin](https://www.space.com/asteroid-apophis-2029-flyby-planetary-defense.html)), keep it in orbit, and turn it into 150 small solar-power satellites, as a proof of concept. ¶ For the woke folks who care about the bloody history of diamond production, there’s the likelihood that space mining would wipe out Earth’s entire diamond industry. “They will be found in quantities unattainable on Earth,” claims Suarez, with good reason. We are starting to discover that there is more crystalized carbon in the cosmos than we ever suspected. Astronomers have identified one [distant planet made entirely of diamond](https://www.nationalgeographic.com/science/phenomena/2014/06/24/diamond-the-size-of-earth/); there may be more, but they are, ironically, hard to see. ¶ We don’t have diamond planets in our solar system (and we can’t do interstellar missions), but we do have diamond-studded asteroids. Mine them for long enough and you will wear diamonds on the soles of your shoes.¶ For investors and entrepreneurs, there is the thrill of racing to be the first member of the four-comma club. ([Neil deGrasse Tyson believes that the first trillionaire will be an asteroid mining mogul](https://www.nbcnews.com/science/space/neil-degrasse-tyson-says-space-ventures-will-spawn-first-trillionaire-n352271); Suarez isn’t sure whether they’ll be the first, but he suspects that asteroid mining “will mint more trillionaires than any industry in history.”) ¶ For the regular guy or gal with a 401K, there’ll be a fast-rising stock market — inflated not by financial shenanigans this time, but an actual increase in what the world counts as wealth.¶ For workers, there is the promise of sharing in the untold riches, both legally and otherwise. It would be hard to stop miners attaining mineral wealth beyond their paycheck, under the table, when your bosses are millions of miles away. Then there’s the likelihood of rapid advancement in this new economy, where the miners fast gain the knowledge necessary to become moguls.¶ “After several tours in space working for others, perhaps on six-month or year-long contracts, it's likely that some workers will partner to set up their own businesses there,” says Suarez. “Either serving the needs of increasing numbers of workers and businesses in space, marketing services to Earth, or launching asteroid mining startups themselves.” All in all, it’s starting to sound a damn sight more beneficial to the human race than the internet economy is. Not a moment too soon. I’ve written encouragingly about asteroid mining several times before, each time touting the massive potential wealth that seems likely to be made. And each time there’s been a sense of disquiet among my readers, a sense that we’re taking our rapacious capitalist ways and exploiting space.¶ Whereas the truth is, this is exactly the version of capitalism humanity has needed all along: the kind where there is no ecosystem to destroy, no marginalized group to make miserable. A safe, dead space where capitalism’s most enthusiastic pioneers can go nuts to their hearts’ content, so long as they clean up their space junk. ¶ ([Space junk](https://mashable.com/category/space-junk) is a real problem in orbital space because it has thousands of vulnerable satellites clustered closely together around our little blue rock. The vast emptiness of cislunar space, not so much.)¶ And because they’re up there making all the wealth on their commodities market, we down here on Earth can certainly afford to focus less on growing our stock market. Maybe even, whisper it low, we can afford a fully functioning social safety net, plus free healthcare and free education for everyone on the planet.¶ It’s also clearly the area where we should have focused space exploration all along. If we settle on Mars, we may disturb as-yet-undiscovered native bacteria — and as the character Nathan Joyce shouts at a group of “Mars-obsessed” entrepreneurs in Delta-V, Mars is basically filled with toxic sand and is thus looking increasingly impossible to colonize. (Sorry, Mark Watney from The Martian, those potatoes would probably kill you.)

#### Warming causes extinction.

Bill McKibben 19, Schumann Distinguished Scholar at Middlebury College; fellow of the American Academy of Arts and Sciences; holds honorary degrees from 18 colleges and universities; Foreign Policy named him to their inaugural list of the world’s 100 most important global thinkers. "This Is How Human Extinction Could Play Out." Rolling Stone. 4-9-2019. https://www.rollingstone.com/politics/politics-features/bill-mckibben-falter-climate-change-817310/

Oh, it could get very bad. In 2015, a study in the Journal of Mathematical Biology pointed out that if the world’s oceans kept warming, by 2100 they might become hot enough to “stop oxygen production by phyto-plankton by disrupting the process of photosynthesis.” Given that two-thirds of the Earth’s oxygen comes from phytoplankton, that would “likely result in the mass mortality of animals and humans.” A year later, above the Arctic Circle, in Siberia, a heat wave thawed a reindeer carcass that had been trapped in the permafrost. The exposed body released anthrax into nearby water and soil, infecting two thousand reindeer grazing nearby, and they in turn infected some humans; a twelve-year-old boy died. As it turns out, permafrost is a “very good preserver of microbes and viruses, because it is cold, there is no oxygen, and it is dark” — scientists have managed to revive an eight-million-year-old bacterium they found beneath the surface of a glacier. Researchers believe there are fragments of the Spanish flu virus, smallpox, and bubonic plague buried in Siberia and Alaska. Or consider this: as ice sheets melt, they take weight off land, and that can trigger earthquakes — seismic activity is already increasing in Greenland and Alaska. Meanwhile, the added weight of the new seawater starts to bend the Earth’s crust. “That will give you a massive increase in volcanic activity. It’ll activate faults to create earthquakes, submarine landslides, tsunamis, the whole lot,” explained the director of University College London’s Hazard Centre. Such a landslide happened in Scandinavia about eight thousand years ago, as the last Ice Age retreated and a Kentucky-size section of Norway’s continental shelf gave way, “plummeting down to the abyssal plain and creating a series of titanic waves that roared forth with a vengeance,” wiping all signs of life from coastal Norway to Greenland and “drowning the Wales-sized landmass that once connected Britain to the Netherlands, Denmark, and Germany.” When the waves hit the Shetlands, they were sixty-five feet high. There’s even this: if we keep raising carbon dioxide levels, we may not be able to think straight anymore. At a thousand parts per million (which is within the realm of possibility for 2100), human cognitive ability falls 21 percent. “The largest effects were seen for Crisis Response, Information Usage, and Strategy,” a Harvard study reported, which is too bad, as those skills are what we seem to need most. I could, in other words, do my best to scare you silly. I’m not opposed on principle — changing something as fundamental as the composition of the atmosphere, and hence the heat balance of the planet, is certain to trigger all manner of horror, and we shouldn’t shy away from it. The dramatic uncertainty that lies ahead may be the most frightening development of all; the physical world is going from backdrop to foreground. (It’s like the contrast between politics in the old days, when you could forget about Washington for weeks at a time, and politics in the Trump era, when the president is always jumping out from behind a tree to yell at you.) But let’s try to occupy ourselves with the most likely scenarios, because they are more than disturbing enough. Long before we get to tidal waves or smallpox, long before we choke to death or stop thinking clearly, we will need to concentrate on the most mundane and basic facts: everyone needs to eat every day, and an awful lot of us live near the ocean. FOOD SUPPLY first. We’ve had an amazing run since the end of World War II, with crop yields growing fast enough to keep ahead of a fast-rising population. It’s come at great human cost — displaced peasant farmers fill many of the planet’s vast slums — but in terms of sheer volume, the Green Revolution’s fertilizers, pesticides, and machinery managed to push output sharply upward. That climb, however, now seems to be running into the brute facts of heat and drought. There are studies to demonstrate the dire effects of warming on coffee, cacao, chickpeas, and champagne, but it is cereals that we really need to worry about, given that they supply most of the planet’s calories: corn, wheat, and rice all evolved as crops in the climate of the last ten thousand years, and though plant breeders can change them, there are limits to those changes. You can move a person from Hanoi to Edmonton, and she might decide to open a Vietnamese restaurant. But if you move a rice plant, it will die. A 2017 study in Australia, home to some of the world’s highest-tech farming, found that “wheat productivity has flatlined as a direct result of climate change.” After tripling between 1900 and 1990, wheat yields had stagnated since, as temperatures increased a degree and rainfall declined by nearly a third. “The chance of that just being variable climate without the underlying factor [of climate change] is less than one in a hundred billion,” the researchers said, and it meant that despite all the expensive new technology farmers kept introducing, “they have succeeded only in standing still, not in moving forward.” Assuming the same trends continued, yields would actually start to decline inside of two decades, they reported. In June 2018, researchers found that a two-degree Celsius rise in temperature — which, recall, is what the Paris accords are now aiming for — could cut U.S. corn yields by 18 percent. A four-degree increase — which is where our current trajectory will take us — would cut the crop almost in half. The United States is the world’s largest producer of corn, which in turn is the planet’s most widely grown crop. Corn is vulnerable because even a week of high temperatures at the key moment can keep it from fertilizing. (“You only get one chance to pollinate a quadrillion kernels of corn,” the head of a commodity consulting firm explained.) But even the hardiest crops are susceptible. Sorghum, for instance, which is a staple for half a billion humans, is particularly hardy in dry conditions because it has big, fibrous roots that reach far down into the earth. Even it has limits, though, and they are being reached. Thirty years of data from the American Midwest show that heat waves affect the “vapor pressure deficit,” the difference between the water vapor in the sorghum leaf’s interior and that in the surrounding air. Hotter weather means the sorghum releases more moisture into the atmosphere. Warm the planet’s temperature by two degrees Celsius — which is, again, now the world’s goal — and sorghum yields drop 17 percent. Warm it five degrees Celsius (nine degrees Fahrenheit), and yields drop almost 60 percent. It’s hard to imagine a topic duller than sorghum yields. It’s the precise opposite of clickbait. But people have to eat; in the human game, the single most important question is probably “What’s for dinner?” And when the answer is “Not much,” things deteriorate fast. In 2010 a severe heat wave hit Russia, and it wrecked the grain harvest, which led the Kremlin to ban exports. The global price of wheat spiked, and that helped trigger the Arab Spring — Egypt at the time was the largest wheat importer on the planet. That experience set academics and insurers to work gaming out what the next food shock might look like. In 2017 one team imagined a vigorous El Niño, with the attendant floods and droughts — for a season, in their scenario, corn and soy yields declined by 10 percent, and wheat and rice by 7 percent. The result was chaos: “quadrupled commodity prices, civil unrest, significant negative humanitarian consequences . . . Food riots break out in urban areas across the Middle East, North Africa, and Latin America. The euro weakens and the main European stock markets lose ten percent.” At about the same time, a team of British researchers released a study demonstrating that even if you can grow plenty of food, the transportation system that distributes it runs through just fourteen major choke-points, and those are vulnerable to — you guessed it — massive disruption from climate change. For instance, U.S. rivers and canals carry a third of the world’s corn and soy, and they’ve been frequently shut down or crimped by flooding and drought in recent years. Brazil accounts for 17 percent of the world’s grain exports, but heavy rainfall in 2017 stranded three thousand trucks. “It’s the glide path to a perfect storm,” said one of the report’s authors. Five weeks after that, another report raised an even deeper question. What if you can figure out how to grow plenty of food, and you can figure out how to guarantee its distribution, but the food itself has lost much of its value? The paper, in the journal Environmental Research, said that rising carbon dioxide levels, by speeding plant growth, seem to have reduced the amount of protein in basic staple crops, a finding so startling that, for many years, agronomists had overlooked hints that it was happening. But it seems to be true: when researchers grow grain at the carbon dioxide levels we expect for later this century, they find that minerals such as calcium and iron drop by 8 percent, and protein by about the same amount. In the developing world, where people rely on plants for their protein, that means huge reductions in nutrition: India alone could lose 5 percent of the protein in its total diet, putting 53 million people at new risk for protein deficiency. The loss of zinc, essential for maternal and infant health, could endanger 138 million people around the world. In 2018, rice researchers found “significantly less protein” when they grew eighteen varieties of rice in high–carbon dioxide test plots. “The idea that food became less nutritious was a surprise,” said one researcher. “It’s not intuitive. But I think we should continue to expect surprises. We are completely altering the biophysical conditions that underpin our food system.” And not just ours. People don’t depend on goldenrod, for instance, but bees do. When scientists looked at samples of goldenrod in the Smithsonian that dated back to 1842, they found that the protein content of its pollen had “declined by a third since the industrial revolution — and the change closely tracks with the rise in carbon dioxide.” Bees help crops, obviously, so that’s scary news. But in August 2018, a massive new study found something just as frightening: crop pests were thriving in the new heat. “It gets better and better for them,” said one University of Colorado researcher. Even if we hit the UN target of limiting temperature rise to two degrees Celsius, pests should cut wheat yields by 46 percent, corn by 31 percent, and rice by 19 percent. “Warmer temperatures accelerate the metabolism of insect pests like aphids and corn borers at a predictable rate,” the researchers found. “That makes them hungrier[,] and warmer temperatures also speed up their reproduction.” Even fossilized plants from fifty million years ago make the point: “Plant damage from insects correlated with rising and falling temperatures, reaching a maximum during the warmest periods.”

