## 1

#### Appropriation is key to private sector innovation: regulations hinder it significantly.

EOPCEA 21 [Executive Office of the President Council of Economic Advisers. “Economic Report of the President.” 1/21. Chapter 8: “Exploring New Frontiers in Space Policy and Property Rights.” https://www.govinfo.gov/content/pkg/ERP-2021/pdf/ERP-2021-chapter8.pdf]

#### The Department of Defense continues to foster partnerships with the private sector through design competitions that award contracts to both large and small space technology companies, and through consulting programs that mentor small companies in competing for these contracts. These events and programs include the Space Enterprise Consortium; the Space Pitch Day, which awards grants to accelerate new technology; and the National Security Space Launch, which is helping to create new engines and launch vehicles. These partnerships help break down barriers to entry for smaller firms in this industry, which will drive competition and innovation, while decreasing the cost of operating within the space economy. To ensure that the United States maintains its leadership in space innovation and remains the flag of choice for space commerce, it must maintain a business-friendly regulatory environment that offers streamlined permitting, encourages innovation and risk-taking, and safeguards workers, the public, and property. The Trump Administration has prioritized regulatory reform over the past four years, and it continues to focus on cutting red tape in the space sector. With regulatory authorities distributed among the Federal Aviation Administration, Federal Communications Commission, and National Oceanic Atmospheric Administration, the Trump Administration has made efforts to modernize the authorization process for new space missions, as directed in Space Policy Directive-2. In addition, Federal Government procurement regulations are often complex and burdensome for the private sector. In fact, government-procured space systems were historically characterized by high costs, long program schedules, and frequent delays due to these regulations (Butow et al. 2020). This discouraged efficiency, innovation, and the entrance of new actors into the market. In the interest of increasing competition and innovation while reducing costs and bureaucracy, the Administration continues to remove undue regulatory barriers and increase the efficiency of existing processes. Doing so will foster a free and prosperous space economy, enable commercial space companies to operate more efficiently, and allow new firms to participate in the private space industry.

#### Public sector space innovation falls continues to fall short. The private sector is key to space research/innovation.

Follett 21 [Andrew Follett- previously space and science reporter for Daily Caller News Foundation, researcher for the Congressional Committee on Science, Space and Technology, the National Aeronautics and Space Administration, the Cato Institute, and the Competitive Enterprise Institute. currently conducts research analysis for nonprofit in Washington, D.C., area.. “Private Firms Are the Key to Space Exploration.” 8/21/21. National Review. https://www.nationalreview.com/2021/08/private-firms-are-the-key-to-space-exploration/]

