# Solar Flares DA

#### Space superstorms are inevitable in the immediate future – solar maximum makes the risk uniquely high

Kettley 19 [Sebastian Kettley, science reporter citing Dr Kaku, a theoretical physicist at the City College of New York. “Space weather WARNING: 'All hell will break loose' when solar flare CRIPPLES Earth.” January 25, 2019. https://www.express.co.uk/news/science/1077603/Space-weather-warning-solar-flare-hit-earth-michio-kaku-sunspot]

Major solar flares triggered by a solar maximum in [space](https://www.express.co.uk/latest/space) will wreak havoc on Earth and it is only a “matter of time”. Dr Kaku, a theoretical physicist and book author at the City College of New York, has warned modern technology is defenceless against such reckless power. Solar flares are highly-charged streams of gaseous energy particles violently ejected from the Sun out into the solar system. When solar flares strike the atmosphere, they create beautiful displays of light near the North and South Poles, known as aurora. But solar flares also have the power to wipe out communications satellites, disable electronic devices and cause aeroplanes to malfunction. At their worst, solar flares can blow out power stations, disable GPS navigation and ground emergency services. Speaking live on Coast to Coast AM Radio, Dr Kaku said solar flares on this scale are rare – they only strike once every 100 to 200 years. But the last known solar flare this powerful struck 150 years ago, suggesting the planet could be due another solar attack soon. Dr Kaku said: “These are rare events, maybe once in 100 years or once in 200 years, but is it is inevitable.” And once the solar flare does strike, the effects will be much more devastating than the aftermath of Hurricane Katrina. In 1859, a major solar flare struck the planet, lighting up the night skies from the North Pole all the way down to Cuba. The flare was caused by a so-called Coronal Mass Ejection (CME) from the surface of the Sun and has caused one of the largest geomagnetic storms on record. Dr Kaku said: “It’s a matter of time, you know, we’ve had a big one 150 years ago in 1859. We’ve had a huge solar flare that hit the Earth. One of these days one of these solar flares is going to hit the Earth Dr Michio Kaku, Theoretical physicist “Back then they only had telegraph poles but even they got shorted out and you could read the newspaper in Cuba at night by the light of the Northern Lights, the Aurora Borealis, as far south as Cuba. “From that, we physicists can recalculate how big that solar flare of 1859 must have been. “If we were hit by another one like that, it would fry our satellites, communications would go down instantly, power plants would be shorted out, and in the worst case – remember this a worst case scenario – we physicists believe that it could be 20-times worse than Hurricane Katrina. “So image 20 Hurricane Katrinas ravaging the Earth simultaneously and you can begin to estimate the kind of damage if there is a direct hit from one of these solar flares. “And we’re headed toward the maximum, so more flares are going off the Sun – we had a big one last month.” The solar maximum is a period of the tumultuous solar activity during an 11-year-long cycle. During a solar maximum, the highest number of sunspots appears and the amount of energy radiating from the star has been known to change the weather on Earth. According to Dr Kaku, the solar maximum is the most likely window of opportunity for a major solar flare to hit the Earth. He said: “So far we’ve dodged the bullet, so far we’ve been able to miss these sale flares, but these solar flares are like bullets and sunspots are like rifles. “Think of rifles shooting bullets into outer space and missing Earth. “Of course outer space is quite big but one of these days one of these solar flares is going to hit the Earth like what happened in 1858 and all hell can break loose.”

#### Private sector key to early warnings.

USGPO 19’ – Chairwoman Kendra Horn, “SPACE WEATHER: ADVANCING RESEARCH, MONITORING, AND FORECASTING CAPABILITIES”, U.S Government Publishing Office, October 23rd, 2019, [https://www.govinfo.gov/content/pkg/CHRG-116hhrg38122/html/CHRG-116hhrg38122.htm] Accessed 12/14/21

Our Nation's infrastructure is not all that is threatened by space weather events. I proudly represent the Johnson Space Center, the home to NASA's Astronaut Corps. These are the astronauts who currently work on the International Space Station (ISS) more than 200 miles above the Earth's surface and will one day serve on missions to the Moon and Mars. While we have developed techniques and technology to reduce the threats posed by increased radiation exposure due to a severe solar event, we have more work to do to mitigate these hazards to our astronauts. As the Ranking Member of the Space and Aeronautics Subcommittee, I've supported efforts to spur the commercialization of low-Earth orbit by private sector companies. These new entrants into the space economy have a vested interest in protecting their assets. However, they also offer an opportunity to provide data and resources to our Federal agencies as we seek to improve our space weather efforts. As this Committee potentially considers legislation relating to space weather monitoring and research, we must be certain that whatever legislation that we mark up is not a top-down legislative mandate and ensures a role for the commercial sector. The Weather Research and Forecasting Innovation Act, which was passed by this Committee and signed into law 2 years ago, serves as a template for how we could accomplish this. The Weather Act took steps to integrate commercial weather data into NOAA's forecast models, and a similar model should guide us when developing space weather legislation. NOAA is also advancing our research to operations processes. This includes a new program, the Earth Prediction Innovation Center or EPIC. EPIC will use partnerships with academia, the private sector, and relevant agencies to test and validate new capabilities and transition these capabilities from research to operations, thereby improving our existing forecast and warning capabilities. NOAA is also exploring with NASA the potential for a space weather testbed to further accelerate the transfer of research to operations and operations to research. Strong public-private partnerships are essential to maintain and approve the observing networks, conduct research, create forecast models, and supply the services necessary to support our national security and our economic prosperity…NOAA is committed to working toward the growth of the private sector as our national infrastructure and technological base becomes more sensitive to the impacts of space weather, thus demanding more improved space weather services. NOAA will continue to explore partnerships with the commercial and academic community as we work to maintain and improve our operational capabilities. In closing, NOAA appreciates the ongoing support we have received from Congress for our critically important space weather program. We will continue to work with other Federal agencies, the private sector in this effort to develop and strengthen our activities in space weather research and forecasting, and I look forward to answering your questions.

#### Severe space weather is a great filter event that sparks resource wars, economic collapse, grid failure, pandemics, and nuclear miscalc

Loper 19 [Dr. Robert D. Loper, Ph.D. from the Air Force Institute of Technology, Assistant Professor of Space Physics, Spring 2019. “Carrington-class Events as a Great Filter for Electronic Civilizations in the Drake Equation.” Publications of the Astronomical Society of the Pacific. https://iopscience.iop.org/article/10.1088/1538-3873/ab028e/meta]

Eastwood et al. (2017), the National Academy of Sciences (2008), and the Royal Academy of Engineering (2013) outline the potential economic impacts of severe space weather. In particular, major direct impacts from a Carrington-class CME could be outlined as including the following. 1. Power grid failure due to destruction of large transformers by geomagnetically induced currents. The large transformers in question here generally cost about $1 million per unit and require about 18 months to manufacture, ship, and install. The National Academy of Sciences (2008) report estimates such a power grid failure would cost $1–2 trillion per year6 and last four to ten years. 2. Outages or failures of LEO (low Earth orbit) space assets due to enhancement of the inner Van Allen belt. A severe solar storm can also cause ionospheric uplift which can dramatically increase satellite drag (Tsurutani et al. 2012). Additionally, LEO spacecraft operation could be disrupted by solar energetic protons (SEPs) generated in the shock of the CME passage through the solar wind (Royal Academy of Engineering 2013). 3. Outages or failures of GEO (geosynchronous equatorial orbit) space assets due to enhancement of the outer Van Allen belt or due to SEPs generated in the shock of the CME passage (Royal Academy of Engineering 2013). 4. GPS outages due to GEO spacecraft outages or failures, or GPS degradation due to ionospheric uplift and enhancement, potentially lasting several days or longer. 5. Communications outages due to high-frequency and ultrahigh-frequency radio blackouts, as well as cellular communication network and internet collapse due to extended power outages beyond the limits of generators and stored fuel. In particular, although optical ﬁber cables are the foundation of much of the global communication network, electrical power is still needed to power optical repeaters and transmitters (Royal Academy of Engineering 2013). 6. Increased radiation doses to astronauts and airline passengers (Royal Academy of Engineering 2013). This is more of a risk for long-haul airline ﬂights or manned spaceﬂight. Major indirect effects could include, but are by no means limited to, the following: 1. water and waste water shortages due to reduced or eliminated pumping from power grid failure; 2. fuel shortages due to reduced or eliminated pumping from power grid failure, which could result in transportation stoppages; 3. food shortages due to transportation stoppages, which could contribute to increased death rates and incite rioting and/or looting; 4. reduced hospital care due to water shortages and power outages, which could contribute to increased death rates and rates of infection; and 5. a years-long power grid and internet degradation or outage might irrevocably damage the global economy, in turn greatly prolonging the time to restore the power grid beyond the estimate of four to ten years. If one recalls major disasters caused by terrestrial weather events like hurricanes Katrina (New Orleans, 2005) and Maria (Puerto Rico, 2017), one can imagine the sorts of major effects on people and life in those areas. The most striking difference is that, whereas humanitarian aid came to bear on these disasters, a Carrington-class event would be a global catastrophe with little or no aid forthcoming. Much greater loss of life could result, and our civilization could be driven back to a much more fractured and pre-electronic one. For the purposes of another planet’s Drake equation, our civilization would be eliminated from the calculation. Conversely, another planet whose electronic civilization were struck by a Carrington-class CME would be eliminated from our calculation. Riley (2012) estimates the probability of another Carringtonclass event occuring within the following decade at about 12%. This estimate preceded the solar storm of 2012, but a good rule of thumb would be to estimate this to be the probability of having a Carrington event during any given solar cycle. Love (2012) and Kataoka (2013) have calculated probabilities in rough agreement, but there are a wide range of probabilities in the literature, ranging from once per 60 years (Tsubouchi & Omura 2007) to once per 500 years (Yermolaev et al. 2018). This work will retain the result of Riley (2012), which is also used in National Academy of Sciences (2008) and Royal Academy of Engineering (2013). This roughly agrees with the “once in a century” designation usually given to the Carrington event. Royal Academy of Engineering (2013) indicates that this designator is not well understood given the relative lack of data, but also that there are several tens of Carrington-class CMEs every century that either miss Earth or have lesser impact due to a northward orientation of the interplanetary magnetic ﬁeld. As shown in Figure 1, such a CME has a very wide angular extent (in the 2012 July event, the CME extended in about a 135° arc from the Sun), which could strike Earth in three out of eight occurrences. There is also some indication that a solar storm could trigger other Great Filter events. Knipp et al. (2016) outlines a solar storm in 1967 May that nearly triggered a nuclear war, as American radar operators initially mistook a solar storm for Soviet jamming. It might also be possible that a Carrington-class event could unleash or exascerbate an infectious disease due to reduced hospital care at a critical time, resulting in a pandemic.