#### An asteroid collision would ensure extinction – would fundamentally alter the biosphere, don’t underestimate its risk. Hudson 19

Wesley Hudson ’19, news reporter for Express, “Asteroid alert: NASA warning as kilometre long space rock set to skim Earth at 25,000mph”, 8/28/19, Express, https://www.express.co.uk/news/science/1170826/asteroid-news-NASA-latest-space-rock-asteroid-1998-HL1-earth-danger-apocalypse

AN ASTEROID almost a kilometre wide is currently barreling through space at more than 25,000mph and is due to skim the earth towards the end of October. NASA’s Jet Propulsion Laboratory (JPL) claim the space rock will shoot past the earth within a “close” proximity of the planet in the early hours of October 26. The asteroid, dubbed 1998 HL1, is a so-called Near-Earth Object (NEO) flying on a Close Approach Trajectory. NASA expects the 1998 HL1 to come flying by dangerously close around 1.21am BST (17.21pm PDT). The daunting moment will mark anther journey around the sun for the asteroid since it was discovered in 1998. The asteroid will be travelling at a staggering speed of over 25,000mph as it barrels past the Earth. The JPL predict the asteroid could be between 440m and 990m wide. At its largest an asteroid of this size is bigger than the tallest building in the world, the Burj Khalifa in Dubai. Even at it’s smallest, 1998 HL1 is still bigger than The Shard. Since it was discovered, 1998 HL1 has been seen up to 408 times. An NEO is an asteroid or comet which is on an orbital path intersecting that of the Earth's. This asteroid will miss the Earth by almost four million miles. If it were to strike the Earth, an asteroid of this size would cause catastrophic damage. The extinction of the dinosaurs in the Cretaceous-Tertiary event 65million years ago is famously believed to have been caused by a massive asteroid impact. The Chicxulub Crater in Mexico is the most commonly accepted point of impact, with the responsible body thought to be around 10km in diameter. A car-sized asteroid is estimated to hit the Earth roughly once a year. The majority of asteroids on track for the planet are usually burnt up as they enter the Earth's atmosphere. NASA administrator Jim Bridenstine has previously warned a potential asteroid collision is more likely then people realise. He said: "We have to make sure that people understand that this is not about Hollywood, it's not about the movies. "This is about ultimately protecting the only planet we know, right now, to host life - and that is the planet Earth.” NASA is currently in the process of developing the Double Asteroid Redirection Test (DART). DART will test if it is possible to redirect asteroids that are threatening to impact with Earth. SpaceX chief Elon Musk had previously tweeted fears of a deadly collision that Earth was not prepared for. Mr Musk tweeted: “A big rock will hit Earth eventually & we currently have no defence.”

#### Don’t write our impacts off as low probability – asteroid collision is complex and the existence of space keyholes exponentially increases the risk of collision. Vereš ’19

Peter Vereš ’19, Harvard-Smithsonian Center for Astrophysics, “Chapter 6 Vision of Perfect Observation Capabilities”, 2019, Planetary Defense, Space and Society, https://dl1.cuni.cz/pluginfile.php/634091/mod\_resource/content/1/Planetary%20Defence.pdf

Often, uncertain orbits are a source of elevated impact risks of some NEOs with the Earth. The impact probability of an asteroid with Earth is a complex problem. First, the orbits of Earth and the asteroid should be close enough or even intersect; second, the Earth and asteroid should meet at the intersection at the same time. If these conditions are met, then one can assess how close the asteroid flies around the Earth at a given time, or whether it will hit the Earth. One must remember that each asteroid orbit comes with uncertainties and therefore, instead of a single accurate solution where the asteroid will hit the Earth or miss it, there is always a realm of possible solutions within the orbit uncertainties. The tangent plane to the asteroid’s trajectory at the time of impact, or close approach, is called a b-plane. At a given time of a predicted impact, all possible closest distances to the Earth of possible orbits create an area on the tangent plane. If the area contains the Earth, then the impact probability for that epoch is non-zero and in a simple approximation can be denoted as a ratio of an area of Earth cross section and the entire area with possible orbits going through the b-plane. It happens that a newly discovered NEO with a short arc that is coming very close to the Earth has a non-zero impact probability, because its orbit is highly uncertain and the area on the b-plane is very large. Typically, further observations improve the orbit, and the impact risk for a given epoch falls to zero. Some objects, however, have orbits with low orbital uncertainty, but still have non-zero impact probability, such as Bennu. The non-zero impact probability is computed for a given time in the future, but even if the orbit is known very well today, small perturbations from planets and non-gravitational forces increase the uncertainty for future impacts. That is why NASA’s Sentry is providing predictions only for the next 100 years. A close flyby of a spacecraft around an asteroid may improve the asteroid’s orbit significantly, however, it does not fully mitigate its impact in the future, due to the presence of keyholes (Chodas 1999)—small areas in space near Earth. Keyholes are specific for asteroids flying very close to the Earth and are rather small, from a few to hundreds of kilometers across. If the keyhole is hit during the NEO flyby, the orbit of the NEO becomes resonant with Earth and the NEO will return to Earth regularly, increasing its impact probability. Thus, in case of a very near Earth flyby, the orbit needs to be known with such precision (~km) that keyhole avoidance is confirmed. NASA has even created the NEO Deflection App,1 where the public can try to change the orbit of a hypothesized NEO on direct impact trajectory. For Earth impact monitoring, the accuracy of orbits and orbital uncertainties is crucial and deserves more attention. The future of orbit determination and uncertainty mitigation will depend more and more on sophisticated software that will be able to handle orbital computation in detail; assess uncertainties and errors of measurements; coordinate a list of objects that are crucial for follow-up or orbit improvement, or even automatically point the telescopes in a network to observe those asteroids; measure their positions; and submit the data to MPC. This automated process is more or less implanted by several surveys (CSS, LCOGT) and agencies (ESA, MPC).