#### America’s public-sector space program recently had a rough couple of weeks that perfectly exemplify why it desperately needs a free-market overhaul. On July 29, the International Space Station (ISS) suffered a serious loss of control after a Russian spacecraft docked with it, accidentally causing the station to make a full 540-degree rotation and a half before coming to a stop upside down, when the astronauts got it under control. Like most NASA programs, the ISS is massively over budget. Costs were initially projected at $12.2 billion, but the bill ultimately reached a stunning $150 billion. American taxpayers paid around 84 percent of that. What happened to the American dream of human space exploration? Put simply, the government happened. NASA devolved into a jobs program to bring home the space bacon. Then, on August 10, NASA’s inspector general released a report deeming plans to send astronauts back to the moon in 2024 unfeasible because of significant delays in developing the mission’s spacesuits. Right now the suits are being built by 27 different companies that successfully lobbied the government for a piece of the action. SpaceX’s Elon Musk has rightly noted that NASA has “too many cooks in the kitchen.” The difference between NASA’s cumbersome designed-by-committee suits and SpaceX’s suits — created by a single contractor — is remarkable, even to the naked eye. The report unconvincingly blames NASA’s failure to develop a new spacesuit over the last 14 years solely on shifting technical requirements. It recommends “ensuring technical requirements for the next-generation suits are solidified before selecting the acquisition strategy to procure suits for the ISS and Artemis programs.” Instead of dealing with the problem, the Biden administration is trying to distract attention from the space agency’s mismanagement by announcing plans to land the first person of color on the moon . . . even though NASA has been incapable of sending astronauts of any color into space under its own power since July 2011. NASA has been reduced to begging the Russians for a ride. The agency’s troubled Constellation program, meant to replace the Space Shuttle fleet, was canceled after tens of billions of dollars had already been spent. But NASA’s troubles are, depressingly, likely to get even worse. In November the James Webb Space Telescope (JWST) will finally launch, after taxpayers have forked over $9.7 billion. It was originally supposed to launch in 2007 on a budget of $500 million. That means the project is over a decade behind schedule and costing almost 20 times its initial budget. Perhaps the telescope, meant to locate potentially habitable planets around other stars and perhaps even extraterrestrial life, could instead search for a calendar . . . or fiscal sanity . . . in the stars? JWST isn’t the first NASA space telescope to suffer cost overruns and setbacks. The Hubble Space Telescope (HST) was originally intended to launch in 1983, but technical issues delayed the launch until 1990 because the main mirror was incorrectly manufactured. JWST is very likely to fail because it is supposed to unfold itself “origami style” in space in an extremely technically complicated process. If difficulties arise, JWST lacks HST’s generous margin for error because of its location far beyond earth’s orbit at the Sun-Earth L2 LaGrange point. NASA currently lacks the capability to send a team of astronauts out that far to fix any problems. Even if NASA could get out to JWST, the telescope doesn’t have a grappling ring for an astronaut to grab onto and thus could potentially kill astronauts attempting to fix it. It is hard to imagine a better example of the private sector’s amazing ability to outcompete government bureaucracy and mismanagement than NASA’s planned Shuttle replacement, the Space Launch System. It is estimated to cost more than $2 billion per flight. That’s on top of the $20 billion and nine years the agency has already spent developing the vehicle. Contrast that with the comparatively inexpensive $300 million spent by SpaceX to develop the Falcon 9 in a little over four years, and the fact that each Falcon 9 costs around $62 million. One SLS launch could pay for over 32 SpaceX launches. Private ventures such as SpaceX are more efficient because they have a lot more incentive to avoid excessive costs and focus on solutions: Their own money is at stake, and people spend their own money more carefully than they spend taxpayer dollars collected from others. Multiple private American space firms are currently pursuing accomplishments beyond those of NASA, and they are more advanced and ambitious than the entire government space programs of China and the European Union combined. So one possible solution to NASA’s woes would be to greatly increase its reliance on commercial launch providers. And one way to do that would be to return to the system that made civil aviation great: prizes to reward private-sector innovation. Charles Lindbergh flew across the Atlantic Ocean in pursuit of the privately funded Orteig prize, valued at almost $395,000 in today’s money. Another famous example was the X Prize, which rewarded Burt Rutan’s company Scaled Composites with over $14 million in today’s money for becoming the first nongovernmental organization to launch a reusable and manned space vehicle, SpaceShipOne. The X Prize succeeded in creating over $100 million in investment by private corporations and individuals. Aerospace experts expect that establishing a $10 billion prize for successfully landing a crew on Mars and returning it safely to earth could very well lead to a successful landing. That’s a bargain compared with the $500 billion cost estimates NASA puts out for the same objective. And of course in the worst-case failure scenario for a prize program, taxpayers would pay nothing until the mission was complete. A system based on private enterprise incentivized by a fixed prize would end government cost overruns and waste. The cause of space exploration is simply too important to leave to the public sector.

#### Space research solves climate change.

Autry 19 [Greg Autry- Professor of Space Leadership, Policy and Business at Thunderbird School of Global Management. Former NASA Presidential Appointee. “Space Research Can Save the Planet—Again.” 7/20/19. Foreign Policy. https://foreignpolicy.com/2019/07/20/space-research-can-save-the-planet-again-climate-change-environment/]

