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THE REVOLUTION OF THE COMMERCIAL SPACE INDUSTRY: WHY CURRENT LAWS MUST BE REPLACED BEFORE AMERICAN BUSINESS EXPANDS TO THE MOON AND BEYOND

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ABSTRACT:

Space, the final frontier. Resting at the rim of the Earth, an endless void full of opportunity awaits those who are willing to take a leap of faith. Historically, only national space programs have been capable of orchestrating expeditions to outer space. However, American aerospace companies now rival governmental entities in their abilities to operate beyond the Earth's atmosphere. State-of-the-art developments in aerospace technology have positioned the American commercial space sector to become more productive than national space programs in the years to come. Unfortunately, the potential of the American commercial space sector is severely hindered under the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space (Outer Space Treaty)—an international treaty enacted in 1967 that governs all American activities in outer space. This Note explores how specific provisions of the Outer Space Treaty can have a negative impact on American aerospace companies and proposes new legislation which can serve as a foundation of law for the ever-evolving American commercial space sector.

INTRODUCTION

"One small step for man. One giant leap for mankind."[1]

The famous words of Apollo 11's Commander Neil Armstrong echoed throughout the world on July 20, 1969, as the United States landed a lunar module on the Moon's surface and mankind took its first steps towards exploring the final frontier—outer space.[2] The monumental success of the National Aeronautics and Space Administration (NASA) to guide the United States to victory in the space race[3] serves as one of America's most historic achievements and represents the precise moment that humankind's

1. Linda Herridge, *50 Years Ago: Apollo Astronauts Land, Take First Steps on Moon*, NASA (July 20, 2019), https://www.nasa.gov/feature/50-years-ago-apollo-astronauts-land-take-first-us-steps-on-moon.

2. *Id.*

3. *See* History.com Editors, *The Space Race*, HISTORY (Feb. 21, 2020), https://www.history.com/topics/cold-war/space-race ("By landing on the moon, the United States effectively 'won' the space race that had begun with Sputnik's launch in 1957. For their part, the Soviets made four failed attempts to launch a lunar landing craft between 1969 and 1972, including a spectacular launch-pad explosion in July 1969. From beginning to end, the American public's attention was captivated by the space race, and the various developments by the Soviet and U.S. space programs were heavily covered in the national media.")

relationship with outer space changed forever.[4] As a result of NASA's triumph, the horizon of space exploration broadened substantially and expeditions to the Moon were finally within reach of mankind for the first time in history.[5]

Following the success of Apollo 11, NASA returned to the Moon five more times before halting manned missions to the lunar surface due to budgetary constraints.[6] By the conclusion of Apollo 17, the United States had successfully landed twelve people on the Moon, collected a variety of Moon rocks, and planted the American flag on lunar soil.[7] Despite NASA's groundbreaking achievements, however, NASA failed to establish a lasting human presence on the Moon.[8] Since 1972, no person has touched foot on the Moon and all human contact with celestial bodies has been made through the utilization of machines.[9] Even though the United States government has slowed its initiatives concerning human space travel,[10] outer space still remains a frontier for innovation and economic opportunity. Regardless of NASA's hesitation to return astronauts to the Moon, American companies have begun to recognize the potential of human beings sustaining a lasting presence on the Moon and other planets within the solar system.[11]

Since the original Moon landing, aerospace companies have joined the United States government in the ability to travel beyond the confines of Earth's atmosphere.[12] Private companies have expanded their business capabilities due in part to large investments into the commercial space

4. Herridge, *supra* note 1.

5. *See* Sarah Loff, *Apollo 11 Mission Overview,* NASA (May 15, 2019), https://www.nasa.gov/mission_pages/apollo/missions/apollo11.html.

6. *See* Dan Vergano, *We Got to the Moon Six Times. Here's Why America Really, Really Didn't Want to Go Back.*, BUZZFEED (July 19, 2019), https://www.buzzfeednews.com/article/danvergano/nasa-apollo-moon-landings-ended-50-years (NASA's manned missions to the Moon stopped in part because "there really wasn't any appetite for these more expansive efforts at the time. [T]hat was largely about cost." Once the Americans beat the Soviets to the Moon in the space race, interest in the lunar program fell and some viewed Moon expeditions as a waste of tax dollars).