### 3

#### China’s economy is on the brink – the global economy and Xi legitimacy is in danger. Duesterberg 12-20:

Thomas J. Duesterberg {senior fellow at the Hudson Institute}, 21 - ("Opinion," WSJ, 12-20-2021, https://www.wsj.com/articles/slow-meltdown-of-china-economy-evergrande-property-market-collapse-downturn-xi-cewc-11640032283)//marlborough-wr/

China is experiencing a slow-motion economic crisis that could undermine stability in the current regime and have serious negative consequences for the global economy. Despite the many warning signs, Western analysts and policy makers are optimistic that Xi Jinping is up to the task of managing the crisis. Such optimism is misplaced. The U.S. and its allies have many tools to influence China’s economy and need to weigh the consequences of an acute crisis against the threat its current trajectory poses to the U.S. Policy makers should be thinking of how best to deploy these tools, instead of passively assuming the rapid growth and stability of the Chinese economy will continue. In December real-estate developers China [Evergrande](https://www.wsj.com/market-data/quotes/EGRNF) and Kaisa joined several other overleveraged firms in bankruptcy, exposing hundreds of billions in yuan- and dollar-denominated debt to default. Real estate represents around 30% of the Chinese economy, nearly twice the levels that led to the financial crisis of 2008-09 in the U.S., Spain and England. The real-estate industry has been key to keeping annual growth above 6%. Yet a debt bubble has inflated by 20% annually [between 2014 and 2018](https://scholar.harvard.edu/rogoff/publications/peak-china-housing). Originally intended to accommodate rapid urbanization for the industrial economy, the urban property market is now overbuilt. Some 90% of urban households own their own properties and enough vacant units are available to accommodate 10 years of urban immigrants. Sales and prices have tumbled this year, and overleveraged builders and creditors are suffering the consequences. After a major change in how central and local governments divvy up tax revenue in 1994, Chinese local officials began to rely on land sales for the income needed for improving infrastructure and social welfare. At a minimum, one-third of local government revenues is derived from land sales. Another 10% to 15% come from related taxes on development. But land sales fell by more than 30% in late 2021, putting local finances in jeopardy. Local governments have struggled to address other priorities such as healthcare, pensions, environmental cleanup, income inequality and education. Moreover, up to 80% of household wealth in China is in real estate holdings, a hedge against weakness of the social safety net. In other words, an economic meltdown is a potential threat to the implicit social compact in China between authoritarian rulers and a quiescent population.

#### Robust Chinese Space Industry key to Economic rejuvenation.

Goswami 19 Namrata Goswami 2019 "What China Wants in Outer Space" <https://www.thecairoreview.com/wp-content/uploads/2019/05/cr33-global-forum.pdf> (Dr. Namrata Goswami is an independent scholar on space policy, great power politics, and ethnic conflicts. She was subject matter expert in international affairs with the Futures Laboratory, Alabama, U.S., and guest lecturer, India Today Class, Emory University. After earning her Ph.D. in international relations from Jawaharlal Nehru University, New Delhi, she worked as research fellow at the Institute for Defence Studies and Analyses, New Delhi. She has been a visiting fellow at Peace Research Institute, Oslo, Norway; La Trobe University, Melbourne, Australia; and University of Heidelberg, Germany.)//Elmer

Beijing has made it clear that its ambitions for China’s space program are an integral part of its long-term vision for national rejuvenation. In his 2017 address to the Chinese Communist Party’s nineteenth National Congress, President Xi Jinping said that the Chinese space program will play a critical role in elevating the country to a “fully developed, rich, and powerful nation” by 2049—the year the People’s Republic of China celebrates its one-hundredth anniversary. For China, investing in outer space goes beyond simply achieving prestige and reputation—as opposed to the “flags and footprints”-based moon race between the United States and the Soviet Union during the Cold War. Instead, China aims to establish a permanent space presence, which would offer long-term economic benefits. The global space economy today is worth $350 billion, but is predicted to grow to $2.7 trillion by 2040. The economic returns from future mining of space-based resources like titanium, platinum, water-ice, thorium, and iron-ore far exceed the trillion-dollar mark. Consequently, the Chinese are working to establish a base on the moon with the industrial capacity to build spacecrafts using lunar resources. This would drastically reduce the cost of interplanetary travel. A lunar base would serve the distinctive purpose of providing a testing ground for human space settlement, and building capacity for China’s long-term space ambitions. Beijing’s Lunar Dreams Following the landing of Chang’e 4 (China’s fourth lunar exploration mission) on the far side of the moon on January 3, the China National Space Administration (CNSA) announced follow-on missions to augment the state’s space capacity. By this year’s end, China will launch Chang’e 5 to bring lunar samples back to Earth, followed by Chang’e 6 (2024) to bring samples specifically from the moon’s south pole. Chang’e 7 (2030) will survey the south pole’s composition and Chang’e 8 (2035) will test key technologies like 3D printing to lay the groundwork for the construction of a research station. The moon not only strengthens China’s space-faring capacities but also has resources like iron-ore and water that can be utilized for space-based manufacturing. Meanwhile, a lunar base offers some short-term strategic dominance in cislunar space (the area between the Earth and the moon). Another of China’s major space ambitions is its investment in SpaceBased Solar Power (SBSP) to build a space solar station thirty-six thousand kilometers above Earth. Some Chinese leaders stress that dwindling fossil fuel resources on Earth will make solar energy the most important future energy source. China started construction on the world’s first SBSP experimental plant in Chongqing earlier this year. If successful, the technology would allow China to fully power its lunar base and augment space mining operations. Space mining involves developing technologies to harvest resources from asteroids and the moon—a highly lucrative prospect. For instance, a single asteroid called 2011 UW158, which passed by Earth in 2015, was estimated to contain 5 trillion dollars’ worth of platinum. While still roughly a decade off, space mining is fast becoming a reality. Countries like the United States and Luxembourg have already passed legislation enabling private companies to begin exploration and operations.

#### Diversionary conflict – it escalates.

Hassid, PhD, 19

(Jonathan, PoliSci@Berkeley, AssistProfPoliSci@IowaState, A Poor China Might Be More Dangerous Than a Rich China, in Foreign Policy Issues for America, ed. Richard Mansbach DPhil and James McCormick PhD, Routledge)

China has a number of political differences and potential conflicts with the United States, some of which are summarized in Chapter 4. From China’s vast maritime territorial claims, the anomalous status of Taiwan to America’s alliances with Japan and South Korea, its treatment of Tibetans and Islamic minorities like the Uighurs, and its reluctance to implement UN-sponsored sanctions to force North Korea to abandon nuclear weapons, there are many potential flash points in the Sino-U.S. relationship. Many analysts noted that at the 19th Party Congress Xi Jinping promoted a more aggressive and muscular foreign policy, promising that China would become a world superpower by 2050. This fact alone could presage eventual conflict with the current reigning superpower, the United States. Indeed, many in China and across Asia feel that President Trump’s pullout from the U.S.-led Trans-Pacific Partnership (TPP) have already signaled US retreat from the region, opening the way for a more assertive Chinese foreign policy. Some analysts go further, arguing that China is even now trying to build its own world order and muscle out U.S. trade influence by signing new bilateral trade agreements with historical U.S. allies like Canada. These signs may point to potential conflict in the future. However there is also reason to be hopeful; relations between the two giants were normalized in the 1970s, and thus far China and the United States have avoided serious conflict. In part this has been a result of U.S. policies in the region and because China has been able to increase its global status peacefully. But perhaps the most important reason conflict has been avoided is because Beijing has looked inwardly, concentrating on generating economic growth within its borders rather than making trouble beyond them. President Donald Trump has repeatedly argued that the United States must be more assertive in foreign affairs and in realizing its national interest regardless of the impact on others. His rhetoric has been highly combative. From vowing to declare China a “currency manipulator” on his first day in office – a claim he has since abandoned – to arguing that China has been cheating America in trade deals and denouncing the U.S. trade deficit with China, Trump has appeared to prefer confronting Beijing rather in engaging and cooperating with China. But this appearance of confrontation may belie a different reality. Many have noted that Trump and his family have personal business ties with China, including large investments and numerous pending trademark applications. Actions like Trump’s 2018 public support for state-owned Chinese tech company ZTE – coming just two days after the Chinese government announced a US $500m investment in a Trump-branded property in Indonesiaiii – further suggest to some that Beijing might be directly manipulating the US president to benefit Chinese foreign policy. Combined with the perception, common in Chinese official circles, that the United States under Trump is actually retreating from its commitments in Asia, the result might be additional areas of potential conflict with China and misperception and misunderstanding between the two. What might happen if there were an unintended Sino-American military confrontation in the South China Sea or the Sea of Japan, just as the Chinese economy slumps and triggers spreading labor unrest and disturbances at home? What might happen if Xi Jinping’s goal of having “no poverty in China by 2020” proves impossible, and China’s middle class becomes alienated from the regime and political dissent spreads owing to acute economic and/or environmental distress? Under such circumstances, China’s history suggests that Xi and other leaders might decide a “minor” foreign conflict would be a way to divert the attention of Chinese citizens from their domestic concerns. In China’s past, as we have seen, such “domestically-influenced” conflicts have been contained, but the very success of these previously limited conflicts might make Chinese leaders overconfident about their ability to avoid military escalation. Mistakes are easy to make, especially if the potential foe has a leader who tweets militant threats. If Beijing sought to distract an unhappy population by stirring up Chinese nationalism toward the United States, Taiwan, or Japan regarding maritime territorial claims, for example, and believes the Trump administration will not intervene, the two might careen toward a war that neither wants. An incident caused by a trigger-happy U.S. pilot or Chinese naval officer might escalate into a war that neither Washington nor Beijing sought. In the end, then, it may arguably better for the Trump administration that China continues to flourish economically. A prosperous China means that the United States has a valuable trading partner and – in certain issues – even a strategic partner. An impoverished China, however, might be bad news for everyone.