**Climate change is a poster child for the critical role of space data.** Trekking across the globe to measure ice sheets with drills and gauge sea temperatures from the sides of ships is an expensive, slow, and insufficient way to assay the state of the planet. **Satellites operated by NASA, the U.S. National Oceanic and Atmospheric Administration, and an increasing number of commercial firms provide a plethora of multispectral imaging and radar measurements of developments such as coral reef degradation, harmful plankton blooms, and polar bears negotiating thinning ice.** Much of the technology involved in observing the Earth today was initially developed for probes sent to explore other planets in our solar system. IT WAS NASA SATELLITE DATA THAT REVEALED A FRIGHTENING AND GROWING HOLE IN THE OZONE LAYER OVER THE SOUTH POLE, GALVANIZING PUBLIC CONCERN THAT, IN 1987, PRODUCED THE MONTREAL PROTOCOL: THE FIRST INTERNATIONAL AGREEMENT ADDRESSING A GLOBAL ENVIRONMENTAL PROBLEM. **Indeed, understanding the evolution of other planets’ climates is essential for modeling possible outcomes on Earth.** NASA probes revealed how, roughly 4 billion years ago, a runaway greenhouse gas syndrome turned Venus into a hot, hellish, and uninhabitable planet of acid rain. Orbiters, landers, and rovers continue to unravel the processes that transformed a once warm and wet Mars into a frigid, dry dust ball—and scientists even to conceive of future scenarios that might terraform it back into a livable planet. Discovering other worlds’ history and imagining their future offers important visions for climate change mitigation strategies on Earth, such as mining helium from the moon itself for future clean energy. **Spinoff technologies from space research, from GPS to semiconductor solar cells, are already helping to reduce emissions; the efficiency gains of GPS-guided navigation shrink fuel expenditures on sea, land, and air by between 15 and 21 percent—a greater reduction than better engines or fuel changes have so far provided.** Modern solar photovoltaic power also owes its existence to space. The first real customer for solar energy was the U.S. space program; applications such as the giant solar wings that power the International Space Station have continually driven improvements in solar cell performance, and NASA first demonstrated the value of the sun for powering communities on Earth by using solar in its own facilities. **Promisingly, space-based solar power stations could overcome the inconvenient truth that wind and solar will never get us anywhere near zero emissions because their output is inherently intermittent and there is, so far, no environmentally acceptable way to store their power at a global scale, even for one night. Orbital solar power stations, on the other hand, would continually face the sun, beaming clean power back through targeted radiation to Earth day or night, regardless of weather. They would also be free from clouds and atmospheric interference and therefore operate with many times the efficiency of current solar technology.** Moving solar power generation away from Earth—already possible but held back by the current steep costs of lifting the materials into space—would preserve land and cultural resources from the blight of huge panel farms and save landfills from the growing problem of discarded old solar panels. Sustainable energy advocates in the U.S. military and the Chinese government are actively pursuing space-based solar power, but just making solar cells damages the environment due to the caustic chemicals employed. Space technology offers the possibility of freeing the Earth’s fragile biosphere and culturally important sites from the otherwise unavoidable damage caused by manufacturing and mining. The U.S. start-up Made in Space is currently taking the first steps toward manufacturing in orbit. The company’s fiber-optic cable, produced by machinery on the International Space Station, is orders of magnitude more efficient than anything made on Earth, where the heavy gravity creates tiny flaws in the material. Made in Space and others are eventually planning to build large structures, such as solar power stations, in space. As these technologies develop, they will augment each other, bringing costs down dramatically; space manufacturing, for instance, slashes the cost of solar installations in space.

#### Space research is key to solving climate change.

Derr 21 [Emma Derr- External communications specialist. “Space is Crucial to Understanding Climate Change.” 9/17/21. NEI. https://www.nei.org/news/2021/space-is-crucial-to-understanding-climate-change]