# China DA

#### China challenging US dominance in space – private sector maintains the US’s preeminence

Harding 21 Harding, Luke. "The Space Race Is Back On – But Who Will Win?". The Guardian, 2021, <https://www.theguardian.com/science/2021/jul/16/the-space-race-is-back-on-but-who-will-win>. Luke Harding is a Guardian foreign correspondent. His book [Shadow State](https://guardianbookshop.com/shadow-state-9781783352050.html) is published by Guardian Faber.

Liu Boming took in the dizzy view. Around him lay the inky vastness of space. Below was the Earth. “Wow,” he said, laughing. “It’s too beautiful out here.” Over the next seven hours Liu and his colleague Tang Hongbo carried out China’s second spacewalk, helped along by a giant robotic arm. Mission accomplished, the two taikonauts – China’s astronauts – clambered back into their home for the next three months: Beijing’s new space station. The core module of the station, named Tiangong, meaning “heavenly palace”, was launched in April. “There will be more spacewalks. The station will keep growing,” Liu said. Meanwhile, on Mars, a Chinese rover was exploring. Video shows the [vehicle trundling over a rocky surface](https://www.theguardian.com/world/video/2021/jun/27/china-releases-footage-from-its-mars-rover-video). There is even sound: an eerie mechanical groaning. Since landing in May the Zhurong probe has been busy seeking clues as to whether Mars once supported life. There is no answer yet: so far it has travelled just over 410 metres. China is only the second country to land and operate a rover on the red planet, after the US. The frantic tempo of the China National [Space](https://www.theguardian.com/science/space) Administration’s (CNSA) recent programme is reminiscent of the cold war, when Moscow and Washington were superpower rivals scrambling to put the first man in space and land on the moon. Half a century on, space has opened up. It is less ideological and a lot more crowded. About 72 countries have space programmes, including India, Brazil, Japan, Canada, South Korea and the UAE. The European Space Agency is active too, while the UK boasts the most private space startups after the US. Space today is also highly commercial. On Sunday [Richard Branson](https://www.theguardian.com/business/richard-branson) flew to the edge of space and back again in his Virgin Galactic passenger rocket. On Tuesday, Branson’s fellow billionaire Jeff Bezos is due to travel in his own reusable craft, New Shepard, built by the Amazon founder’s company Blue Origin and launched from west Texas. Non-state actors play an increasingly important role in space exploration. Elon Musk’s SpaceX vehicles have made numerous flights to the International Space Station (ISS), and [since last year they have transported people as well as cargo](https://www.spacex.com/human-spaceflight/iss/index.html). Later this year Musk is due to send his own all-civilian crew into orbit – though he isn’t going himself. Even so, space still reflects tensions on Earth. “Astropolitics follows terrapolitics,” says [Mark Hilborne](https://twitter.com/space_security?lang=en), a lecturer in defence studies at King’s College London. Up there anything goes, he adds. “Space governance is a bit fuzzy. Laws are few and very old. They are not written for asteroid mining or for a time when companies dominate.” 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. The Kremlin has been a key partner in managing and resupplying the ISS. US astronauts used Russian Soyuz rockets to reach the station, taking off from a cosmodrome in Kazakhstan, after the Space Shuttle programme was phased out. But this epoch seems to be coming to an end as private companies such as [SpaceX](https://www.theguardian.com/science/spacex) take over. “I expect US-Russian relations to get worse,” Gabuev says, adding that Americans “no longer need” Russia’s help. Moscow’s state corporation for space activities, Roscosmos, has faced accusations of being more interested in politics than space research. Last month the newspaper Novaya Gazeta reported that Roscosmos’s executive director of manned space programmes, former cosmonaut Sergei Krikalev, had been fired. His apparent crime: questioning an official decision to shoot a film on the Russian section of the ISS. The film, Challenge, is about a female surgeon operating on a cosmonaut in space, and has been backed and financed by Roscosmos . It stars Yulia Peresild, who is due to head to space in October with director Klim Shipenko. The launch seems timed to beat Tom Cruise, who is due to shoot his own movie on board the ISS with director Doug Liman[.](https://www.theguardian.com/science/2021/may/13/russia-send-actor-director-iss-shoot-first-movie-space) Krikalev, who spent more than 800 days in space and was in orbit when the USSR collapsed, apparently told Roscomos’s chief, Dmitry Rogozin, that the film was pointless. Rogozin – its co-producer – has called on the west to drop sanctions in return for Russia’s cooperation on space projects. Putin, Rogozin’s boss, appears to not be very interested in other planets, though, and is more concerned with [nature and the climate crisis](https://www.reuters.com/article/us-russia-putin-idUSKCN1LC1X0) these days. “Space is one of the areas that has traditionally transcended politics. The Mir space station worked at a time of east-west tensions. There was symbolic cooperation. Whether this will continue in the future is really up for debate,” Hilborne says. “The US is very sensitive about what happens in space.” Most observers think the US will remain the world’s pre-eminent space power, thanks to its innovative and flourishing private sector. China’s Soviet-style state programme appears less nimble. Despite ambitious timetables, and billions spent by Beijing, it is unclear when – or even if – an astronaut will return to the moon. The 2030s, perhaps? Will they be American or Chinese? Or from a third country? It may well be that the first person to boldly go again doesn’t merely represent a nation or carry a flag. More likely, they will emerge from a lunar lander wearing a spacesuit with a SpaceX logo on the back – a giant leap not only for mankind, but for galactic marketing.

#### Property rights key to investment in space – studies prove

CEA 21 Econ. Rept. 2021 - Chapter 8: Exploring New Frontiers In Space Policy And Property Rights. U.S. Government Publishing Office, 2021, https://www.govinfo.gov/content/pkg/ERP-2021/pdf/ERP-2021-chapter8.pdf, Accessed 10 Jan 2022. The Council of Economic Advisers (CEA) is a United States agency within the Executive Office of the President established in 1946, which advises the President of the United States on economic policy.

All the space policy developments discussed above have improved the ability of investors to set expectations for the manner in which benefits flow from investments in space. The historical examples given argue that further specifying property rights will bolster investment in the space economy. Increased investments in the space economy will lead to advances in space technology. In this subsection, we discuss the economics literature that addresses the effects of setting and strengthening property rights on both investment and economic growth. The research presented here aims to convey that the benefits for economic activity from improved setting of expectations that clarifies property rights is universal and not just due to specific circumstances of time and/or place. Losses from short-term decisionmaking. A growing concern for future space exploration activities arises from a lack of property rights security leading to short-term decisionmaking, which may inhibit long-term human activity. Many empirical studies show that insecure property rights lead to investment decisions with lower values. Many of these studies have come from analyses of water rights in the western United States. In what is known as the Prior Appropriation Doctrine, water rights are handed out based on a “first in time, first in right” principle. Given that the amount of water available changes each year due to precipitation patterns, water rights holders that were, earlier in time, known as senior rights holders are more likely to receive their water allocation each year than those that were later in time, known as junior rights holders. Leonard and Libecap (2019) argue that the Prior Appropriation Doctrine, with its clear rights for senior rights holders, allowed for investment in irrigation technologies. Given the climate of the western United States, large-scale investment in irrigation is required to maximize the productivity of large swaths of land. Leonard and Libecap estimate that 16 percent of western States’ income in 1930 is attributable to investments made in irrigation that would not have occurred without secure property rights. Another concern with insecure property rights is that owners of natural resources rush to extract them to ensure that they accrue the benefits of their investments. This rush to extract resources has a detrimental effect on the value obtained from those resources and other negative spillover effects on society. One example is the increase in the rate of deforestation that occurs when property rights for the land are insecure (Bohn and Deacon 2000). Ferreira (2004) finds that those countries with clearly defined property rights experience less deforestation than those with weaker protections. Kemal and Lange (2018) find that a reduced chance of oil well expropriation in Indonesia lowered the rate of extraction by up to 40 percent. If short-term decisionmaking prevails in the initial incursions into space, the future of the space economy could be seriously harmed. Depleting the resources necessary to sustain life in space would mean having to transport these resources from Earth at a prohibitive cost and complexity.

#### US space dominance prevents war with China – deters anti-satellite use and Taiwan intervention

Chow and Kelley 21 Chow, Brian, and Brandon Kelley. "China’S Anti-Satellite Weapons Could Conquer Taiwan—Or Start A War". The National Interest, 2021, <https://nationalinterest.org/feature/china%E2%80%99s-anti-satellite-weapons-could-conquer-taiwan%E2%80%94or-start-war-192135.Brian> Chow is an independent policy analyst (Ph.D. physics, MBA with Distinction, Ph.D. finance) with over 160 publications in space and other national security policies and Brandon Kelley