### 4

#### Russia and China are in a space arms race- the plan causes China to bow out and Russia wins. This independently turns case because their Bowman and Thompson + Rogin cards are not about a Russian-Sino alliance, but about an arms race between the countries. Bowman and Thompson 20:

Bradley Bowman, Jared Thompson {Bradley Bowman, the senior director of the Center on Military and Political Power at the Foundation for Defense of Democracies, and Jared Thompson, a U.S. Air Force major and visiting military analyst at the Foundation for Defense of Democracies, }, 20 - ("Russia and China Seek to Tie America’s Hands in Space," Foreign Policy, 11-12-2020, https://foreignpolicy.com/2021/03/31/russia-china-space-war-treaty-demilitarization-satellites/)//marlborough-wr/

Consider the actions of the United States’ two great-power adversaries when it comes to anti-satellite weapons. China and Russia have [sprinted](https://thedispatch.com/p/we-must-work-to-prevent-a-space-pearl) to develop and deploy both ground-based and space-based weapons targeting satellites while simultaneously pushing the United States to sign a treaty banning such weapons. To protect its vital space-based military capabilities—including communications, intelligence, and missile defense satellites—and effectively deter authoritarian aggression, Washington should avoid being drawn into suspect international treaties on space that China and Russia have no intention of honoring. The Treaty on the Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects (PPWT), which Beijing and [Moscow](https://undocs.org/en/CD/2181) have submitted at the United Nations, is a perfect example. PPWT signatories [commit](https://undocs.org/pdf?symbol=en/CD/1985) “not to place any weapons in outer space.” It also says parties to the treaty may not “resort to the threat or use of force against outer space objects” or engage in activities “inconsistent” with the purpose of the treaty. On the surface, that sounds innocuous. Who, after all, wants an arms race in space? The reality, however, is that China and Russia are already racing to field anti-satellite weapons and have been for quite some time. “The space domain is competitive, congested, and contested,” Gen. James Dickinson, the head of U.S. Space Command, [said](https://www.defense.gov/Explore/News/Article/Article/2483340/commander-lists-5-tasks-to-ensuring-continued-space-superiority/) in January. “Our competitors, most notably China and Russia, have militarized this domain.” Beijing already has an [operational ground-based anti-satellite missile capability](https://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Space_Threat_V14_020119_sm.pdf#page=3). People’s Liberation Army units are training with the missiles, and the U.S. Defense Department [believes](https://media.defense.gov/2020/Sep/01/2002488689/-1/-1/1/2020-DOD-CHINA-MILITARY-POWER-REPORT-FINAL.PDF#page=90) Beijing “probably intends to pursue additional [anti-satellite] weapons capable of destroying satellites up to geosynchronous Earth orbit.” That is where America’s most sensitive nuclear communication and missile defense satellites orbit and keep watch. Similarly, Moscow [tested](https://www.spacecom.mil/News/Article-Display/Article/2448334/russia-tests-direct-ascent-anti-satellite-missile/) a ground-based anti-satellite weapon in December that could destroy U.S. or allied satellites in orbit. That attack capability augments a ground-based laser weapon that Russian President Vladimir Putin [heralded](https://tass.com/defense/1034344) in 2018. In a moment of candor, Russia’s defense ministry admitted the system was designed to “fight satellites.” To make matters worse, both countries are also working to deploy space-based—or so-called “[on-orbit](https://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Space_Threat_V14_020119_sm.pdf#page=3)”—capabilities to attack satellites.

#### Unchecked Russian influence in space will inevitably lead to war – the asymmetric advantage given to them by the plan is key for Russian space heg. They are uniquely more aggressive than China, and the CP is the only way to limit them. Don’t let them say Russia needs China – Stent only says that Russia supports Chinese aggression, not that they’re dependent on it, which means Russia heg independently turns case. Boulègue and Unal 20:

[Mathieu Boulègue](https://www.chathamhouse.org/about-us/our-people/mathieu-boulegue), [Beyza Unal](https://www.chathamhouse.org/about-us/our-people/beyza-unal) {Unal is Deputy Director, International Security Programme, Boulègue is a Research Fellow, Russia and Eurasia Programme}, 20 - ("Russia’s Behaviour Risks Weaponizing Outer Space," Chatham House – International Affairs Think Tank, 7-27-2020, https://www.chathamhouse.org/2020/07/russias-behaviour-risks-weaponizing-outer-space)//marlborough-wr/

Russia’s use of outer space Russia is not the only state investigating anti-satellite weaponry capabilities. There is a wider trend (e.g. China, India, US) to demonstrate advanced space capabilities with nefarious, if not directly offensive, intent. But, for the past few years, Russia in particular, has been provocative in testing its space weapon capabilities. For example, in April 2020, Russia [launched and tested into low orbit](https://www.space.com/russia-anti-satellite-missile-test-2020.html) the PL-19 Nudol direct-ascent anti-satellite (DA-ASAT) interceptor missile system from the Plesetsk Cosmodrome demonstrating its space assets with potential offensive capabilities, in particular, Russia’s capacity to destroy satellites in Low Earth Orbit. In addition, the satellites, Kosmos-2535 and Kosmos-2536, launched in [July 2019](http://www.russianspaceweb.com/Cosmos-2535-2536-2537-2538.html), are also suspected to be operating beyond their official mission of studying Russian orbital assets. It is [reported that](https://breakingdefense.com/2020/05/us-should-start-space-security-talks-with-russia-china/) these satellites conducted a close proximity activity, coming within one kilometre from each other, which led to the creation of orbital debris. Russia’s space strategy By exploiting asymmetric advantages in space, Russia seeks to leverage its capabilities against competitors in space and in other domains, falling in line with its wider military strategy as well as its current [Federal Space Programme](https://www.planetary.org/blogs/guest-blogs/2016/0323-russia-space-budget.html) for 2016 to 2025. Russian space activities also have a cyber and electronic warfare angle. With the help of remote-sensing capabilities, Russian spy satellites potentially seek to disrupt military and civilian satellite communications and navigation systems. Indeed, in 2018, French authorities [publicly accused](https://www.rferl.org/a/france-accuses-russia-spying-military-communications-satellite-in-space/29478427.html) Russia of seeking to intercept communication satellites for French and Italian armed forces putting data transmission through Western civilian and military satellites at risk of interception. Furthermore, earlier this year, both Kosmos-2542 and 2543 came within 160 kilometres of a US spy satellite, US KH-11, similarly to Russia ‘[buzzing’](https://www.theguardian.com/uk-news/2020/mar/08/russian-jets-heading-to-uk-airspace-intercepted-by-raf-typhoons) around the British Isles or submarine surveillance that Norway and Sweden have been subjected to recently. [Shadowing and tailing](https://time.com/5779315/russian-spacecraft-spy-satellite-space-force/) in space is regarded as spying and this recent anti-satellite weapon test is part of a trend which demonstrates Russia’s persistent space strategy for close-proximity operations with foreign countries. Orbital hypocrisy Despite Russia’s calls for a treaty to [prevent the placement of weapons in outer space,](https://www.nti.org/learn/treaties-and-regimes/proposed-prevention-arms-race-space-paros-treaty/) there remains little international trust in Russia’s behaviour in space so far with a US-Russia Space Security Exchange meeting scheduled to [take place](https://www.state.gov/briefing-with-assistant-secretary-for-international-security-and-nonproliferation-dr-christopher-a-ford-on-the-u-s-russia-space-security-exchange/) in Vienna on 27 July to discuss outer space stability and security. This is amid a backdrop of bilateral nuclear arms control talks on the extension of the extant nuclear weapons reduction treaty, New START, which is scheduled to expire in February 2021. There is no guarantee, however, that the talks will achieve anything especially since the future of outer space requires a wider multilateral dialogue with all parties involved – including China. Anti-satellite tests (ASATs) are a particularly dangerous form of weapon. Not only do they create major vulnerabilities in a domain where so much of humanity depends on for navigation, communications and environmental monitoring, they are also primarily a target for destabilization and undermining global positioning information in times of crisis. And, perhaps most significantly, they possess the highly destructive potential to create even more space debris in Earth’s orbits that endanger the peaceful use of satellites and could do serious damage to large parts of the economies of developed and developing countries. Avoiding space warfare Space is for all but there is a risk that it is being hijacked by a few. It is time to re-assert and reinforce the rules, principles and norms of responsible state behaviour in outer space enshrined in the 1967 Outer Space Treaty and its associated international agreements. And, because the treaty specifically prohibits stationing nuclear weapons and other weapons of mass destruction in orbit or on celestial bodies, it is necessary to build on it to ban other types of weapons in space. Space has been militarized since 1957 with the launch of Soviet satellite Sputnik. But the increasing weaponization of space adds more uncertainty, and unveils more vulnerabilities, that states need to address before space warfare becomes a reality.