7. Dave Mosher & Hilary Brueck, *Astronauts explain why nobody has visited the moon in more than 45 years – and the reasons are depressing*, BUS. INSIDER (July 19, 2019), https://www.businessinsider.com/moon-missions-why-astronauts-have-not-returned-2018-7 (The Apollo program was the United States' third human spaceflight program and resulted in eleven successful spaceflights and six manned missions to the Moon. Apollo 17 was NASA's last successful manned mission to the Moon, which touched down on the lunar surface in December 1972).

8. *Id.*

9. *See* Mike Wall, *It's 2019. Why Haven't Humans Gone Back to the Moon Since the Apollo Missions?*, FUTURE US, INC. (July 21, 2019), https://www.space.com/after-apollo-why-not-go-back-to-the-moon.html. A celestial body is any natural body outside of the Earth's atmosphere. Examples are the Sun, Moon, and additional planets within the solar system. *Id*.

10. Ann Martin, *Why hasn't NASA gone back to the moon?*, ASTRONOMY DEPT. CORNELL UNIV. (June 25, 2015), http://curious.astro.cornell.edu/legal-information/45-our-solar-system/the-moon/the-moon-landings/121-why-hasn-t-nasa-gone-back-to-the-moon-beginner.

11. *See* Herridge, *supra* note 1.

12. *See Commercial Space Activities*, SPACE POL'Y ONLINE, https://spacepolicyonline.com/topics/commercial-space-activities/#us-aerospace-companies (last visited Oct. 27, 2020).

industry.[13] The vast increase in capital allowed these companies to fast-track innovation of aerospace technology, which led to cost reductions in building, launching, and operating interstellar machinery within the solar system.[14] As a result of the vast expansion of the commercial space sector, the global space economy eclipsed $414.75 billion in 2018[15] and is anticipated to exceed more than one trillion dollars by 2040.[16]

Returning people to the Moon is now a primary goal of several American commercial space companies. The expected growth of the global space economy is directly related to the increasing capabilities of these privatized space programs.[17] For example, SpaceX recently became the first company to launch astronauts into orbit on a commercial spacecraft, dock the spacecraft with the international space station, and return the astronauts safely back to Earth.[18] The company saw $1.9 billion in new funding within a single month following these accomplishments.[19] However, American corporations are focusing on business opportunities far more ambitious than simply transporting astronauts to the international space station.[20] Their current aspirations include transporting private astronauts to the Moon,[21] mining elements from celestial bodies,[22] and developing lunar bases to serve as the foundation for future space exploration.[23] The implementation of these ultra-modern commercial masterplans will redefine America's relationship

13. Charles E. Miller, *The revolution that is commercial space is just beginning*, SPACENEWS (Nov. 15, 2018), https://spacenews.com/op-ed-the-revolution-that-is-commercial-space-is-just-beginning/ (Note that a primary reason the United States government halted human space exploration was because there was not enough money to fund the program).

14. *Id.*

15. Space Foundation Editorial Team, *The Space Report Reveals 2018 Global Space Economy Exceeded $400 Billion for the First Time*, SPACE FOUND (July 15, 2019), https://spacefoundation.org/2019/07/15/the-space-report-reveals-2018-global-space-economy-exceeded-400-billion-for-the-first-time/.

16. Michael Sheetz, *Morgan Stanley says 2019 could 'be the year for space,' led by the likes of SpaceX and Blue Origin,* CNBC (Nov. 28, 2018), https://www.yahoo.com/now/morgan-stanley-says-2019-could-200200440.html.

17. *See* Adam Mann, *So You Want to Be a Space Tourist? Here Are Your Options*, NBC NEWS (July 21, 2017), https://www.nbcnews.com/mach/science/so-you-want-be-space-tourist-here-are-your-options-ncna784166.

18. *See* Samantha Mathewson, *SpaceX raises $1.9 billion in latest funding round: report*, FUTURE US, INC. (Aug. 22, 2020), https://www.space.com/spacex-raises-1.9-billion-funding-round.html.

19. *Id.*

20. *See Commercial Space Activities*, SPACE POL'Y ONLINE, https://spacepolicyonline.com/topics/commercial-space-activities/#brief (last updated Sep. 4, 2020, 5:18 PM).

21. *See* Vision, VIRGIN GALACTIC, https://www.virgingalactic.com/vision/ (last visited Nov. 8, 2020).