**Space developments in the last two decades have greatly contributed to our understanding of our planet’s climate**. Satellite imaging, space exploration, and new technologies give us an idea of the big picture and how we can adapt to address climate change. For example, **satellites in space have played a critical role in our understanding of the causes of global warming by providing us with a large body of data to examine the variations in the Earth’s orbit. Data from these capabilities were essential inputs into the Intergovernmental Panel on Climate Change’s (IPCC) recent report that focused on how the physical science of climate change informs likely impacts under five different emissions scenarios.** The report also found that climate change is happening quicker than we thought, making the need to reduce emissions imminent. To address this, **space infrastructure such as positioning, navigation, and timing (PNT) can help identify efficient transportation routes and sources of emissions, ultimately aiding mitigation efforts.** Time Progression of the Ozone Hole Over Antarctica This series of images shows the size and shape of the thinning ozone layer over Antarctica each year from 1979-2019. Red and yellow areas indicate the ozone hole. Credit to nasa.gov. NASA’s Earth System Observatory, **the next generation of Earth science satellites that will launch in the next decade, reflect the importance of Earth imaging. This constellation of satellites is designed to provide information about our planet ranging from the location of forest fires to the sea level rise to our agricultural processes.** It will be able to collect data at the regional and local levels and connect critical interactions between the atmosphere, land, ocean and ice, significantly bolstering our understanding of the Earth’s climate. **Another large focus of the initiative is predicting severe weather and answering questions surrounding aerosols,** which are particles in the atmosphere that are a key source of uncertainty in predicting climate change. Alongside adding funding to FEMA, the Biden Administration announced the development of the Earth System Observatory, indicating its support for the program in understanding how climate change is impacting communities. **Space exploration is foundational to climate science because it provides us with more information about the Earth, our solar system and the role of gases in our atmosphere, and nuclear energy has played an important role powering our missions into space**. In 1969, NASA launched Nimbus III, a nuclear-powered spacecraft, that is the first U.S. satellite to gather vital oceanographic data, such as measurements of sea ice and the ozone layer. The spacecraft also measured atmospheric temperature, water vapor and ozone, as well as the amount of ultraviolet radiation reaching our atmosphere from the sun. Cassini, a nuclear-powered probe into Saturn and its moons, released the Huygens probe which collected important data about what earth may have looked like in its state before humans evolved. The mission revealed Titan to be one of the most Earth-like worlds we’ve encountered and has shed light on the history of our home planet. Nuclear energy has powered dozens of interplanetary missions, which have gathered critical information about our universe. These make up some of the most successful and inspiring missions in U.S. space exploration history. Climate and space technologies build off of each other, as evidenced by solar photovoltaic panels first gaining a foothold in the space industry. Nuclear energy can be positioned to experience such a catalyst with new investments in nuclear space technologies. As climate change intensifies, space exploration and Earth observation will become increasingly important to gathering critical data. We must meet the moment by investing in these missions and recognizing nuclear power’s important role in space technologies.

#### Space mining provides a reservoir for resources that benefits the environment.

Delay & Bendebury 20 [Michael Delay, Anastasia Bendebury. “Is space mining the eco-friendly choice?.” 11/11/20. Astronomy. https://astronomy.com/news/2020/11/is-space-mining-the-eco-friendly-choice]