# CASE

#### Vote neg on presumption – there is nothing in this aff about how banning appropriation solves. Go ahead and command F appropriation in the doc because it literally only appears in the plan text. China subcontracting military tech development to private firms is nowhere close to appropriation. Post-plan, 100% of the public-private partnerships the aff is complaining about continue, and there is 0 risk of aff solvency.

#### Gorove 69:

Stephen Gorove, Interpreting Article II of the Outer Space Treaty, 37 Fordham L. Rev. 349 (1969). Available at: https://ir.lawnet.fordham.edu/flr/vol37/iss3/2

With respect to the concept of appropriation the basic question is what constitutes "appropriation," as used in the Treaty, especially in contradistinction to casual or temporary use. The term "appropriation" is used most frequently to denote the taking of property for one's own or exclusive use with a sense of permanence. Under such interpretation the establishment of a permanent settlement or the carrying out of commercial activities by nationals of a country on a celestial body may constitute national appropriation if the activities take place under the supreme authority (sovereignty) of the state. Short of this, if the state wields no exclusive authority or jurisdiction in relation to the area in question, the answer would seem to be in the negative, unless, the nationals also use their individual appropriations as cover-ups for their state's activities.5 In this connection, it should be emphasized that the word "appropriation" indicates a taking which involves something more than just a casual use. Thus a temporary occupation of a landing site or other area, just like the temporary or nonexclusive use of property, would not constitute appropriation. By the same token, any use involving consumption or taking with intention of keeping for one's own exclusive use would amount to appropriation.

#### No Sino-Russian space alliance right now, leaving Russian space program powerless, but in order to circumvent the plan, China helps Russia fill in as the US’s space leader. Proven by their Curcio card which says Russia wants to buy Chinese tech. Harding 21:

Luke Harding {Guardian foreign correspondent. His book [Shadow State](https://guardianbookshop.com/shadow-state-9781783352050.html) is published by Guardian Faber.}, 21 - ("The space race is back on – but who will win?," Guardian, 7-16-2021, https://www.theguardian.com/science/2021/jul/16/the-space-race-is-back-on-but-who-will-win)//marlborough-wr/

The biggest challenge to US space supremacy comes not from [Russia](https://www.theguardian.com/world/russia) – heir to the Soviet Union’s pioneering space programme, which launched the Sputnik satellite and got the first human into space in the form of Yuri Gagarin – but from China. In 2011 Congress prohibited US scientists from cooperating with Beijing. Its fear: scientific espionage. Taikonauts are banned from visiting the ISS, which has hosted astronauts from 19 countries over the past 20 years. The station’s future beyond 2028 is uncertain. Its operations may yet be extended in the face of increasing Chinese competition. In its annual threat assessment this April, the office of the US Director of National Intelligence (DNI) described China as a “near-peer competitor” pushing for global power. It warns: “Beijing is working to match or exceed US capabilities in space to gain the military, economic, and prestige benefits that Washington has accrued from space leadership.” The Biden administration suspects Chinese satellites are being used for non-civilian purposes. The People’s Liberation Army integrates reconnaissance and navigation data in military command and control systems, the DNI says. “Satellites are inherently dual use. It’s not like the difference between an F15 fighter jet and a 737 passenger plane,” Hilborne says. Once China completes the Tiangong space station next year, it is likely to invite foreign astronauts to take part in missions. One goal: to build new soft-power alliances. Beijing says interest from other countries is enormous. The low Earth orbit station is part of an ambitious development strategy in the heavens rather than on land – a sort of belt and rocket initiative. According to Alanna Krolikowski, an assistant professor at the Missouri University of Science and Technology, a “bifurcation” of space exploration is under way. In one emerging camp are states led by China and Russia, many of them authoritarian; in the other are democracies and “like-minded” countries aligned with the US. Russia has traditionally worked closely with the Americans, even when terrestrial relations were bad. Now it is moving closer to Beijing. In March, China and Russia [announced plans to co-build an international lunar research station](https://www.theguardian.com/science/2021/mar/10/china-and-russia-unveil-joint-plan-for-lunar-space-station). The agreement comes at a time when Vladimir Putin’s government has been increasingly isolated and subject to western sanctions. In June, Putin and his Chinese counterpart Xi Jinping renewed a friendship treaty. Moscow is cosying up to Beijing out of necessity, at a time of rising US-China bipolarity. These rival geopolitical factions are fighting over a familiar mountainous surface: the moon. In 2019 a Chinese rover landed on its far side – a first. China is now planning a mission to the moon’s south pole, to establish a robotic research station and an eventual lunar base, which would be intermittently crewed. Nasa, meanwhile, has said it intends to put a woman and a person of colour on the moon by 2024. SpaceX has been hired [to develop a lander](https://www.theguardian.com/science/2021/apr/17/nasa-spacex-moon-spacecraft-elon-musk). The return to the moon – after the last astronaut, commander Eugene Cernan, said goodbye in December 1972 – would be a staging post for the ultimate “giant leap”, Nasa says: sending astronauts to Mars. Krolikowski is sceptical that China will quickly overtake the US to become the world’s leading spacefaring country. “A lot of what China is doing is a reprisal of what the cold war space programmes did in the 1960s and 1970s,” she said. Beijing’s recent feats of exploration have as much to do with national pride as scientific discovery, she says. But there is no doubting Beijing’s desire to catch up, she adds. “The Chinese government has established, or has plans for, programmes or missions in every major area, whether it’s [Mars](https://www.theguardian.com/science/mars) missions, building mega constellations of telecommunications satellites, or exploring asteroids. There is no single area of space activity they are not involved in.” “We see a tightening of the Russia-China relationship,” Krolikowski says. “In the 1950s the Soviet Union provided a wide range of technical assistance to Beijing. Since the 1990s, however, the Russian space establishment has experienced long stretches of underfunding and stagnation. China now presents it with new opportunities.” Russia is poised to benefit from cost sharing, while China gets deep-rooted Russian technical expertise. At least, that’s the theory. “I’m sceptical this joint space project will materialise anytime soon,” says Alexander​ Gabuev, a senior fellow at the Carnegie Moscow Centre. Gabuev says both countries are “techno-nationalist”. Previous agreements to develop helicopters and wide-bodied aircraft saw nothing actually made, he says.

#### Can’t solve – regulatory forum-shopping means Chinese companies just launch rockets from another country. Proven by all of their Chinese-companies-exporting-to-Russia warrants.

Dovey 21 [Ceridwen Dovey, “Space Exploration At What Price?,” Readers Digest Asia Pacific, 5/1/21. <https://www.pressreader.com/australia/readers-digest-asia-pacific/20210501/281487869174485>] CT

Lenient supervision. In 2017, Luxembourg – already a corporate tax haven, complicit in international investor tax avoidance and evasion – followed the US’s lead and passed a space-resources law that allows companies to claim resources they extract from space as private property. Guardian journalist Atossa Araxia Abrahamian recounted a chilling comment from an American space executive: “We just want to work with a government who won’t get in the way.” Companies anywhere in the world can stake resource claims in space under this new law; their only requirement is an office in Luxembourg. This sets a murky precedent of ‘regulatory forum-shopping’, where companies choose to incorporate in states where they’ll be most leniently supervised. In 2018, a Silicon Valley start-up called Swarm Technologies illegally launched four miniature satellites known as CubeSats into space from India. They’d been refused launch permission in the US due to safety concerns over whether the satellites could be tracked once in orbit. Fined US$900,000 by the US Federal Communications Commission, the company was subsequently given permission to start communicating with its satellites, and launched more CubeSats as part of a payload on a SpaceX rocket that November. In January 2019, the company raised $25 million in venture capital.

#### Space commercialization is a strong constraint on conflict – solves space war

Wendy N. Whitman **Cobb 20**, is currently an associate professor of strategy and security studies at the US Air Force's School of Advanced Air and Space Studies, 7-21-2020, "Privatizing Peace: How Commerce Can Reduce Conflict in Space," Routledge & CRC Press, <https://www.routledge.com/Privatizing-Peace-How-Commerce-Can-Reduce-Conflict-in-Space/Cobb/p/book/9780367337834> // AAli

By the end of the twentieth century, scholars zeroed in on the democratic peace theory which attempts to explain why democracies do not go to war with other democracies and why, in some analyses, they seem to be more prone to peace in general than non-democracies. Similar to the golden arches, what is it about democracy that seems to induce such peacefulness? Academics have proposed everything from the nature of mediating institutions to the restraint of public opinion, to trade relations. While these variations will be explored further in Chapter 3, of interest here are the versions that focus explicitly on trade, commercial ties, and capitalism. Along these lines, Erik Gartzke argues, "peace ensues when states lack differences worthy of costly conflict."31 If the costs of conflict are too high, then states should be more unlikely to engage in it. To this end, economic globalization can provide the means through which costs are raised. “The integration of world markets not only facilitates commerce, but also creates new interests inimical to war. Financial interdependence ensures that damage inflicted on one economy travels through the global system, afflicting even aggressors."32 Focusing his analysis primarily on the influence of capitalism, Gartzke's findings suggest that states with markets more closely tied to the global economy are far less likely to experience a militarized dispute.