22. *See* Leonard David, *Moon Mining Could Actually Work, With the Right Approach,* FUTURE US, INC. (Mar. 15, 2019), https://www.space.com/moon-mining-space-exploration-report.html.

23. *NASA SELECTS LUNAR OPTIMIZED STARSHIP*, SPACEX, https://www.spacex.com/updates/nasa-selects-lunar-optimized-starship/ (last visited Nov. 8, 2020).

with outer space once more,[24] much like NASA did with the success of the Apollo program years ago.[25]

Some have suggested a second space race has begun.[26] This time, instead of the Soviet Union and the United States scrambling to be the first to reach the lunar surface,[27] multinational companies are competing to become the first private entity to expand business practices to the Moon and the stars.[28] American commercial space companies are already far along into creating technology that can transport people beyond Earth's atmosphere.[29] For instance, SpaceX advertises its Starship Program as "a fully reusable transportation system designed to carry both crew and cargo to . . . the Moon . . . and beyond."[30] Further, Blue Origin maintains that its Blue Moon Lunar Transport is capable of "delivering a wide variety of small, medium, and large payloads to the lunar surface . . . [which] will enable a sustained human presence on the Moon."[31] Commercial space companies do not limit the sale of their products to government entities, they market services to civilian customers as well.[32] Civilian customers can solicit seat reservations for Blue Origin's New Shephard suborbital spaceflight rocket system today,[33] with ticket prices likely to exceed $200,000 per seat.[34]

While the excitement surrounding the commercial space sector is comparable to NASA's Apollo program,[35] an unresolved key issue pertaining to American companies expanding their business capabilities into outer space still exists. The ability of American companies to establish a sustained commercial presence on the Moon and in space is severely limited under the *Treaty on Principles Governing the Activities of States in the Exploration and*

24. *See Commercial Space Activities*, *supra* note 20.

25. *See* Herridge, *supra* note 1.

26. *See* Luis Sanchez, *Which Companies Are Winning the Commercial Space Race,* MOTLEY FOOL (Aug. 15, 2019), https://www.fool.com/investing/2019/08/05/which-companies-are-winning-commercial-space-race.aspx.

27. *See id.*

28. *Id.*

29. *See* Lauren Grush, *This Was The Decade The Commercial Spaceflight Industry Leapt Forward,* THE VERGE (Dec. 11, 2019), https://www.theverge.com/2019/12/11/20981714/spacex-commercial-spaceflight-space-industry-decade-nasa-business.

30. *Starship*, SPACEX, https://www.spacex.com/vehicles/starship/ (last visited Nov. 8, 2020).

31. *Blue Moon*, BLUE ORIGIN, https://www.blueorigin.com/blue-moon (last visited Nov. 8, 2020).

32. *Reserve a Seat*, BLUE ORIGIN, https://www.blueorigin.com/new-shepard/become-an-astronaut/reserve-a-seat (last visited Nov. 8, 2020).

33. *Id.*

34. Dan Neal, *Price, the Final Frontier: Blue Origin's Tourist Rocket*, WALL ST. J. (Apr. 12, 2019), https://www.wsj.com/articles/price-the-final-frontier-blue-origins-tourist-rocket-11555083002#:~:text=Dodd%20noted%20that%20Blue%20Origin's,undercut%20Virgin%20Galactic%2C%E2%80%9D%20Mr.

35. *See Houston We Have a Podcast: Space Tourism and Commercialization*, NASA (Aug. 2, 2019), https://www.nasa.gov/johnson/HWHAP/space-tourism-and-commercialization.

Use of Outer Space (Outer Space Treaty),[36] which stands as the leading body of law governing the commercial space sector in the United States today.[37]

The Outer Space Treaty is older than the Apollo 11 mission itself.[38] In 1967, during the middle of the Cold War, the United States joined several other space-hopeful countries in signing the Outer Space Treaty.[39] The purpose of the treaty was to limit the extraterrestrial activities of countries competing in the space race.[40] Essentially, this treaty served as an international consensus aimed to preserve peace and restrict hostile activities from being conducted in outer space or on celestial bodies by national space programs.[41] As a result, the Outer Space Treaty became the world's first set of legal principles for space exploration, which still maintains that "the exploration and use of outer space . . . shall be carried out for the benefit and in the interest of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind."[42]