On July 1, 2021—the one-hundredth birthday of the Chinese Communist Party—[President Xi Jinping](https://asia.nikkei.com/Politics/Full-text-of-Xi-Jinping-s-speech-on-the-CCP-s-100th-anniversary) declared that China will “[advance peaceful national reunification](https://nationalinterest.org/blog/reboot/could-taiwan%E2%80%99s-terrain-stop-chinese-invasion-its-tracks-191919)” with Taiwan. It would be easy to dismiss such statements as mere political rhetoric: certainly, Taiwan would never willingly accede to Chinese demands to rejoin the fold. But China’s rapidly advancing anti-satellite (ASAT) capabilities could open up another avenue: deterring United States intervention on Taiwan’s behalf in order to coerce reunification without firing a shot. If current trends hold, then China’s [Strategic Support Force](https://ndupress.ndu.edu/Portals/68/Documents/stratperspective/china/china-perspectives_13.pdf) will be capable by the late 2020s of holding key U.S. space assets at risk. [Chinese military doctrine](https://nationalinterest.org/blog/reboot/nowhere-earth-will-be-safe-us-china-war-172523), statements by senior officials, and past behavior all suggest that China may well believe threatening such assets to be an effective means of deterring U.S. intervention. If so, then the United States would face a type of “Sophie’s Choice”: decline to intervene, potentially leading allies to follow suit and Taiwan to succumb without a fight, thereby enabling Xi to achieve his goal of “peacefully” snuffing out Taiwanese independence; or start a war that would at best be long and bloody and might well even cross the nuclear threshold. This emerging crisis has been three decades in the making. In 1991, China watched from afar as the United States used space-enabled capabilities to obliterate the Iraqi military from a distance in the first Gulf War. The People’s Liberation Army quickly set to work developing capabilities targeted at a perceived Achilles’ heel of this new [American way of war](https://nationalinterest.org/feature/secrets-and-lies-role-truth-great-power-information-warfare-170579): reliance on vulnerable space systems. This project came to fruition with a direct ascent [ASAT weapons test](https://fas.org/sgp/crs/row/RS22652.pdf) in 2007, but the test was limited in two key respects. First, it only reached low Earth orbit. Second, it generated thousands of pieces of long-lasting space junk, provoking immense [international ire](https://spacenews.com/u-s-official-china-turned-to-debris-free-asat-tests-following-2007-outcry/). This backlash appears to have taken China by surprise, driving it to seek new, more usable ASAT types with minimal debris production. Now, one such ASAT is nearing operational status: spacecraft capable of rendezvous and proximity operations (RPOs). Such spacecraft are [inevitable](https://www.airuniversity.af.edu/Portals/10/SSQ/documents/Volume-12_Issue-2/Chow.pdf#page=22) and cannot realistically be limited. The United States, European Union, China, and others are developing them to provide a range of satellite services essential to the [new space economy](https://www.morganstanley.com/ideas/space-economy-themes-2021), such as in situ repairs and refueling of satellites and active removal of space debris. But RPO capabilities are dual-use: if a satellite can grapple space objects for servicing, then it might well be capable of grappling an adversary’s satellite to move it out of its servicing orbit. Perhaps it could degrade or disable it by bending or disconnecting its solar panels and antennas all while producing minimal debris. This is [a serious threat](https://nationalinterest.org/feature/can-america-lose-china-189020), primarily because no international rules presently exist to limit close approaches in space. Left unaddressed, this lacuna in international law and space policy could enable a prospective attacker to pre-position, during peacetime, as many spacecraft as they wish as close as they wish to as many high-value targets as they wish. The result would be an ever-present possibility of sudden, bolt-from-the-blue attacks on vital space assets—and worse, on many of them at once. China has conducted at least [half a dozen tests of RPO](https://swfound.org/media/207179/swf_chinese_rpo_fact_sheet_apr2021.pdf#page=3) capabilities in space since 2008, two of which went on for years. Influential space experts have noted that these tests have plausible peaceful purposes and are in many cases similar to those conducted by the United States. This, however, does not make it any less important to establish effective legal, policy, and technical counters to their offensive use. Even if it were certain that these capabilities are intended purely for peaceful applications—and it is not at all clear that that is the case—China (or any other country) could at any time decide to repurpose these capabilities for ASAT use. There is still time to get out ahead of this threat, but likely not for much longer. China’s RPO capabilities have, thus far, lagged about five years behind those of the United States. There are reasons to believe this gap may close, but even assuming that it holds, we should expect to see China demonstrate an operational dual-use rendezvous spacecraft by around 2025. (The first instance of a U.S. commercial satellite docking with another satellite to change its orbit occurred in [February 2020](https://news.northropgrumman.com/news/releases/northrop-grumman-successfully-completes-historic-first-docking-of-mission-extension-vehicle-with-intelsat-901-satellite).) At the same time, China is expanding its capacity for rapid spacecraft manufacturing. The [Global Times](https://www.globaltimes.cn/page/202101/1213345.shtml) reported in January that China’s first intelligent mass production line is set to produce 240 small satellites per year. In April, [Andrew Jones](https://spacenews.com/china-is-developing-plans-for-a-13000-satellite-communications-megaconstellation/#:~:text=China%20is%20developing%20plans%20for%20a%2013%2C000%2Dsatellite%20megaconstellation,-by%20Andrew%20Jones&text=HELSINKI%20%E2%80%94%20China%20is%20to%20oversee,the%20country's%20major%20space%20actors.) at SpaceNews reported that China is developing plans to quickly produce and loft a thirteen thousand-satellite national internet megaconstellation. It is not unreasonable to assume that China could manufacture two hundred small rendezvous ASAT spacecraft by 2029, possibly more. If this happens, and Beijing was to decide in 2029 to launch these two hundred small RPO spacecraft and position them in close proximity to strategically vital assets, then China would be able to simultaneously threaten disablement of the entire constellations of U.S. satellites for missile early warning (about a dozen satellites with spares included); communications in a nuclear-disrupted environment (about a dozen); and positioning, navigation, and timing (about three dozen); along with several dozen key communications, imagery, and meteorology satellites. Losing these assets would severely degrade U.S. deterrence and warfighting capabilities, yet once close pre-positioning has occurred such losses become almost impossible to prevent. For this reason, such pre-positioning could conceivably deter the United States from coming to Taiwan’s aid due to the prospect that intervention would spur China to disable these critical space systems. Without their support, the war would be much bloodier and costlier—a daunting proposition for any president. Should the United States fail to intervene, the consequences would be disastrous for both Washington and its allies in East Asia, and potentially the credibility of U.S. defense commitments around the globe. Worse yet, however, might be what could happen if China believes that such a threat will succeed but proves to be wrong. History is rife with examples of major wars arising from miscalculations such as this, and there are many pathways by which such a situation could easily escalate out of control to a full-scale conventional conflict or even to nuclear use. This Catch-22 of so-called “peaceful reunification” on the one hand and catastrophic miscalculation on the other is entirely preventable. To do so, however, the United States must act now. To deter such pre-positioning and provide a clear framework for how to handle it if it does occur, the United States should immediately begin coordinating with its allies to establish shared understandings for the rules and operations of [warning](http://npolicy.org/article_file/Space_and_Missile_Wars.pdf#page=136)/[self-defense](https://www.airuniversity.af.edu/Portals/10/SSQ/documents/Volume-14_Issue-4/Chow.pdf#page=5) zones in orbit. Additionally, the United States should develop and deploy [bodyguard spacecraft](https://www.airuniversity.af.edu/Portals/10/SSQ/documents/Volume-14_Issue-4/Chow.pdf#page=6) to monitor and enforce such rules. The United States cannot afford to wait; once the potential threat arrives, it will already be too late.

#### US-China war goes nuclear – leads to power vacuum, econ collapse and extinction

Sharman 17 (Jon Sharman, “US would go into any war with China with 'unparalleled violence', warn experts’” 2017. The Independent. February 5, 2017. http://www.independent.co.uk/news/world/americas/us-china-war-be-end-of-life-earth-nuclear-weapons-apocalypse-steve-bannon-donald-trump-white-house-a7561821.html.)

While the prospect remains relatively remote, experts have told The Independent they believe such a conflict would be catastrophic, throwing the entire globe into turmoil and potentially ending "life as we know it on Earth". The United States would likely win because sending China's untested forces against the might of America's military would be like pitching farmers against Achilles and his warriors, said one, but even a conventional military victory would be a strategic disaster. It would set off a global economic crisis and create a potential power vacuum inside defeated China "the like of which we can't imagine". Mr Bannon said war would erupt in the South China Sea in "five to 10 years". He said: "They’re taking their sandbars and making basically stationary aircraft carriers and putting missiles on those. They come here to the United States in front of our face—and you understand how important face is—and say it’s an ancient territorial sea." The US and China have been engaged in a back-and-forth dispute over military build-up and territorial claims in the region for some years. In December the US said it would base its deadliest fighter jets in Australia, and days later China seized an unmanned US Navy drone. It followed a diplomatic spat around then-President-elect Trump's congratulatory phone call with Taiwan's Prime Minister Tsai Ing-wen, which broke with decades of US policy. Mr Trump has been forthright about China's influence, blaming it for the loss of American jobs. The war of words recently heated up when a Chinese military official was quoted as saying talk of war with the US under Mr Trump "are not just slogans, they are becoming a practical reality". Trevor McCrisken, associate professor of politics and international studies at the University of Warwick, said that if war broke out "we would be looking, I would imagine, at World War Three". He said: "I really do think that would be the end of life as we know it on Earth. "From a global strategic risk level I would say the last thing you want is war between the United States and any of the major powers because of the risks of escalation, obviously the potential for nuclear weapons to be used. The likelihood of nuclear exchange between the two principals involved is high."

# Orbital Use Fees CP

#### CP: The United States should establish an orbital use fee for all US based satellites and use the money received to pay for debris cleanup

Vergoth 20 Vergoth, Karin. "Solving The Space Junk Problem". CU Boulder Today, 2020, <https://www.colorado.edu/today/2020/05/26/solving-space-junk-problem>. Karin Vergoth is a CIRES-NOAA Science Writer.