In thinking about the space environment today, there are obvious principles of capitalism at work. However, China, a major spacefaring state that has been making capitalist reforms, arguably remains far from a true capitalist country. This is especially true in their space industry which is heavily subsidized by the state and almost wholly integrated with China's military.34 Many other states continue to subsidize space activities heavily as well. A better approach through which to examine conflict in space is presented by an offshoot of the capitalist peace which is termed the commercial peace. The commercial peace thesis emphasizes the role of trade and the connections made through it to explain a lack of conflict. Han Dorussen and Hugh Ward write:

Trade is important not only because it creates an economic interest in peace but also because trade generates 'connections' between people that promote communication and understanding.... Based on these ideas, the flow of goods between countries creates a network of ties and communication links. If two countries are more embedded in this network, their relations should be more

peaceful 35

Given the interconnectedness of the global economy to space-based assets, a version of the commercial peace thesis can be used to argue that the chance of conflict in space is less than is commonly understood or recognized precisely because of the extent to which the global economy has become dependent on space-based assets.

To understand this argument, consider a scenario in which Russia, in preparation for a new assault on Eastern Europe, attacks a key US military satellite with the purpose of disrupting and disabling military communications in Europe. This action would conceivably enable the Russians to undertake their attack under more favorable conditions and prevent a quicker response from America and its allies. However, if the satellite was attacked via an ASAT that kinetically destroyed the US satellite, the debris cloud created from the attack could have disastrous consequences beyond military communications Much like the movie Gravity, the debris cloud could cause a chain reaction, hitting and ~~disabling~~ dismantling other satellites that would in turn disrupt civilian communications, business transactions, and perhaps even Russian military satellites. The economic effects of lost satellites would not be restricted to one country alone; the global economic consequences in terms of lost property (satellites), lost transactions, and financial havoc would echo throughout the world, including in Russia itself. Finally, the attack on one satellite could even ultimately endanger the ISS and its inhabitants, several of which are Russians. Destruction of the ISS would negate billions of dollars in investment from not just Russia, but other countries that have participated in it including Japan, Italy, and Canada. Therefore, an attack on a US military satellite would not just be an attack on one but an attack on all.

While the previous scenario highlights several reasons why it would not be in Russia's best interest to attack a US satellite, this book argues that the economic argument is both the strongest and the most restraining especially as space becomes more congested, competitive, contested, and commercialized. The emergence of private space companies enhances this argument. "In the commercial sector, companies need reliability and legal enforcement mechanisms if they are going to operate profitably in a shared environment."36 In order to foster the growing area of space commercialization, companies must be assured that the activities they undertake in space will be protected in some way or, at a minimum, allowed to proceed to the extent where they can reap the profit. This could be done through international organizations that would provide some sort of space traffic control, but the likelihood of a major international breakthrough on rules regarding space is unlikely in the near term. Therefore, actors must rely on the protections afforded them by an increasingly globalized economy that is ever more dependent on space-based assets.

#### No China space war – the only scenario for conflict is Earthbound – Chinese military plans prove

Cheng 17 [Dean Cheng, Senior Research Fellow, Asian Studies Center, Davis Institute for National Security and Foreign Policy Heritage. The U.S.-Japan Alliance and Deterring Gray Zone Coercion in the Maritime, Cyber, and Space Domains. Chapter 6. Space Deterrence, the U.S.-Japan Alliance, and Asian Security: A U.S. Perspective. Rand Corporation. 2017]

But while there may be clashes in space, the actual source of any Sino-American conflict will remain earthbound, most likely stemming from tensions associated with the situation in the East China Sea, the Taiwan Strait, or the South China Sea. This suggests that U.S. and allied decisionmakers (both in Asia and Europe) should be focusing on deterring aggression in general, rather than concentrating primarily on trying to forestall actions in space. Indeed, there is little evidence that Chinese military planners are contemplating a conflict limited to space. While there may be actions against space systems, Chinese writings suggest that they would either be limited in nature, as part of a signaling and coercive effort, or else would be integrated with broader terrestrial military operations.

#### Non-unique – AC Erickson and Collins assumes a world with Chinese space industry and says that China heg will decline anyways

#### No solvency –

#### Their Autry and Kwast evidence isn’t saying Chinese commercial companies are key for China heg but that American private space companies are key for US heg – the neg doesn’t change that, so the impact is non-unique

#### China’s ASATs are operated by the Strategic Support Force – proven by 1AC Chow and Kelley.

#### The SSF is a governmental entity – they’re not a private actor.

Pollpeter et Al 17 Pollpeter, Kevin L., Michael S. Chase, and Eric Heginbotham. The creation of the PLA strategic support force and its implications for Chinese Military Space Operations. RAND Corporation Santa Monica United States, 2017. (Analyst at Rand)//Elmer

This report explores the missions and organization of China's military space enterprise, focusing on the organizational structure of the People's Liberation Army (PLA) Strategic Support Force (SSF). Created on December 31, 2015, as part of a major reorganization of China's military, the SSF is charged with developing and employing most of the PLA's space capabilities. Its creation signifies a shift in the PLA's prioritization of space and an increased role for PLA space capabilities. Chinese military strategists see military space capabilities and operations as a key component of strategic deterrence, critical to enabling the PLA to fight informatized local wars and counter U.S. military intervention in the region and essential for supporting operations aimed at protecting China's emerging interests in more-distant parts of the world. The main function of the SSF's space component appears to be the launch and operation of satellites to provide the PLA with command and control, communications, computers, intelligence, surveillance, and reconnaissance capabilities. It appears that information warfare, including space warfare, long identified by PLA analysts as a critical element of future military operations, has entered a new phase of development in which an emphasis on space and information warfare, long-range precision strikes, and the requirements associated with conducting operations at greater distances from China has necessitated the establishment of a new and different type of organization.

#### This means the Aff doesn’t effect ASATs – they will say commercial Sectors produce them, but that’s irrelevant since the PLA operates them as an act of appropriation which isn’t effected by the plan because the government can just buy private companies’ ASATs.

#### Chinese Economic Decline spills-over globally.

Rogoff 18 Kennetth Rogoff 11-7-2018 "The Global Impact of a Chinese Recession" <https://www.project-syndicate.org/commentary/global-impact-of-chinese-recession-by-kenneth-rogoff-2018-11?barrier=accesspaylog> (Professor of Economics and Public Policy at Harvard University and recipient of the 2011 Deutsche Bank Prize in Financial Economics, was the chief economist of the International Monetary Fund from 2001 to 2003.)//Elmer

Most economic forecasts suggest that a recession in China will hurt everyone, but that the pain would be more regionally confined than would be the case for a deep recession in the United States. Unfortunately, that may be wishful thinking. CAMBRIDGE – When China finally has its inevitable growth recession – which will almost surely be amplified by a financial crisis, given the economy’s massive leverage – how will the rest of world be affected? With US President Donald Trump’s trade war hitting China just as growth was already slowing, this is no idle question. Typical estimates, for example those embodied in the International Monetary Fund’s assessments of country risk, suggest that an economic slowdown in China will hurt everyone. But the acute pain, according to the IMF, will be more regionally concentrated and confined than would be the case for a deep recession in the United States. Unfortunately, this might be wishful thinking. First, the effect on international capital markets could be vastly greater than Chinese capital market linkages would suggest. However jittery global investors may be about prospects for profit growth, a hit to Chinese growth would make things a lot worse. Although it is true that the US is still by far the biggest importer of final consumption goods (a large share of Chinese manufacturing imports are intermediate goods that end up being embodied in exports to the US and Europe), foreign firms nonetheless still enjoy huge profits on sales in China. Investors today are also concerned about rising interest rates, which not only put a damper on consumption and investment, but also reduce the market value of companies (particularly tech firms) whose valuations depend heavily on profit growth far in the future. A Chinese recession could again make the situation worse. I appreciate the usual Keynesian thinking that if any economy anywhere slows, this lowers world aggregate demand, and therefore puts downward pressure on global interest rates. But modern thinking is more nuanced. High Asian saving rates over the past two decades have been a significant factor in the low overall level of real (inflation-adjusted) interest rates in both the United States and Europe, thanks to the fact that underdeveloped Asian capital markets simply cannot constructively absorb the surplus savings. Former US Federal Reserve chair Ben Bernanke famously characterized this much-studied phenomenon as a key component of the “global savings glut.” Thus, instead of leading to lower global real interest rates, a Chinese slowdown that spreads across Asia could paradoxically lead to higher interest rates elsewhere – especially if a second Asian financial crisis leads to a sharp draw-down of central bank reserves. Thus, for global capital markets, a Chinese recession could easily prove to be a double whammy

. As bad as a slowdown in exports to China would be for many countries, a significant rise in global interest rates would be much worse. Eurozone leaders, particularly German Chancellor Angela Merkel, get less credit than they deserve for holding together the politically and economically fragile single currency against steep economic and political odds. But their task would have been well-nigh impossible but for the ultra-low global interest rates that have allowed politically paralyzed eurozone officials to skirt needed debt write-downs and restructurings in the periphery. When the advanced countries had their financial crisis a decade ago, emerging markets recovered relatively quickly, thanks to low debt levels and strong commodity prices. Today, however, debt levels have risen significantly, and a sharp rise in global real interest rates would almost certainly extend today’s brewing crises beyond the handful of countries (including Argentina and Turkey) that have already been hit. Nor is the US immune. For the moment, the US can finance its trillion-dollar deficits at relatively low cost. But the relatively short-term duration of its borrowing – under four years if one integrates the Treasury and Federal Reserve balance sheets – means that a rise in interest rates would soon cause debt service to crowd out needed expenditures in other areas. At the same time, Trump’s trade war also threatens to undermine the US economy’s dynamism. Its somewhat arbitrary and politically driven nature makes it at least as harmful to US growth as the regulations Trump has so proudly eliminated. Those who assumed that Trump’s stance on trade was mostly campaign bluster should be worried. The good news is that trade negotiations often seem intractable until the eleventh hour. The US and China could reach an agreement before Trump’s punitive tariffs go into effect on January 1. Such an agreement, one hopes, would reflect a maturing of China’s attitude toward intellectual property rights – akin to what occurred in the US during the late nineteenth century. (In America’s high growth years, US entrepreneurs often thought little of pilfering patented inventions from the United Kingdom.) A recession in China, amplified by a financial crisis, would constitute the third leg of the debt supercycle that began in the US in 2008 and moved to Europe in 2010. Up to this point, the Chinese authorities have done a remarkable job in postponing the inevitable slowdown. Unfortunately, when the downturn arrives, the world is likely to discover that China’s economy matters even more than most people thought.