Throughout the Cold War, the Outer Space Treaty served a relevant purpose for the United States by prohibiting military activity off Earth and holding signees accountable for their respective space programs,[43] however, the law contained within has become obsolete.[44] The Outer Space Treaty overly limits property rights in outer space and exposes the United States government to liability straining from the actions of American commercial space companies.[45] Given the increasing certainty that American businesses will reach the Moon in the foreseeable future, the United States should govern its commercial space sector in a way that is comparable to other industries operating beyond the borders of sovereign nations. Thus, the United States should withdraw from the Outer Space Treaty and adopt new legislation that (1) permits American commercial space companies to utilize outer space and celestial bodies for commercial purposes, (2) subjects American businesses to liability for damages deriving from commercial activities conducted in outer space, and (3) establishes simple regulatory principles governing the American commercial space sector that can serve as a foundation of law for future commercial space legislation.

36. *See* Christopher Gawronski, *Where No Law Has Gone Before: Space Resources, Subsequent Practice, and Humanity's Future in Space,* 79 OHIO ST. L.J. 175, 176 (2018).

37. Treaty on Principles Governing the Activities of the States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205, 6 I.L.M. 386 [hereinafter Outer Space Treaty].

38. *See* Gawronski, *supra* note 36, at 176.

39. *Id.*

40. *See* Grush, *supra* note 29.

41. *Id.*

42. *See* Outer Space Treaty, *supra* note 37.

43. See Grush, *supra* note 29.

44. *See* Brian Bozzo, *Not Because It Is Easy: Exploring National Incentives For Commercial Space Travel Through a Geopolitical Lens,* 71 DREXEL L. REV. 597, 601 (2018).

45. *Id.*

This Note discusses how the Outer Space Treaty prohibits American aerospace companies from accomplishing their objectives beyond the Earth's atmosphere and proposes new legislation which can serve as a foundation of law for the evolving American commercial space sector. Part I discusses how the Outer Space Treaty negatively impacts the American commercial space sector and why the United States should withdraw from it entirely. Part II addresses how supplemental American laws that govern activity in outer space continue to prohibit American commercial space companies from maximizing full business potential. Part III proposes legislation that governs extraterrestrial property rights and commercial liability in outer space, while additionally proposing a new regulatory scheme that can support the future of American commercial space endeavors.

I. HOW THE OUTER SPACE TREATY THREATENS THE WELFARE OF THE AMERICAN COMMERCIAL SPACE SECTOR

A. THE OUTER SPACE TREATY

Although the Outer Space Treaty is 53 years old, it is still the leading body of law that governs commercialized space endeavors in 2020.[46] When the United States signed the Outer Space Treaty, it agreed to halt "a new form of colonial competition and the possible damage that self-seeking exploitation might cause"[47] in an initiative primarily focused on deterring nations with nuclear capabilities from positioning weapons of mass destruction in orbit around Earth and prohibiting the construction of military institutions on the Moon.[48] While the Outer Space Treaty is very clear on its governance of military endeavors and colonial expansion, it lacks clarity on commercial activity conducted in outer space.[49]

As it pertains to commercial activities, the language of the Outer Space Treaty is incredibly vague, probably because a commercial enterprise beyond the Earth's atmosphere was not a realistic possibility in 1967.[50] Furthermore, the provisions of the Outer Space Treaty that address commercial space activities have left many nations confused due to their ambiguity.[51] Such

46. Outer Space Treaty, *supra* note 37.

47. Bureau of Arms Control, *Verification and Compliance, Narrative on Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies,* U.S. DEP'T STATE, https://www.state.gov/t/isn/5181.htm#narrative (last visited Nov. 8, 2020).

48. *See generally* Kerry Kolbe, *Space Race timeline: when the US and the USSR squared up*, TEL. (Feb. 3, 2017), https://www.telegraph.co.uk/films/hidden-figures/space-race-events-timeline/.

49. *See* Karla Lant, *Ambiguous Laws Could Prevent Us from Taking Full Advantage of Celestial Resources*, FUTURISM (Aug. 31, 2017), https://futurism.com/ambiguous-laws-could-prevent-us-from-taking-full-advantage-of-celestial-resources.