Space is getting crowded. Aging satellites and space debris crowd low-Earth orbit, and launching new satellites adds to the collision risk. The most effective way to solve the space junk problem, according to a new study, is not to capture debris or deorbit old satellites: it’s an international agreement to charge operators “orbital-use fees” for every satellite put into orbit. Orbital use fees would also increase the long-run value of the space industry, said economist Matthew Burgess, a [CIRES Fellow and co-author of the new paper](https://cires.colorado.edu/news/solving-space-junk-problem). By reducing future satellite and debris collision risk, an annual fee rising to about $235,000 per satellite would quadruple the value of the satellite industry by 2040, he and his colleagues concluded in a paper published today in the [Proceedings of the National Academy of Sciences](https://www.pnas.org/content/early/2020/05/20/1921260117). “Space is a common resource, but companies aren’t accounting for the cost their satellites impose on other operators when they decide whether or not to launch,” said Burgess, who is also an assistant professor in environmental studies and an affiliated faculty member in economics at CU Boulder. “We need a policy that lets satellite operators directly factor in the costs their launches impose on other operators.” Currently, an estimated 20,000 objects—including satellites and space debris—are crowding low-Earth orbit. It’s the latest tragedy of the commons, the researchers said: Each operator launches more and more satellites until their private collision risk equals the value of the orbiting satellite. So far, proposed solutions have been primarily technological or managerial, said Akhil Rao, assistant professor of economics at Middlebury College and the paper’s lead author. Technological fixes include removing space debris from orbit with nets, harpoons, or lasers. Deorbiting a satellite at the end of its life is a managerial fix. Ultimately, engineering or managerial solutions like these won’t solve the debris problem because they don’t change the incentives for operators. For example, removing space debris might motivate operators to launch more satellites—further crowding low-Earth orbit, increasing collision risk, and raising costs. “This is an incentive problem more than an engineering problem. What’s key is getting the incentives right,” Rao said. A better approach to the space debris problem, Rao and his colleagues found, is to implement an orbital-use fee—a tax on orbiting satellites. “That’s not the same as a launch fee,” Rao said, “Launch fees by themselves can’t induce operators to deorbit their satellites when necessary, and it's not the launch but the orbiting satellite that causes the damage.” Orbital-use fees could be straight-up fees or tradeable permits, and they could also be orbit-specific, since satellites in different orbits produce varying collision risks. Most important, the fee for each satellite would be calculated to reflect the cost to the industry of putting another satellite into orbit, including projected current and future costs of additional collision risk and space debris production—costs operators don’t currently factor into their launches. “In our model, what matters is that satellite operators are paying the cost of the collision risk imposed on other operators,” said Daniel Kaffine, professor of economics and RASEI Fellow at CU Boulder and co-author on the paper. And those fees would increase over time, to account for the rising value of cleaner orbits. In the researchers’ model, the optimal fee would rise at a rate of 14 percent per year, reaching roughly $235,000 per satellite-year by 2040. For an orbital-use fee approach to work, the researchers found, all countries launching satellites would need to participate—that's about a dozen that launch satellites on their own launch vehicles and more than 30 that own satellites. In addition, each country would need to charge the same fee per unit of collision risk for each satellite that goes into orbit, although each country could collect revenue separately. Countries use similar approaches already in carbon taxes and fisheries management. In this study, Rao and his colleagues compared orbital-use fees to business as usual (that is, open access to space) and to technological fixes such as removing space debris. They found that orbital use fees forced operators to directly weigh the expected lifetime value of their satellites against the cost to industry of putting another satellite into orbit and creating additional risk. In other scenarios, operators still had incentive to race into space, hoping to extract some value before it got too crowded. With orbital-use fees, the long-run value of the satellite industry would increase from around $600 billion under the business-as-usual scenario to around $3 trillion, researchers found. The increase in value comes from reducing collisions and collision-related costs, such as launching replacement satellites. Orbital-use fees could also help satellite operators get ahead of the space junk problem. “In other sectors, addressing the tragedy of the commons has often been a game of catch-up with substantial social costs. But the relatively young space industry can avoid these costs before they escalate,” Burgess said.

# Case

## AT Solvency

#### Cross-apply my CEA 21 card that shows that property rights are key to actual investments to space and critical to avoid negative spillover effects. The tragedy of the commons that afflicts all the examples they list guts solvency and turns the case. Overgrazing comes from lack of property rights, lack of forest management that causes wildfires and environmental degradation, and massive destruction of the oceans come not from property rights, but the lack thereof.

#### Enforcement fails

Adrian Taghdiri 13 [ J.D. 2013, Boston University School of Law; B.A., International Political Economy, University of California, Berkeley, 2008. "FLAGS OF CONVENIENCE AND THE COMMERCIAL SPACE FLIGHT INDUSTRY: THE INADEQUACY OF CURRENT INTERNATIONAL LAW TO ADDRESS THE OPPORTUNE REGISTRATION OF SPACE VEHICLES IN FLAG STATES " Journal of Science & Technology Law (2013), https://www.bu.edu/jostl/files/2015/02/05TaghdiriWeb.pdf, accessed 1-5-2022]//anop

As discussed above,168 none of the international space treaties enumerate procedures for enforcement of liability or the settlement of disputes.169 Rather, Article III of the Outer Space Treaty provides for the application of international law and the U.N. Charter to settle disputes relating to international space law.170 While international law and the U.N. Charter provide a significant number of dispute settlement mechanisms for disputes related to outer space, there are several deficiencies.171 First, Article III of the Outer Space Treaty implies, yet does not impose, any form of dispute settlement.172 This “extremely indirect reference” can help potentially liable states evade responsibility because of the absence of any compulsory procedures. 173 Second, even though there are references to the U.N. Charter and the International Court of Justice, it is not likely those references will be satisfactory settlement mechanisms because there is no binding obligation to submit disputes or any “inclination on the part of space-faring States to submit to the jurisdiction of the International Court.”174 Third, the laws of customary international law and of the U.N. Charter will not be capable of addressing many of the issues that will likely face the “novel, rapidly evolving field of [space] law and activity.”175

#### Stregthening ILaw causes Middle East instability – Pakistan proves

Daniel Abebe 7, Lecturer in Law @ Univ of Chicago Law School, 29 Mich. J. Int'l L. 1 '7, ""ARTICLE: NOT JUST DOCTRINE: THE TRUE MOTIVATION FOR FEDERAL INCORPORATION AND INTERNATIONAL HUMAN RIGHTS LITIGATION" l/n

For example, it is highly questionable that international human rights litigation or the promotion of democracy in Jordan, Egypt, or Saudi Arabia will result in regimes that will embrace normative human rights practices. In fact, it may actually worsen the situation and will likely produce anti-U.S. regimes - Hamas's victory in the Palestinian elections, for example - that challenge both the United States' strategic and normative interests. The key is to recognize that there are costs to binding the United States to a normative position when, at times, national security or strategic interests may require expediency. Consider the complicated situation in Pakistan. The military government of Pervez Musharraf was, for the most part, an ally of the United States during the War on Terror. n104 At the same time, Pakistan engaged in a number of practices that violate human rights law. Human Rights Watch notes: President Pervez Musharraf's military-backed government did little in 2006 to address a rapidly deteriorating human rights situation. Ongoing concerns include arbitrary detention, lack of due process, and the mistreatment, torture, and "disappearance" of terrorism suspects and political opponents; harassment and intimidation of the media; and legal discrimination against and mistreatment of women and religious minorities. n105 Arbitrary detention and the disappearance of individuals, for example, are violations of CIL and would likely be actionable claims under the post-Sosa international human rights litigation regime. While no person would condone these practices, the United States has to weigh the benefits of encouraging democracy and normative human rights [\*30] practices against the costs of failing to achieve national security and strategic interests in determining the appropriate policies toward Pakistan. First, Pakistan assists the United States in achieving national security goals: the elimination of terrorist training camps in Afghanistan and the destruction of Al-Qaeda and its affiliated groups. Second, Pakistan is a nuclear power with a divided security apparatus and unclear command and control procedures over its nuclear arsenal. Destabilizing the regime may threaten to jeopardize control of Pakistani nuclear weapons and materiel. Third, and most important, the United States wants stability in Pakistan. For many American policymakers, a democracy led by the late Benazhir Bhutto would have been preferable; however, a pro-U.S. government is the priority. To the extent that strategic interests reinforce normative and strategic goals, policy decisions are easier. But, given the complex political situation within Pakistan, the results of recent elections, and the United States' strategic interests, it is still unclear if regime change will produce a government that will support the United States' strategic interests and embrace its normative human rights concerns. n106 The same difficult balance applies to other countries. For example, the United States' interest in promoting democracy and human rights in Egypt, Saudi Arabia, n107 or the Central Asian Republics, among many others, has been subordinated to the United States' strategic interest in maintaining pro-U.S. regimes in these States. Focusing on Egypt: In 2006 [the United States] provided approximately US$ 1.3 billion in military aid and US$ 490 million in economic assistance [to Egypt]. In June 2006, the US Congress defeated a proposed amendment that would have cut $ 100 million from the US aid package in response to Egypt's poor human rights record. n108 During various Republican and Democratic administrations, the United States has weighed the normative importance of improving human rights practices in Egypt against the cost of compromising strategic or national security interests. Most recently, the United States determined that "facing [\*31] chaos in Iraq, rising Iranian influence and the destabilizing Israeli-Palestinian conflict ... stability, not democracy, was its priority." n109

#### Middle Eastern Instability leads to extinction

Nassar 02 (Bahig, Arab Co-ordinating Centre of Non-Governmental Organizations, and Afro-Asian People's Solidary Organization, 11/25, keynote paper for Cordoba Dialogue on Peace and Human Rights in Europe and the Middle East,http://www.inesglobal.org/BahigNassar.htm)

Wars in the Middle East are of a new type. Formerly, the possession of nuclear weapons by the United States and the Soviet Union had prevented them, under the balance of the nuclear terror, from launching war against each other. In the Middle East, the possession of nuclear weapons and other weapons of mass destruction leads to military clashes and wars. Instead of eliminating weapons of mass destruction, the United States and Israel are using military force to prevent others from acquiring them, while they insist on maintaining their own weapons to pose deadly threats to other nations. But the production, proliferation and threat or use of weapons of mass destruction (nuclear chemical and biological) are among the major global problems which could lead, if left unchecked, to the extinction of life on earth. Different from the limited character of former wars, the current wars in the Middle East manipulate global problems and escalate their dangers instead of solving them.

## AT: Debris

#### Turn - ban on appropriation prevents solutions through tragedy of the commons

Trapp 13 Trapp, Timothy. TAKING UP SPACE BY ANY OTHER MEANS: COMING TO TERMS WITH THE NONAPPROPRIATION ARTICLE OF THE OUTER SPACE TREATY. UNIVERSITY OF ILLINOIS LAW REVIEW, 2013, https://www.illinoislawreview.org/wp-content/ilr-content/articles/2013/4/Trapp.pdf, Accessed 4 Jan 2022. Justin received his B.A. in Creative Writing from North Carolina State University in 2008 and his J.D., summa cum laude, from The University of Illinois College of Law in 2013, where he was elected to the Order of the Coif, a Rickert Award Recipient, and served as articles editor of the University of Illinois Law Review.