**Over the course of the next 50 years, even conservative estimates suggest another 2 billion to 3 billion people will enter the market for cars, houses, and the latest tech gadgets. And as the crest of the population wave looms, so do the insistent alarm-bells of human impact — collapsed fisheries, exploited tar sands, and scorched forests devoid of wildlife.** It’s a grim picture, one made even more poignant by wall-to-wall coverage of yet another catastrophic wildfire season in the midst of a pandemic. But it’s also a reality we must face head-on if we aim to continue to grow and thrive as both a species and planet. However, the age-old question remains: **Where will we get the resources? The solution, according to some, is outer space.** At the 2016 Recode conference, Jeff Bezos breezily suggested that we “don’t want to live in a retrograde world where we have to freeze population growth.” In his vision of the future, CNBC reported, “Earth will be zoned residential and light industrial.” **Operations like mining, which take a heavy toll on the environment, would be moved off Earth.** It’s a magnificently far-fetched idea, one that’s more at home in the pages of a novel than on the front page of the New York Times. But **humanity is already moving in that direction.** The Moon could serve as the first off-world industrial assembly and processing location. **In addition to the presence of abundant raw materials, the Moon is an ideal place to stage more elaborate missions.** The polar water reservoirs will also be extremely useful for producing rocket fuel for those missions. The space rush In this rendition of the human timeline, we don’t abandon heavy industry. We learn to manufacture what we need to maintain our lives in the cold vacuum of space, just in time to give Earth a break. The race to build an industrial foundation in space has already begun, too: Musk promises Mars Base Alpha by 2028; Bezos’ own Blue Origin is working on a “sustained human presence on the Moon;” and NASA’s Lunar Gateway, a permanent orbital station, is set to go into operation by the end of the decade. In 40 years, launch costs have fallen from $85,000 per kilogram to less than $1,000/kg, and NASA hopes to get this under $100/kg in the next few years. This trajectory makes space-mining advocate and Skycorp CEO Dennis Wingo more certain than ever that we are on the cusp of a new era of space mining. He reiterates to Astronomy that “industrial activity on the Moon is how we can make things better here on Earth.” Instead of returning raw materials from the Moon to Earth, which Wingo suggests would “be kind of like shipping dirt from Jakarta to the U.S.,” the space-mining industry would chase profits by finding ways to process raw materials directly at their icy, remote sources. On the horizon, he envisions a solar-powered lunar base capable of producing the gigawatt-level power needed for mining. A potential layout for a Moon base is seen in this artist’s concept. Central, is an electromagnetic catapult called a mass-driver, that would fling spacecraft into orbit. The lack of atmosphere makes transport of materials into orbit much, much more efficient for the moon than back home on Earth. NASA The lunar surface, in his eyes, is an incredibly efficient place for industrial processes. Wingo calculates that “the best vacuum you can get on the Earth is about 10-5 Torr.” (That’s about one one-hundred-millionth the standard pressure at sea level.) “But on the lunar surface, you have infinite quantities of 10-12 Torr.” Under those conditions, it’s possible to efficiently process raw lunar regolith — the pulverized rock that covers the Moon’s surface — into valuable materials. As you “heat regolith to over 2,000 degrees Celsius [3,632 degrees Fahrenheit], the metal oxides it contains dissociate into metal and oxygen,” says Wingo. “That waste oxygen can be compressed and stored or used for breathing.” This creates a self-sustaining system that doesn’t entirely avoid waste products, but still keeps the caustic remnants of mining far from the life-giving ecosystems upon which we depend for survival. The way Wingo sees it, the Moon could be a testing grounds for new extraction techniques, power-plants, and assembly protocols. Proven operations could then radiate outward from Earth and the Moon into the asteroid belt, where the mineral wealth of the solar system has been estimated to run into the quintillions of dollars. Though the upfront costs of establishing extraterrestrial industry is extremely high, the eventual returns could be beyond the greatest riches the world has ever seen. **Once bases have been successfully established on the Moon, a wealth of other asteroids are immediately available in our solar system’s interior**. Craft for those missions will be manufactured in lunar orbit using local materials. Pablo Carlos Budassi Keeping it above board

## Case

**Interp: The aff must disclose the plan text and the advantage 30 minutes before round**

**Violation: A screenshot of a computer

Description automatically generated**

**They didn’t, they didn’t even put their contact info on the wiki**

**1] Evidence Ethics – Disclosure is the only way to verify that cards aren’t miscut or highlighted or bracketed unethically. That’s a voter – maintaining ethical ev practices is key to being good academics and we should be able to verify you didn’t cheat**

**2] Depth of clash – allows debaters to have specific researched objections to the 1AC evidence – that leads to better ev comparison – o/ws because thinking on your feet is non-unique; we still have to do that for responses and CX**

**3] Reciprocity – they get infinite pre-round prep to write the 1AC and we get none to research it**

**4] Education – a) their model incentivizes terrible “one-and-done” affs that are intellectually bankrupt and decrease education – proves they just want the ballot; b) o/ws claims of innovation because innovation is only valuable if the ideas are valuable.**

**5] trigger warning -**

**Voters are education – it’s why schools fund debate – and fairness – that’s a threshold issue because otherwise you have no obligation to fairly evaluate their arguments**

**Paradigm issues**

**DTD**

**1] Actual abuse - I had to alter my strat to run theory**

**2] Deters future abuse – norm-setting**

**3] DTA is DTD – it’s the 1AC**

**4] At minimum if we’re winning any part of the shell they can’t weigh case; A] lack of preround prep means their truth claims are untested which you should presume them false; B] 1AR extensions look stronger than they really are b/c they kept me from cutting specific evidence to challenge their link chain – that’s a reason why new affs are bad, not why the 1AC is true –no “try or die” 2AR**

#### Competing interps: Reasonability is arbitrary and encourages judge intervention since there’s no clear norm.

#### No RVIs – a] illogical, you don’t win for proving that you meet the burden of being fair, logic outweighs since it’s a prerequisite for evaluating any other argument, b] RVIs incentivize baiting theory and prepping it out which leads to maximally abusive practices.

Don’t’ let them get away with small school response – im a small school too, with no resources or anything – no excuse not to discose -plently of free reoscoures to leanr how to disclose