#### Decline cascades – nuclear war

Maavak 21 – Mathew Maavak, PhD in Risk Foresight from the Universiti Teknologi Malaysia, External Researcher (PLATBIDAFO) at the Kazimieras Simonavicius University, Expert and Regular Commentator on Risk-Related Geostrategic Issues at the Russian International Affairs Council, “Horizon 2030: Will Emerging Risks Unravel Our Global Systems?”, Salus Journal – The Australian Journal for Law Enforcement, Security and Intelligence Professionals, Volume 9, Number 1, p. 2-8

Various scholars and institutions regard global social instability as the greatest threat facing this decade. The catalyst has been postulated to be a Second Great Depression which, in turn, will have profound implications for global security and national integrity. This paper, written from a broad systems perspective, illustrates how emerging risks are getting more complex and intertwined; blurring boundaries between the economic, environmental, geopolitical, societal and technological taxonomy used by the World Economic Forum for its annual global risk forecasts. Tight couplings in our global systems have also enabled risks accrued in one area to snowball into a full-blown crisis elsewhere. The COVID-19 pandemic and its socioeconomic fallouts exemplify this systemic chain-reaction. Onceinexorable forces of globalization are rupturing as the current global system can no longer be sustained due to poor governance and runaway wealth fractionation. The coronavirus pandemic is also enabling Big Tech to expropriate the levers of governments and mass communications worldwide. This paper concludes by highlighting how this development poses a dilemma for security professionals. Key Words: Global Systems, Emergence, VUCA, COVID-9, Social Instability, Big Tech, Great Reset INTRODUCTION The new decade is witnessing rising volatility across global systems. Pick any random “system” today and chart out its trajectory: Are our education systems becoming more robust and affordable? What about food security? Are our healthcare systems improving? Are our pension systems sound? Wherever one looks, there are dark clouds gathering on a global horizon marked by volatility, uncertainty, complexity and ambiguity (VUCA). But what exactly is a global system? Our planet itself is an autonomous and selfsustaining mega-system, marked by periodic cycles and elemental vagaries. Human activities within however are not system isolates as our banking, utility, farming, healthcare and retail sectors etc. are increasingly entwined. Risks accrued in one system may cascade into an unforeseen crisis within and/or without (Choo, Smith & McCusker, 2007). Scholars call this phenomenon “emergence”; one where the behaviour of intersecting systems is determined by complex and largely invisible interactions at the substratum (Goldstein, 1999; Holland, 1998). The ongoing COVID-19 pandemic is a case in point. While experts remain divided over the source and morphology of the virus, the contagion has ramified into a global health crisis and supply chain nightmare. It is also tilting the geopolitical balance. China is the largest exporter of intermediate products, and had generated nearly 20% of global imports in 2015 alone (Cousin, 2020). The pharmaceutical sector is particularly vulnerable. Nearly “85% of medicines in the U.S. strategic national stockpile” sources components from China (Owens, 2020). An initial run on respiratory masks has now been eclipsed by rowdy queues at supermarkets and the bankruptcy of small businesses. The entire global population – save for major pockets such as Sweden, Belarus, Taiwan and Japan – have been subjected to cyclical lockdowns and quarantines. Never before in history have humans faced such a systemic, borderless calamity. COVID-19 represents a classic emergent crisis that necessitates real-time response and adaptivity in a real-time world, particularly since the global Just-in-Time (JIT) production and delivery system serves as both an enabler and vector for transboundary risks. From a systems thinking perspective, emerging risk management should therefore address a whole spectrum of activity across the economic, environmental, geopolitical, societal and technological (EEGST) taxonomy. Every emerging threat can be slotted into this taxonomy – a reason why it is used by the World Economic Forum (WEF) for its annual global risk exercises (Maavak, 2019a). As traditional forces of globalization unravel, security professionals should take cognizance of emerging threats through a systems thinking approach. METHODOLOGY An EEGST sectional breakdown was adopted to illustrate a sampling of extreme risks facing the world for the 2020-2030 decade. The transcendental quality of emerging risks, as outlined on Figure 1, below, was primarily informed by the following pillars of systems thinking (Rickards, 2020): • Diminishing diversity (or increasing homogeneity) of actors in the global system (Boli & Thomas, 1997; Meyer, 2000; Young et al, 2006); • Interconnections in the global system (Homer-Dixon et al, 2015; Lee & Preston, 2012); • Interactions of actors, events and components in the global system (Buldyrev et al, 2010; Bashan et al, 2013; Homer-Dixon et al, 2015); and • Adaptive qualities in particular systems (Bodin & Norberg, 2005; Scheffer et al, 2012) Since scholastic material on this topic remains somewhat inchoate, this paper buttresses many of its contentions through secondary (i.e. news/institutional) sources. ECONOMY According to Professor Stanislaw Drozdz (2018) of the Polish Academy of Sciences, “a global financial crash of a previously unprecedented scale is highly probable” by the mid- 2020s. This will lead to a trickle-down meltdown, impacting all areas of human activity. The economist John Mauldin (2018) similarly warns that the “2020s might be the worst decade in US history” and may lead to a Second Great Depression. Other forecasts are equally alarming. According to the International Institute of Finance, global debt may have surpassed $255 trillion by 2020 (IIF, 2019). Yet another study revealed that global debts and liabilities amounted to a staggering $2.5 quadrillion (Ausman, 2018). The reader should note that these figures were tabulated before the COVID-19 outbreak. The IMF singles out widening income inequality as the trigger for the next Great Depression (Georgieva, 2020). The wealthiest 1% now own more than twice as much wealth as 6.9 billion people (Coffey et al, 2020) and this chasm is widening with each passing month. COVID-19 had, in fact, boosted global billionaire wealth to an unprecedented $10.2 trillion by July 2020 (UBS-PWC, 2020). Global GDP, worth $88 trillion in 2019, may have contracted by 5.2% in 2020 (World Bank, 2020). As the Greek historian Plutarch warned in the 1st century AD: “An imbalance between rich and poor is the oldest and most fatal ailment of all republics” (Mauldin, 2014). The stability of a society, as Aristotle argued even earlier, depends on a robust middle element or middle class. At the rate the global middle class is facing catastrophic debt and unemployment levels, widespread social disaffection may morph into outright anarchy (Maavak, 2012; DCDC, 2007). Economic stressors, in transcendent VUCA fashion, may also induce radical geopolitical realignments. Bullions now carry more weight than NATO’s security guarantees in Eastern Europe. After Poland repatriated 100 tons of gold from the Bank of England in 2019, Slovakia, Serbia and Hungary quickly followed suit. According to former Slovak Premier Robert Fico, this erosion in regional trust was based on historical precedents – in particular the 1938 Munich Agreement which ceded Czechoslovakia’s Sudetenland to Nazi Germany. As Fico reiterated (Dudik & Tomek, 2019): “You can hardly trust even the closest allies after the Munich Agreement… I guarantee that if something happens, we won’t see a single gram of this (offshore-held) gold. Let’s do it (repatriation) as quickly as possible.” (Parenthesis added by author). President Aleksandar Vucic of Serbia (a non-NATO nation) justified his central bank’s gold-repatriation program by hinting at economic headwinds ahead: “We see in which direction the crisis in the world is moving” (Dudik & Tomek, 2019). Indeed, with two global Titanics – the United States and China – set on a collision course with a quadrillions-denominated iceberg in the middle, and a viral outbreak on its tip, the seismic ripples will be felt far, wide and for a considerable period. A reality check is nonetheless needed here: Can additional bullions realistically circumvallate the economies of 80 million plus peoples in these Eastern European nations, worth a collective $1.8 trillion by purchasing power parity? Gold however is a potent psychological symbol as it represents national sovereignty and economic reassurance in a potentially hyperinflationary world. The portents are clear: The current global economic system will be weakened by rising nationalism and autarkic demands. Much uncertainty remains ahead. Mauldin (2018) proposes the introduction of Old Testament-style debt jubilees to facilitate gradual national recoveries. The World Economic Forum, on the other hand, has long proposed a “Great Reset” by 2030; a socialist utopia where “you’ll own nothing and you’ll be happy” (WEF, 2016). In the final analysis, COVID-19 is not the root cause of the current global economic turmoil; it is merely an accelerant to a burning house of cards that was left smouldering since the 2008 Great Recession (Maavak, 2020a). We also see how the four main pillars of systems thinking (diversity, interconnectivity, interactivity and “adaptivity”) form the mise en scene in a VUCA decade. ENVIRONMENTAL What happens to the environment when our economies implode? Think of a debt-laden workforce at sensitive nuclear and chemical plants, along with a concomitant surge in industrial accidents? Economic stressors, workforce demoralization and rampant profiteering – rather than manmade climate change – arguably pose the biggest threats to the environment. In a WEF report, Buehler et al (2017) made the following pre-COVID-19 observation: The ILO estimates that the annual cost to the global economy from accidents and work-related diseases alone is a staggering $3 trillion. Moreover, a recent report suggests the world’s 3.2 billion workers are increasingly unwell, with the vast majority facing significant economic insecurity: 77% work in part-time, temporary, “vulnerable” or unpaid jobs. Shouldn’t this phenomenon be better categorized as a societal or economic risk rather than an environmental one? In line with the systems thinking approach, however, global risks can no longer be boxed into a taxonomical silo. Frazzled workforces may precipitate another Bhopal (1984), Chernobyl (1986), Deepwater Horizon (2010) or Flint water crisis (2014). These disasters were notably not the result of manmade climate change. Neither was the Fukushima nuclear disaster (2011) nor the Indian Ocean tsunami (2004). Indeed, the combustion of a long-overlooked cargo of 2,750 tonnes of ammonium nitrate had nearly levelled the city of Beirut, Lebanon, on Aug 4 2020. The explosion left 204 dead; 7,500 injured; US$15 billion in property damages; and an estimated 300,000 people homeless (Urbina, 2020). The environmental costs have yet to be adequately tabulated. Environmental disasters are more attributable to Black Swan events, systems breakdowns and corporate greed rather than to mundane human activity. Our JIT world aggravates the cascading potential of risks (Korowicz, 2012). Production and delivery delays, caused by the COVID-19 outbreak, will eventually require industrial overcompensation. This will further stress senior executives, workers, machines and a variety of computerized systems. The trickle-down effects will likely include substandard products, contaminated food and a general lowering in health and safety standards (Maavak, 2019a). Unpaid or demoralized sanitation workers may also resort to indiscriminate waste dumping. Many cities across the United States (and elsewhere in the world) are no longer recycling wastes due to prohibitive costs in the global corona-economy (Liacko, 2021). Even in good times, strict protocols on waste disposals were routinely ignored. While Sweden championed the global climate change narrative, its clothing flagship H&M was busy covering up toxic effluences disgorged by vendors along the Citarum River in Java, Indonesia. As a result, countless children among 14 million Indonesians straddling the “world’s most polluted river” began to suffer from dermatitis, intestinal problems, developmental disorders, renal failure, chronic bronchitis and cancer (DW, 2020). It is also in cauldrons like the Citarum River where pathogens may mutate with emergent ramifications. On an equally alarming note, depressed economic conditions have traditionally provided a waste disposal boon for organized crime elements. Throughout 1980s, the Calabriabased ‘Ndrangheta mafia – in collusion with governments in Europe and North America – began to dump radioactive wastes along the coast of Somalia. Reeling from pollution and revenue loss, Somali fisherman eventually resorted to mass piracy (Knaup, 2008). The coast of Somalia is now a maritime hotspot, and exemplifies an entwined form of economic-environmental-geopolitical-societal emergence. In a VUCA world, indiscriminate waste dumping can unexpectedly morph into a Black Hawk Down incident. The laws of unintended consequences are governed by actors, interconnections, interactions and adaptations in a system under study – as outlined in the methodology section. Environmentally-devastating industrial sabotages – whether by disgruntled workers, industrial competitors, ideological maniacs or terrorist groups – cannot be discounted in a VUCA world. Immiserated societies, in stark defiance of climate change diktats, may resort to dirty coal plants and wood stoves for survival. Interlinked ecosystems, particularly water resources, may be hijacked by nationalist sentiments. The environmental fallouts of critical infrastructure (CI) breakdowns loom like a Sword of Damocles over this decade. GEOPOLITICAL The primary catalyst behind WWII was the Great Depression. Since history often repeats itself, expect familiar bogeymen to reappear in societies roiling with impoverishment and ideological clefts. Anti-Semitism – a societal risk on its own – may reach alarming proportions in the West (Reuters, 2019), possibly forcing Israel to undertake reprisal operations inside allied nations. If that happens, how will affected nations react? Will security resources be reallocated to protect certain minorities (or the Top 1%) while larger segments of society are exposed to restive forces? Balloon effects like these present a classic VUCA problematic. Contemporary geopolitical risks include a possible Iran-Israel war; US-China military confrontation over Taiwan or the South China Sea; North Korean proliferation of nuclear and missile technologies; an India-Pakistan nuclear war; an Iranian closure of the Straits of Hormuz; fundamentalist-driven implosion in the Islamic world; or a nuclear confrontation between NATO and Russia. Fears that the Jan 3 2020 assassination of Iranian Maj. Gen. Qasem Soleimani might lead to WWIII were grossly overblown. From a systems perspective, the killing of Soleimani did not fundamentally change the actor-interconnection-interaction adaptivity equation in the Middle East. Soleimani was simply a cog who got replaced.