In general, space debris consists of “man-made objects in outer space, other than active or otherwise useful satellites, when no change can reasonably be expected in these conditions in the foreseeable future.”46 As of January 2011, there were approximately 16,000 space objects catalogued by the U.S. Space Surveillance Network, only about 3,500 of which were functional spacecraft.47 This leaves approximately 12,500 pieces of catalogued debris.48 Interestingly, though spacecraft, mission-related objects, and rocket bodies increased fairly linearly since the start of the space age, fragmentation debris has drastically increased since 2007, jumping from approximately 4,000 pieces to approximately 7,000 pieces in the span of a year.49 While this is due in large part to China’s testing of an anti-satellite weapon in space,50 it is also certainly due in part to the replicating nature of fragmentation debris.51 For instance, in February 2009, an operational commercial U.S. satellite collided with a defunct Russian satellite, resulting in about 400 pieces of new debris.52 This, intuitively, creates about 400 new chances for functional spacecraft to be damaged or destroyed. For something to stay in orbit, it has to move very, very fast (from three to eight kilometers per second, or about 6,700 to 18,000 miles per hour, depending on the altitude of the object).53 This is due to the physics that governs orbital mechanics.54 Even in orbit, objects still feel the pull of Earth’s gravity.55 In essence, objects in orbit are constantly falling. Because the Earth is round, however, an object is able to counterbalance the effect of gravity by moving forward fast enough to match the rate of its fall.56 But this requires a fantastic amount of speed, up to about thirty times that of a commercial airliner.57 While intuitive that a collision between two satellites travelling at this speed would be catastrophic, it is also the case that a small object could cause massive damage at this speed.58 The amount of damage caused by the collision of two objects is a function of the objects’ momentum, which is the product of an object’s mass and velocity.59 Because of this, even a very small object can be extremely damaging if it is travelling fast enough.60 For example, an average sized brick travelling at three kilometers per second (or about 6,600 miles per hour), which is on the lower end of the orbital speeds, would have as much momentum as a large horse travelling at about thirty-three mph.61 Not only does space debris carry a large amount of momentum, but it is also often small enough that its impact will be concentrated into a small area, thus maximizing damage to that area.62 This makes debris very dangerous to sophisticated machinery, such as satellites and spaceships that have various small parts that can be incredibly vulnerable. Furthermore, debris does not vanish when it impacts or destroys a functional spacecraft. Instead, it multiplies: the collision creates more debris, and these new pieces of debris will fly out in multiple directions, cluttering space even more.63 This, in turn, makes orbital space that much more cluttered and dangerous, which leads to more collisions, and the cycle continues.64 If this problem is not dealt with, the amount of orbital debris could continue to increase until it makes certain parts of orbit unusable or unnavigable, even without the addition of more functioning spacecraft into orbit.65 The costs of space debris are not limited to merely the loss of functioning spacecraft. There is also the cost of shielding spacecraft from possible debris collisions.66 This cost is two-fold: not only do launching parties have to spend the money to actually research and develop adequate shielding for their spacecraft, they also have to spend extra money for fuel to carry the objects into space.67 The cost of maneuvering out of the path of debris similarly enters into the equation in two ways.68 Maneuvering requires extra fuel and thus detracts from what could have been used to further the actual purpose of the spacecraft.69 Furthermore, for maneuvering to even be effective, there must be prior warning that a collision with debris is imminent.70 This requires a monitoring system, which requires its own resources to develop the necessary surveillance technology as well as to catalog and monitor debris.71 Though the dangerous and replicative nature of the space debris problem is well understood, the nature of the space resource makes it difficult to regulate this problem. First, space is a common resource, which subjects it to falling into a tragedy of the commons.72 Second, because entities are not allowed to appropriate property in space, governing bodies find it difficult to enforce regulations in space that may help to stem the debris problem.

#### Non-unique – anti-satellite tests main source of debris

Pultarova 21 Pultarova, T., 2021. Space debris from Russian anti-satellite test will be a safety threat for years. [online] Space.com. Available at: <https://www.space.com/russia-anti-satellite-test-space-debris-threat-for-years> [Accessed 12 January 2022].  She later took a career break to pursue further education and added a Master's in Science from the International Space University, France, to her Bachelor's in Journalism and Master's in Cultural Anthropology from Prague's Charles University.

Space debris created by a Russian anti-satellite missile test will pose a threat to satellites in low Earth orbit as well as astronauts aboard the International Space Station for years to come, experts reveal. The anti-satellite (ASAT) test targeted the defunct Soviet surveillance satellite Cosmos 1408, which orbited at an altitude of about 404 miles (650 kilometers) above Earth. The 2-ton spacecraft, dead since the mid-1980s, broke apart into at least 1,500 trackable fragments immediately upon the strike, creating a large cloud of debris. The space debris has forced the astronauts and Russian cosmonauts aboard the International Space Station (ISS) to repeatedly take refuge in their transport vehicles. Experts now warn that this space debris will remain a danger for years to come, threatening satellites in low Earth orbit (LEO), the heavily used region of space closest to Earth, as well as space station crews. In addition to the 1,500 trackable fragments generated by the test, the event also created hundreds of thousands of smaller pieces that are invisible to Earth-based observers, the U.S. Space Command (USSC), which is responsible for military operations in outer space, said in a statement.  "USSPACECOM's initial assessment is that the debris will remain in orbit for years and potentially for decades, posing a significant risk to the crew on the International Space Station and other human spaceflight activities, as well as multiple countries' satellites," USSPACECOM said in the statement. In fact, about half of the fragments might fall to Earth "within the next couple of years" but the remainder might remain hurtling through space for "more than a decade," Hugh Lewis, head of the Astronautics Research Group at the University of Southampton, the U.K., and Europe's leading space debris expert told Space.com. "Once the fragments are catalogued, I am expecting to see many close passes with satellites and other objects across quite a wide range of LEO, demonstrating the consequences for space safety," Lewis said. "I would not be surprised if the ISS had to make collision avoidance maneuvers for at least the next couple of years as a direct result." Preliminary calculations suggest that the cloud of debris will increase the number of avoidance maneuvers performed by satellite operators all over the world by more than 100% in the next few years, Tim Flohrer, head of the European Space Agency's (ESA) Space Debris Office, told Space.com.  "The peak can be even significantly higher than 100%," Flohrer added. "In this 400 to 500 kilometer altitude, the fragments will not survive long. We expect them to decay slowly over months and years so the risk increase will still be significant after one or two years." In addition to the impact that this debris will continue to have on the International Space Station, SpaceX's internet-beaming mega-constellation Starlink, currently comprising nearly 1,850 satellites, also orbits in the affected region, Flohrer added.  Experts and military leaders appeared shocked by the act, which will affect long-term safety of all operations in low Earth orbit. "Russia has demonstrated a deliberate disregard for the security, safety, stability, and long-term sustainability of the space domain for all nations," U.S. Army General James Dickinson and U.S. Space Command commander, said in the USSC statement. "The debris created by Russia's DA-ASAT will continue to pose a threat to activities in outer space for years to come, putting satellites and space missions at risk, as well as forcing more collision avoidance maneuvers." In a statement to Russia's news agency Interfax, the Russian Defense Ministry confirmed the test but claimed its debris does not present any risk to orbiting spacecraft. "On November 15 of this year, the Russian Defense Ministry successfully conducted a test, as a result of which the inoperative Russian Tselina-D spacecraft, which had been in orbit since 1982, was struck," the Russian Defense Ministry said, according to Interfax. "The United States knows for certain that the resulting fragments did not represent and will not pose a threat to orbital stations, spacecraft and space activities in terms of test time and orbit parameters." Russia's space agency Roscosmos issued a separate statement on Tuesday (Nov. 16) morning, which, however, does not directly mention the ASAT test. "For us, the main priority has been and remains to ensure the unconditional safety of the crew," Roscosmos said in the statement. "Adherence to this principle is laid both in the basis for the production of space technology in Russia and in the program of its operation." While its impact and consequences has drawn far more concern, this is not the first ASAT test in recent years. In 2019, India conducted an anti-satellite missile test, which, however, targeted a satellite much closer to Earth, at about 175 miles (282 km). Most of the debris created by that strike therefore entered Earth's atmosphere within weeks or months, according to the Carnegie Endowment for International Peace.  The impact of the Russian ASAT test, however, will be much more serious due to the higher altitude of the target satellite. Debris from an ASAT test conducted by China in 2007, which targeted a satellite at an even higher altitude of 540 miles (865 km), is still a major source of collision hazard in low Earth orbit today.

**Low Probability – 0.1% chance of a collision.**

**Salter 16** [(Alexander William, Economics Professor at Texas Tech) “SPACE DEBRIS: A LAW AND ECONOMICS ANALYSIS OF THE ORBITAL COMMONS” 19 STAN. TECH. L. REV. 221 \*numbers replaced with English words] TDI

The probability of a collision is currently low. Bradley and Wein estimate that the maximum probability in LEO of a collision over the lifetime of a spacecraft remains below one in one thousand, conditional on continued compliance with NASA’s deorbiting guidelines.3 However, the possibility of a future “snowballing” effect, whereby debris collides with other objects, further congesting orbit space, remains a significant concern.4 Levin and Carroll estimate the average immediate destruction of wealth created by a collision to be approximately $30 million, with an additional $200 million in damages to all currently existing space assets from the debris created by the initial collision.5 The expected value of destroyed wealth because of collisions, currently small because of the low probability of a collision, can quickly become significant if future collisions result in runaway debris growth.

**Time frame – Kessler effect 200 years away**

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

The prediction of possible scenarios of the future evolution of the debris population involves many uncertainties. Long-term forecasting means the prediction of the evolution of the future debris environment in time periods of decades or even centuries. Predictions are based on models84 that work with certain assumptions, and altering these parameters significantly influences the outcomes of the predictions. Assumptions on the future space traffic and on the initial object environment are particularly critical to the results of modeling efforts.85 A well-known pattern for the evolution of the debris population is the so-called Kessler effect’, which assumes that there is a certain collision probability among space objects because many satellites operate in similar orbital regions. These collisions create fragments, and thus additional objects in the respective orbits, which in turn enhances the risk of further collisions. Consequently, the num ber of objects and collisions increases exponentially and eventually results in the formation of a self-sustaining debris belt aroundthe Earth. While it has long been assumed that such a process of collisional cascading is likely to occur only in a very long-term perspective (meaning a time 1 n of several hundred years),87 a consensus has evolved in recent years that an uncontrolled growth of the debris population in certain altitudes could become reality much sooner.88 In fact, a recent cooperative study undertaken by various space agencies in the scope of i a d c shows that the current l e o debris population is unstable, even if current mitigation measures are applied. The study concludes: Even with a 90% implementation of the commonly-adopted mitigation measures [...] the l e o debris population is expected to increase by an average of 30% in the next 200 years. The population growth is primarily driven by catastrophic collisions between 700 and 1000 km altitudes and such collisions are likely to occur every 5 to 9 years.89

## AT: Colonialism

#### Its reductionist to compare space exploration to violent imperialism. Historical imperialism was built on displacing people which is impossible in space since there actually is no one there. Don’t let the aff conflate the two.

#### Turn – private companies will make space more accessible

Sager 21 Sager, Ian. "Is Space Travel Just For The Trained Scientists? Or Should It Be Available To Everyone? — Science Next". Science Next, 2021, <https://lsuscienceblog.squarespace.com/blog/2021/10/14/is-space-travel-just-for-the-trained-scientists-or-should-it-be-available-to-everyone>. Ian Sager is a senior physics and astronomy major graduating in December 2021.

Nearly 600 people have been to space since humans gained the capability in 1961. An overwhelming majority of astronauts have been employed by governments around the world, but there is a growing trend of private citizens reaching for the stars themselves. Billionaires like Jeff Bezos and Sir Richard Branson have made headlines lately with their short pops into space (though Branson didn’t breach the Karman line—what many determine to be altitude that denotes the beginning of space), but the history of private citizens going into space is not a new one. The first private citizen to go to space was Dennis Tito in 2001. Unlike the suborbital flights of the two aforementioned billionaires, Tito rode aboard a Russian Soyuz rocket that docked with the International Space Station, where he lived for nearly eight days. This trip was organized by a company, Space Adventures, that has since seen six additional clients go to space. However, these trips were always at the digression of the Russian Federal Space Agency, and the seven individual astronauts took off over a period of nearly a decade (the last trip was in 2009). Though this was technically commercial space travel, new private space companies offering their space travel in-house has changed the game. Inspiration4, a mission that launched on September 15 of this year, brought four civilians into orbit for three days. Its orbital altitude brought the crew higher than we have gone since Apollo in a symbolic gesture to show we are once again pushing the boundary of what's possible. Though Blue Origin and Virgin Galactic have both taken crews to space, the capabilities that the Inspiration4 mission, and SpaceX, its launch provider, have had many talking about the possibility of real space tourism taking off. I was invited to view the Inspiration4 launch and brought my dad along with me. Being an astronomy major with a huge passion for following the space industry, he’s heard me talking passionately about missions and launches for most of my life but has never been to one himself, despite growing up in the Apollo era and having family near the space coast during the Shuttle era. Both of us were blown away with the launch, itself, but more so with the people we met and the overall feeling of hope and renewed enthusiasm towards the future of spaceflight that the launch inspired, especially as it pertained to being able to go up to space themselves. This was something I never truly considered or felt myself until this launch. These three private launches are only the beginning of what seems to be a new era of space flight. In the next few years, Axium is looking to launch its own modules to the ISS as well as multiple crewed missions. Yusaku Maezawa chartered a flight around the moon for himself and a dozen artists, and many are now lined up for suborbital hops through Virgin Galactic and Blue Origin. The privatization of space has begun, and we are just now witnessing the opening of the floodgates for what’s to come. This poses the question though: Is this something that should even be happening? Should space be available to anyone, or just those trained to go up through space agencies like NASA? To those who say that you need to be highly trained to go to space at all, I’d point you to the private missions that have been flown already. Though the Inspiration4 crew went through intense training for six months, by SpaceX’s own admission almost the entirety of the mission was automated and the training was mostly in case something went wrong. Comparatively, a trip through Blue Origin or Virgin Galactic requires only basic training days before the mission. The advancement of technology has allowed for missions to space to no longer require master pilots. Another complaint often lobbed at private space flights are that they are just another mode for billionaires to flaunt their wealth. Though it’s undeniable that the first few of these space flights have all included billionaires, I only see this as a temporary necessity. Thinking back to any technology that is commonplace now—mobile phones, televisions, commercial air travel, cars, etc.—, each was adopted first by the ultra-wealthy. It was only after incremental technological improvements and cost saving measures from mass-production that allowed for costs to be driven down to a point where the ordinary person could hope to afford taking part. The same will be true for space flight, in time. After each company had its maiden manned private spaceflight, interest in all three skyrocketed. This will inevitably lead to increased production in rockets and an increased flight cadence, both of which will help bring down costs. Additionally, with the development of rockets like SpaceX’s Starship that can carry as many as 100 people onboard, within the next decade I see it possible that any person can buy a ticket to space like how they can buy a ticket to Europe. This may still be an expensive endeavor, in honesty likely more costly than a trip to Europe, but it would still be obtainable to non-billionaires and millionaires. The last major argument one may cling to is whether any of this does any good. So, what if people can go without training and it be affordable, why should non-scientists go at all? Aside from it just being fun (I’d argue we do many things at great expense and against practicality just because it’s fun), it has a trickle-down effect for the rest of the professional space industry. Not only do driving down costs help keep luxury experiences affordable, but those same refined technologies and learned experiences will make their way to the professionals, making their job easier and cheaper to do. Additionally, those with the most exposure to space always seem to be the most supportive of it. This was incredibly evident during my time in Cape Canaveral for the Inspiration4 launch, as well as my visit during the Demo-2 launch in 2020. NASA’s budget as a percentage of the total federal budget has been on a steady decline since the late ‘60s. Even with the announcement with Artemis—NASA’s mission to send people back to the moon by 2024—there hasn’t been a considerable raise in the agency’s budget. In fact, the only time in history NASA’s budget was very high was when the public had heavy involvement during the Apollo missions. Publicly accessible space travel would get many excited once again about our prospects in space and might allow for increased funding towards further exploration, such as manned missions to Mars and beyond. It might also expose many to the overview effect, a phenomenon where seeing the Earth from space gives one a profound new appreciation for the planet we live on. In the face of constant fighting between nations and the growing threat of climate change, having more people experience this effect would be another force steering us in the right direction. Throughout our time on Earth, humans have always had a propensity to push boundaries and explore farther. We made the leap into space more than 60 years ago, but for almost the entirety of the Earth’s population this has not been something that could be experienced but behind a screen. Though space is still inaccessible to all but the rich, this is becoming less of a barrier every day. An increase in the public being able to go to space will bring a renewed interest in supporting space agencies, and in doing science in space. It’s the next inevitable evolution in our species’ experience with reaching for the stars. Now that this door is officially open, there’s no going back, and there’s no reason not to fully embrace those like you and me from going into space next. Breaking down barriers can only be a good thing, in life and in space. We’ve shown private space flight is possible. Now it’s up to us to widen its reach so we can all take part, together.

#### Corporate colonization will lead to governments being established on planets – no one will move to space without the ability to be represented.

#### Non-unique – making it a global common will ensure only wealthy nations with the resources to access space will benefit.

#### Climate change requires a technological solution that only capitalism can provide---renewables are outpacing fossil fuels and will complete the transition to green growth.

**Smith ’19** (Noah; assistant professor of finance at Stony Brook University; April 5th; “Dumping Capitalism Won’t Save the Planet”; <https://www.bloomberg.com/opinion/articles/2019-04-05/capitalism-is-more-likely-to-limit-climate-change-than-socialism>) --

The climate threat is certainly dire, and carbon taxes are unlikely to be enough to solve the problem. But eco-socialism is probably not going to be an effective method of addressing that threat. Dismantling an entire economic system is never easy, and probably would touch off armed conflict and major political upheaval. In the scramble to win those battles, even the socialists would almost certainly abandon their limitation on fossil-fuel use — either to support military efforts, or to keep the population from turning against them. The precedent here is the Soviet Union, whose multidecade effort to reshape its economy by force amid confrontation with the West led to profound environmental degradation. The world's climate does not have several decades to spare. Even without international conflict, there’s little guarantee that moving away from capitalism would mitigate our impact on the environment. Since socialist leader Evo Morales took power in Bolivia, living standards have improved substantially for the average Bolivian, which is great. But this has come at the cost of higher emissions. Meanwhile, the capitalist U.S managed to decrease its per capita emissions a bit during this same period (though since the U.S. is a rich country, its absolute level of emissions is much higher). In other words, in terms of economic growth and carbon emissions, Bolivia looks similar to more capitalist developing countries. That suggests that faced with a choice of enriching their people or helping to save the climate, even socialist leaders will often choose the former. And that same political calculus will probably hold in China and the U.S., the world’s top carbon emitters — leaders who demand draconian cuts in living standards in pursuit of environmental goals will have trouble staying in power. The best hope for the climate therefore lies in reducing the tradeoff between material prosperity and carbon emissions. That requires technology — solar, wind and nuclear power, energy storage, electric cars and other vehicles, carbon-free cement production and so on. The best climate policy plans all involve technological improvement as a key feature. Recent developments show that the technology-centered approach can work. A recent report by Bloomberg New Energy Finance analyzed about 7000 projects in 46 countries and found that large drops in the cost of solar power from photovoltaic systems, wind power and lithium-ion batteries have made utility-scale renewable electricity competitive with fossil fuels. A 76 percent decline in the cost of energy for short-term battery storage since 2012 is especially important. In a blog post, futurist and energy writer Ramez Naam underscores the significance of these developments. Naam notes the important difference between renewables being cheap enough to outprice new fossil-fuel plants and being inexpensive enough to undercut existing plants. The former is already the case across much of the world, which is among the reasons for an 84 percent decrease in the number of new coal-fired plants worldwide since 2015. But when it becomes cheaper to scrap existing fossil-fuel plants and build renewables in their place, it will allow renewables to start replacing coal and gas much more quickly. Naam cites examples from Florida and Indiana where this is already being done. He cites industry predictions that replacing existing fossil-fuel plants with renewables will be economically efficient almost everywhere at some point in the next decade. Electricity is far from the only source of carbon emissions — there’s also transportation, manufacturing (especially of steel and cement), home and office heating, and agriculture to worry about. But the rapid advance of solar technology is a huge victory in the struggle against climate change, because it will allow people all over the world to have electricity without cooking the planet. And how was this victory achieved? A combination of smart government policy and private industry. Massachusetts Institute of Technology researchers Goksin Kavlak, James McNerney and Jessika Trancik in a recent paper evaluated the factors behind the solar-price decline from 1980 to 2012. They concluded that from 1980 to 2001, government-funded research and development was the main factor in bringing down costs, but from 2001 to 2012, the biggest factor was economies of scale. These economies of scale were driven by private industry increasing output, but with government subsidies helping to increase the incentive to ramp up production.