#### Competition in space increases cooperation and decreases conflict.

Cobb 20 [Whitman, Cobb, Wendy N.. Privatizing Peace : How Commerce Can Reduce Conflict in Space, Taylor & Francis Group, 2020. ProQuest Ebook Central, <http://ebookcentral.proquest.com/lib/marlboroughschool-ebooks/detail.action?docID=6228909>.] CT

The value of competition

As noted in the first chapter, a subsidiary argument offered here is that, even if a space race should break out, military or civilian in nature, competition is not necessarily a bad thing. Much of the technological development noted previously that arose from space investment came at the height of the space race as both the US and the USSR were pouring billions of dollars into a race to the moon. The race itself had a civilian face with a military undertone, but its benefits were on the whole, positive. No overt military conflict arose, there was a significant investment in research, development, and technology, and the two space powers realized that they needed some sort of international framework to preserve their ability to operate in space. Both of these elements continue to be present today.

First, the increased threat of conflict in space could, coming as it does with an increased number of public and private actors and a greater economic threat, impress upon space participants the need to reign in dangerous actions and rhetoric. While it took an atmospheric nuclear test on the part of the Soviets to encourage both the US and USSR to come to the table in the 1960s, increasing awareness of economic and military dependence and the consequences arising from conflict in space could increase the enthusiasm to pursue new international agreements. For its part, the US military increasingly recognizes the dangers and the need to mitigate them, however, mitigation efforts have largely concentrated on offensive rather than defensive capabilities. 59 A focus on offensive weapons can only aggravate the situation and there are still significant technological hurdles in developing on-orbit offensive weapons. As such, a move away from such rhetoric, like Johnson-Freese argues for, is necessary.

Competition can also increase technological capabilities and those technological capabilities can in turn enable cooperation. 60 China is a case in point. In the 1990s and early 2000s when they were beginning to restart a human spaceflight program, Chinese officials often stated their desire to work with other powers in space, particularly the United States. China did in fact forge ties with other countries via space, in particular Brazil. However, as Chinese spaceflight technology advanced, the rhetoric of cooperation was pulled back some over a desire to enter into a partnership on equal footing. Once the Chinese could establish their abilities in space, they would be able to cooperate with potential partners as an equal, rather than junior, partner. 61

As more countries develop space technologies, the ability to help one another out also increases. The Agreement on the Rescue of Astronauts obligates signatories to “take all possible steps to rescue and assist astronauts in distress and promptly return them to the launching state.” 62 More states with the ability to conduct crewed operations in space will only facilitate this type of help and cooperation. While fictional, this is just the type of scenario that played out in the book (and later movie) The Martian . When a supply rocket blows up on launch, NASA turns to China for a replacement that enables a Mars crew to return to Mars to rescue a stranded astronaut. These types of cooperative activities can in turn foster greater cooperation in areas other than space and science. In fact, one of the causal mechanisms through which the economic peace is hypothesized to act is via increased connections between people and private actors which can foster communication and mutual trust. 63 Similarly, sociological liberalism embraces the importance of links among people to create more peaceful global relations. 64 As greater cooperation emerges in space, it can spill over into other areas of interstate relations.

To return to the discussion of space as a global commons, the increased competition and potentially increased cooperation could lead to the type of situation that Ostrom finds powerful in fostering collective action. Increased ties, diplomatically and/or economically, can reduce the costs of engaging in collective action. Historically, space itself has been used to monitor and verify international agreements, thereby lowering the information costs for participants. The openness of space and the vulnerability of space infrastructure makes it an arena that is easily monitored; it takes a fairly low level of technology to track satellites in their orbits. States can provide the means through which private actors are coordinated and norms enforced. Private actors, given their increasing role in the commercial and military aspects of space can also be empowered and lend considerable weight to the discussions. Thus, while the commercial space peace theory presented here may seem rather pessimistic about the possibility of cooperation among states, it can also be seen as an optimistic vision where increased economic ties between space and among actors, state and non-state alike, bring countries to the negotiating table and create the conditions needed to ensure collective action.

The remainder of this book will take up various aspects related to this argument. The next chapter examines military and geopolitical considerations in space conflict while Chapter 6 discusses the various actors involved. Chapter 6, in particular, focuses on the new non-state actors that are driving significant change in earth’s relationship to space. Finally, Chapter 7 looks at the possibility of space races in the future given this new space environment with its proliferation of players. It ends with several policy suggestions that could be pursued to reduce the level of tension among space powers and create a scenario that recognizes both the dangers and promises of space.