#### Violence has massively decreased because of cap

**Gat ‘13** (AZAR GAT, DPhil in History (University of Oxford, 1986); Ezer Weitzman Professor of National Security, Political Science Department, Tel Aviv University; recent books: War in Human Civilization (Oxford University Press, 2006); Victorious and Vulnerable: Why Democracy Won in the 20th Century and How It Is Still Imperiled (Hoover Institution, Rowman & Littlefield, 2010); Nations: The Long History and Deep Roots of Political Ethnicity and Nationalism (Cambridge University Press, 2013). Is war declining – and why? Azar Gat⇑ Department of Political Science, University of Tel Aviv azargat@post.tau.ac.il , March 19th 2013)

When quite **a number of scholars** **simultaneously and independently** of one another arrive at **very similar conclusions** on an **issue of cardinal theoretical and practical significance**, their thesis **deserves**, and has received, **great attention**. The thesis is that **war and violence** in general have progressively **decreased in recent times, during the modern era, and** even **throughout history.** Of course, despite their unanimity, all these scholars could still be wrong. Indeed, each of them tells a similar story of people’s **disbelief at their findings**, most notably that **we live in the most peaceful period in** human **history**. Some of them even explain the general incredulity by the findings of evolutionary psychology according to which we tend to be overly optimistic about ourselves but overly pessimistic about the world at large. Having myself written about the marked decrease in deadly human violence (Gat, 2006), I agree with the authors’ general thesis. However, their unanimity falters over, and they are less clear about, the historical trajectory of and the reasons for the decline in violence and war, questions that are as important as the general thesis itself. Previous Section Next Section Hobbes was right, and Rousseau wrong, about the state of nature Steven Pinker’s The Better Angels of Our Nature (2011) towers above all the other books surveyed here in size, scope, boldness, and scholarly excellence. It has deservedly attracted great public attention and has become a best-seller. Massively documented, this 800-page volume is lavishly furnished with statistics, charts, and diagrams, which are one of the book’s most effective features. The book, spanning the whole human past as far back as our aboriginal condition, points to two major steps in the decline of violence. The first is the sharp decline in violent mortality which resulted from the rise of the state-Leviathan from around 5,000 years ago. This conclusion is based on the most comprehensive studies of the subject published over the past 15 years (Keeley, 1996; LeBlanc, 2003; Gat, 2006), which demonstrate on the basis of anthropological and archaeological evidence that Hobbes’s picture of the anarchic state of nature as a very violent one was fundamentally true. Pinker rightly summarizes that violent mortality with the rise of states dropped from a staggering estimated 15% of the population, 25% of the men, in pre-state societies, to about 1–5%. The main reason for this drop is the enforcement of internal peace by the Leviathan, but also, less noted by Pinker, lower mobilization rates and a smaller exposure of the civilian population to war than with tribal groups, as will be explained shortly. This conclusion regarding the dramatic drop in violent mortality with the transition to the state is at odds with the claim made by Jack Levy & William Thompson in their book, The Arc of War (2011). As the book’s title implies, Levy & Thompson posit a great increase in warfare during history, before a decrease during the past two centuries. Thus, the book claims that mortality in fighting greatly increased, ‘accelerated’ in the authors’ language, with the transition to the state. They reach this conclusion by making several mistaken assumptions. First, although professing ignorance about the distant past because of the lack of evidence on the behavior of hunter-gatherer societies before the adoption of agriculture some 10,000 years ago, they cite and are heavily influenced by the old Rousseauite anthropology of the generation after the 1960s, which recent studies have refuted. Obviously, one does not have to accept the above findings regarding the pervasiveness and great lethality of prehistoric warfare. But Levy & Thompson simply do not engage with them. They accept as true the Rousseauite premise that sparse human population could not possibly have had that much to fight about. However, recently extant hunter-gatherer societies prove the opposite. Australia is our best laboratory of hunter-gatherer societies, because that vast continent was entirely populated by them and ‘unpolluted’ by agriculturalists, pastoralists or states until the arrival of the Europeans in 1788. And the evidence shows that the Australian tribes fought incessantly with one another. Even in the Central Australian Desert, whose population density was as low as one person per 35 square miles, among the lowest there is, conflict and deadly fighting were the rule. Much of that fighting centered on the water-holes vital for survival in this area, with the violent death rate there reckoned to have been several times higher than in any state society. In most other places, hunting territories were monopolized and fiercely defended by hunter-gatherers because they were quickly depleted. Even among the Inuit of Arctic Canada, who were so sparse as to experience no resource competition, fighting to kidnap women was pervasive, resulting in a violent death rate 10 times higher than the USA’s peak rate of 1990, itself the highest in the developed world. In more hospitable and densely populated environments casualties averaged, as already mentioned, 15% of the population and 25% of the men, and the surviving men were covered with scars (Gat, 2006: chs 2, 6). We are not dealing here with a piece of exotic curiosity. Ninety-five percent of the history of our species Homo sapiens sapiens – people who are like us – was spent as hunter-gatherers. The transition to agriculture and the state is very recent, the tip of the iceberg, in human history. Furthermore, the human state of nature turns out to be no different than the state of nature in general. Here too, science has made a complete turnabout. During the 1960s people believed that animals did not kill each other within the same species, which made humans appear like a murderous exception and fed speculations that warfare emerged only with civilization. Since then, however, it has been found that animals kill each other extensively within species, a point pressed on every viewer of television nature documentaries. There is nothing special about humans in this regard. Thus, lethal human fighting did not ‘emerge’ at some point in history, as Levy & Thompson posit. Previous Section Next Section Violent death sharply decreased with the rise of the Leviathan As mentioned earlier and as Pinker well realizes, violent mortality actually dropped steeply with the emergence of the state-Leviathan. Here is where Levy & Thompson make a second mistake. For measuring the lethality of warfare they use evidence of battle mortality, but this is highly misleading for various reasons. First, pre-state tribes’ main fighting modes were not the battle but the raid and the ambush – capturing the enemy by surprise and often annihilating entire sleeping camps: men, women, and children. Second, the size of battles merely indicates the size of the states and their armies, which are obviously larger than tribal groups in absolute terms. Yet **the main question is relative casualties**, what percentage of the population died violently. And here the fact is that while states and their armies grew by a factor of tens, hundreds, and thousands, giving a spectacular impression of large-scale fighting, **relative casualties actually decreased** under the state, and not only because of internal peace. Indeed, casualties decreased precisely because states grew large. Take Egypt, for example, part of the ‘acceleration’ of war with the emergence of states in Mesopotamia, Egypt, Greece, and China, according to Levy & Thompson. The size of the Egyptian army with which Pharaoh Ramses II fought the Hittite empire at the Battle of Kadesh (commonly dated 1274 BCE) was 20,000–25,000 soldiers. This was a very large army by the standards of the time. Yet the total population of Egypt was about 2–3 million, so the army constituted 1% of the population at most. This was very much the standard in large states and empires throughout history because of the great financial and logistical problems of maintaining large armies for long periods at great distances from home. Thus, in comparison to the high military participation rates of small-scale tribal societies, participation rates, and hence war casualties, in large states’ armies were much lower. Moreover, in contrast to the great vulnerability of women and children in small-scale tribal warfare, the civilian population of Egypt was sheltered by distance from the theaters of military operations and not often exposed to the horrors of war. Such relative security, interrupted only by large-scale invasions, is one of the main reasons why societies experienced great demographic growth after the emergence of the state. It is also the reason why civil war, when the war rages within the country, tends to be the most lethal form of war, as Hobbes very well realized. Warfare and feuds in the pre- and early-modern eras Levy & Thompson further posit that between the 14th and early 19th centuries, Europe was the scene of a second ‘acceleration’ in the historical trajectory of violence. This is very much in line with the prevailing perceptions regarding early modern European history, but these perceptions are most probably wrong, and for the same reason as before: Levy & Thompson count absolute battle casualties, and obviously states became more centralized during this period and armies grew in number, so battles also grew in size. Yet it was the anarchy and feudal fragmentation in Europe between the fall of the Roman Empire and 1200 that were responsible for the pervasive insecurity and endemic violence that characterized the Dark Ages and resulted in, among other things, a sharp demographic decline. Again, small-scale usually meant more, not less, violent mortality. The focus on early modern Europe is misleading also in another way: in the late Middle Ages the Mongol conquests inflicted on the societies of China, Central Asia, and Eastern Europe casualties and destruction that were among the highest ever suffered during historical times. Estimates of the sharp decline experienced by the populations of China and Russia, for example, vary widely. Still, even by the lowest estimates they were at least as great, and in China almost definitely much greater, than the Soviet Union’s horrific rate in World War II of about 15%. The receding of medieval anarchy in the face of the growing European state-Leviathans was the first step towards a steep decline in the continent’s violent mortality rate beginning in early modernity and continuing to the present day. The studies and data cited by Pinker with respect to the domestic aspect of this trend are strikingly paralleled by those of Robert Muchembled’s History of Violence (2012). The work of a historian, the book meticulously documents, on the basis of French legal records, a 20-fold decrease in homicide rates between the 13th and 20th centuries. Earlier studies of other parts of Europe, starting with Gurr (1981), have come up with similar findings. Like Pinker, Muchembled attributes the steep decline to the state’s growing authority, as its justice system effectively replaced and deterred ‘private justice’, vendetta, and pervasive violence, all of them endemic in unruly societies. Correspondingly, again like Pinker, Muchembled invokes Norbert Elias’s (2000) ‘civilizing process’, whereby the defense of honor by sword and knife, a social norm and imperative in most traditional societies, is gradually given up among both the nobility and the general populace. The civilizing process is partly a function of the growing authority of the state’s rule and justice system. But there were other factors involved, which Pinker excels in identifying and weaving together. Although he is not a historian, his historical synthesis is exemplarily rich and nuanced. He specifies the growing humanitarian sensibilities in Europe of the Enlightenment, which he traces to, among other things, the gradual improvement in living conditions, growing commercial spirit and, above all, the print revolution with the attendant values and habits of reasoning, introspection, and empathy that it inculcated among the reading elites. As Pinker points out, not only did homicide rates decline but also other previously common forms of violence, such as judicial disembowelment and torture, were becoming unacceptable by the 18th century. This was the beginning of a continuous process which during the following centuries would bring about, among other things, the abolition of slavery and the decline of capital punishment, tyranny, and political violence in the developed world – most notably in the areas where the values of Enlightenment humanitarianism triumphed. Both Pinker and Muchembled identify a change in the trend towards increased violence and homicide rates in the United States and Europe from the 1960s on. They attribute this change (Pinker is particularly elaborative here) to the erosion of public authority and some reversal of the ‘civilizing process’ with the cults of youth culture, defiance of authority, radical ideologies of violence by the ‘oppressed’, and the fragmentation of the stable family structure. Pinker identifies a return to a downward trend in violence from about 1990 on, which he attributes to an ebbing of much of the above through reasserted state action and changes in the public mood. A last point worth mentioning in this context: Muchembled reveals that throughout the steep decline in homicide rates, from medieval times to the present, 90% or more of all cases have been perpetrated by men, especially between the ages of 20 and 30 years old. As Daly & Wilson (1988: 145–149) have shown, this ratio is found in each and every society studied around the globe, from hunter-gatherers to agricultural and industrial societies, irrespective of the vastly different homicide rates among them. Previous Section Next Section The decline of war and the three `Long Peaces' after 1815 We now move to the decline of war, which is our main concern here. Most people are surprised to learn that the occurrence of war and overall mortality in war sharply decreased after 1815, most notably in the developed world. The ‘Long Peace’ among the great powers after 1945 is more recognized and is widely attributed to the nuclear factor, a decisive factor to be sure, which concentrated the minds of all the protagonists wonderfully. The (inter-)democratic peace has been equally recognized. But in actuality, the **decrease in war had been very marked before the nuclear era** **and encompassed both democracies and non-democracies**. In the century after 1815, **wars among economically advanced countries declined in their frequency to** about **one-third of** what they had been in the **previous centuries, an unprecedented change**. Indeed, the Long Peace after 1945 was preceded by the second longest peace among the great powers, between 1871 and 1914, and by the third longest peace, between 1815 and 1854 (Gat, 2006: 536–537, 608). Thus, the three longest periods of peace by far in the modern great powers system all occurred after 1815. Clearly, one needs to explain the entire trend, while also accounting for the glaring divergence from it: the two World Wars. Previous Section Next Section Is modern war more lethal and destructive than before? In his earlier works, Levy (1983) was among the first to document the much-reduced frequency of war after 1815. But what brought about this change? Levy & Thompson assume – this is perhaps the most natural hypothesis – that wars declined in frequency because they became too lethal, destructive, and expensive. Supposedly, a trade-off of sorts was created between the intensity and frequency of warfare: fewer, larger wars supplanting many smaller ones. This hypothesis barely holds, however, because, again, relative to population and wealth wars have not become more lethal and costly than earlier in history. Furthermore, as Levy & Thompson rightly document, the wars of the 19th century – the most peaceful century in European history – were particularly light, in comparative terms, so there is no trade-off here. True, the World Wars, especially World War II, were certainly on the upper scale of the range in terms of casualties. Yet, as already noted, they were far from being exceptional in history. Once more, we need to look at relative casualties, general human mortality in any number of wars that happen to rage around the world, rather than at the aggregate created by the fact that many states participated in the World Wars. I have already mentioned the Mongol invasions, but other examples abound. In the first three years of the Second Punic War, 218–16 BCE, Rome lost some 50,000 citizens of the ages of 17–46, out of a total of about 200,000 in that age demographic (Brunt, 1971). This was roughly 25% of the military-age cohorts in only three years, the same range as the Russian and higher than the German rates in World War II. This, and the devastation of Rome’s free peasantry during the Second Punic War, did not reduce Rome’s propensity for war thereafter. During the Thirty Years War (1618–48) population loss in Germany is estimated at between one-fifth and one-third – either way higher than the German casualties in World War I and World War II combined. People often assume that more developed military technology during modernity means greater lethality and destruction, but in fact it also means greater protective power, as with mechanized armor, mechanized speed and agility, and defensive electronic measures. Offensive and defensive advances generally rise in tandem. In addition, it is all too often forgotten that the vast majority of the many millions of non-combatants killed by Germany during World War II – Jews, Soviet prisoners of war, Soviet civilians – fell victim to intentional starvation, exposure to the elements, and mass executions rather than to any sophisticated military technology. Instances of genocide in general during the 20th century, much as earlier in history, were carried out with the simplest of technologies, as the Rwanda genocide horrifically reminded us. Nor have wars during the past two centuries been economically more costly than they were earlier in history, again relative to overall wealth. War has always involved massive economic exertion and has been the single most expensive item of state spending (e.g. massively documented, Bonney, 1999). Examples are countless, and it will suffice to mention that both 16th- and 17th-century Spain and 18th-century France were economically ruined by war and staggering war debts, which in the French case brought about the Revolution. Furthermore, death by starvation in premodern wars was widespread. Previous Section Next Section Is it peace that has become more profitable? So if wars have not become more costly and destructive during the past two centuries then why have they receded, particularly in the developed world? The answer is the **advent of the industrial–commercial revolution** after 1815, the most profound transformation of human society since the Neolithic adoption of agriculture. The correlation between the decline of war in the developed world and the process of modernization, both unfolding since 1815, is surely not accidental, and the causation is not difficult to locate. In the first place, given explosive growth in per capita wealth, about 30- to 50-fold thus far, the Malthusian trap has been broken. Wealth no longer constitutes a **fundamentally finite quantity**, and wealth acquisition progressively **shifted** away **from a zero-sum game**. Secondly, economies are no longer overwhelmingly autarkic, **instead having become increasingly interconnected** by specialization, scale, and exchange. Consequently, foreign devastation potentially depressed the entire system and was thus **detrimental to a state’s own wellbeing**. This reality, already noted by Mill (1848/1961: 582), starkly manifested itself after World War I, as Keynes (1920) had anticipated in his criticism of the reparations imposed on Germany. Thirdly, **greater economic openness has decreased the likelihood of war by disassociating economic access from the confines of political borders and sovereignty**. It is no longer necessary to **politically possess a territory in order benefit** from it. Of the above three factors, the second one – commercial interdependence – has attracted most of the attention in the literature. But the other two factors have been no less significant. Thus, the greater **the yield of competitive economic cooperation, the more counterproductive and less attractive conflict becomes**. Rather than war becoming more costly, as is widely believed, **it is in fact peace that has been growing more profitable.** Referring to my argument in this regard, Levy & Thompson (2011: 72–75) excused themselves from deciding on the issue on the grounds of insufficient information regarding the cost of premodern war. But as already noted, the information on the subject is quite clear.

#### Neoliberal growth is the best and fastest way to reduce poverty on a global scale

**The Economist** 9-13-20**13**; “A dollar a day” <http://www.economist.com/blogs/feastandfamine/2013/09/poverty-growth-and-world-bank>

In 1991, David Dollar and Aart Kraay, both of the World Bank, published an influential paper, “Growth is good for the Poor”. It established, as an empirical matter, that when average incomes rise, the average incomes of the poorest fifth of society rise proportionately. The implication was that economic growth and its determinants—macroeconomic stability, rule of law, openness to trade and so on—benefit the poorest fifth as much as they do everyone else. This was the heyday of the "Washington consensus". The term had been coined by John Williamson of the Institute for International Economics only two years before. And the study helped confirm the then-widespread view that, as a guideline for policymakers, poor countries ought to concentrate on getting the basics of growth right, rather than on specific measures aimed at helping the poorest. They could do that too, of course. But the impact was not all that great. When Messrs Dollar and Kraay examined four interventions—primary education, social spending, agricultural productivity and improvements in formal democratic institutions—they found little evidence that these disproportionately benefited the poor. Now, Messrs Dollar and Kraay, together with Tatjana Kleineberg, have revisited their study. Using a larger and more detailed data set (118 countries not 92), they find that just over three-quarters of the improvement in the incomes of the poorest 40% is attributable to improvements in average incomes—ie, it comes mainly from growth. The title of the new paper says it all: “Growth still is good for the poor”. But the context is very different from what it was in the early 1990s. Now, the talk is all about income inequality, people being trapped in poverty and the need to help the poorest directly. Barack Obama, David Cameron, the World Bank and dozens of non-governmental organisations, for example, have signed up to the idea that extreme poverty can be eradicated by 2030 (in practice, this means reducing to about 3% the share of the world’s population subsisting on $1.25 a day or less). With hundreds of development agencies gathering in New York on September 25th to talk about "sustainable development goals" to replace the millennium goals that expire in 2015, the air is thick with talk about the problem of inequality and about how the poorest can be trapped by "business as usual". Does this mean the new paper contradicts—and possibly undermines—the post-Washington consensus? The World Bank itself has what it calls a new "overarching mission" which fits the mood of the sustainable-development goals. It commits the bank to "end extreme poverty and promote shared prosperity". It is hard to resist discerning some tension—a difference in emphasis, at least —between the aim of "promoting shared prosperity" and this sentence from the new paper: "historical experience in a large sample of countries does not provide much guidance on which combinations of macroeconomic policies and institutions might be particularly beneficial for promoting ‘shared prosperity’ as distinct from simply ‘prosperity’." If it is hard to know how to promote "shared prosperity", why not just concentrate on prosperity pure and simple? On the other hand, the mission also says that "reaching the target [of ending extreme poverty] will require sustaining high rates of economic growth across the developing world." And that is clearly consistent with the Dollar-Kraay-Kleineberg paper. The bank's description of its new mission describes the rationale for its targets. This blog, by the bank’s chief economist Kaushik Basu, explains why shared prosperity ought to be a guiding principle for the institution. Other non-governmental organisations have gone further than the World Bank. Save the Children, a charity, argues in a new paper ("Getting to Zero: how tackling inequality and governance could move us closer to finishing the job of the MDGs") that "governments must get serious about addressing income inequality and improving governance." But if economic growth produces four-fifths of the improvement in the incomes of the poorest, would it not be better to concentrate on that? Perhaps the answer depends on whether you think one-quarter of poor peoples’ income growth is a lot or a little. This is the amount that, the paper says, is not attributable to improving the incomes of people as a whole. Is it worth concentrating on that? Yes, in the sense that it can get you the extra mile, the extra 25% or so of poverty reduction, which can only be a good thing. On the other hand, it is also clear that three-quarters is a much larger share and that growth is more important. Of course, there doesn’t have to be a trade-off between the two. Ideally, one should try for both. But if there were a trade-off - if pro-poor policies compromised economic growth perhaps by causing inflation and putting macro stability at risk - then (according to the new paper) the poor would be better off if countries stick with pro-growth policies, rather than adopt pro-poor ones.