50. *See id.*

51. *Id.*

language has also proven to hinder the capabilities of the American commercial space industry due to overly restrictive legal constraints.[52] To best understand why the Outer Space Treaty is a threat to the prosperity of the American commercial space sector, it is necessary to grasp how the Outer Space Treaty commercial provisions operate and why they can be problematic for commercial space.[53]

There are three articles included within the Outer Space Treaty that impact the American commercial space sector.[54] First, Article II of the Outer Space Treaty (the Appropriation Clause) addresses the appropriation of space and celestial bodies, including the Moon.[55] Second, Article VI of the Outer Space Treaty (the Regulation Clause) maintains that any commercial space companies—with ties to a signee—conducting activities in outer space or on celestial bodies are subject to the regulation of at least one country that is a signee to the Outer Space Treaty.[56] Third, Article VII of the Outer Space Treaty (the Liability Clause) holds that any and all objects or people that are sent into outer space are liabilities to the country of origin.[57] This Part explores the Appropriation Clause, Regulation Clause, and Liability Clause in depth, while explaining how the Outer Space Treaty jeopardizes the health of the American commercial space sector as a whole.

1. Article II: The Appropriation Clause

The Appropriation Clause provides that "outer space, including the moon and other celestial bodies, [are] not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means."[58] The Appropriation Clause is limited to a brief 31 words.[59] It is incredibly vague and does not clearly explain law vital to the commercial space industry today.[60] Specifically, the definition of "national appropriation" is omitted.[61] Due to this ambiguity, signees to the Outer Space Treaty are left to determine whether commercial appropriation—or commercial activity in general—falls under the scope of national appropriation and is therefore barred by the Outer Space Treaty.[62] Although the Appropriation Clause fails to clearly outline the legal functionality of the commercial space sector,[63] several nations assert

52. Bozzo, *supra* note 44, at 607.
53. *Id.*
54. *Id.*
55. *See* Outer Space Treaty, *supra* note 37.
56. *Id.*
57. Bozzo, *supra* note 44, at 610.
58. *See* Outer Space Treaty, *supra* note 37.
59. *Id.*
60. Stephen Gorove, *Interpreting Article II of the Outer Space Treaty*, 37 FORDHAM L. REV. 349, 349 (1969) (The Appropriation Clause does not define the scope of outer space, nor does it explain the concept of appropriation).
61. *Id.* at 352.
62. *Id.* at 349.
63. *Id.*

that the Appropriation Clause prohibits nongovernmental entities from appropriating outer space and celestial bodies for commercial purposes.[64] If the United States chose to abide by this interpretation of the Appropriation Clause, the American commercial space sector would suffer tremendously since any business initiatives that incorporate celestial land or utilize specific areas of outer space would be deemed illegal under the Appropriation Clause.[65]

The United States has made few decisions regarding the types of property rights afforded to commercial space companies under the Outer Space Treaty.[66] Be that as it may, the United States will be inclined to make additional decisions soon due to the expanding capabilities of the American commercial space sector.[67] American companies have already developed the technology to reach the Moon now and imminently plan to do so[68] Yet there is no law currently in place that distinctly governs the property rights of an American corporation planning to embark on a commercial space venture to the Moon.[69] Because the Appropriation Clause is too vague to support the American commercial space sector and the Outer Space Treaty is outdated, they should be replaced by Congress before American businesses are prepared to venture deeper into space.[70]

2. Article VI: The Regulation Clause

The Regulation Clause of the Outer Space Treaty maintains that any nongovernmental entity operating in outer space or on a celestial body will be supervised by at least one national regulatory body.[71] Specifically, the Regulation Clause provides:

> States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty. When activities are carried on in outer space, including the Moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty

64. Lant, *supra* note 49. (Belgium, Russia, and Brazil argue that the "national appropriation" language in the Outer Space Treaty prohibits resource mining on celestial bodies).
65. *Id.*
66. *Id.*
67. *Id.*
68. Starship, *supra* note 30.
69. *See* Outer Space Treaty, *supra* note 37.
70. Lant, *supra* note 49.
71. *See* Outer Space Treaty, *supra* note 37.

> shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization.[72]

Essentially, the Regulation Clause impacts the commercial space sector in three ways. First, the Regulation Clause "makes no difference as to whether the activities at issue [are] the state's own or those of private actors."[73] Second, a signee has the power to permit private space activities at its discretion.[74] Third, signees who permit a private space activity have a mandatory legal duty to continually regulate that private space activity.[75] It follows that, in a commercial context, the Regulation Clause aims to create a reality where at least one country will be responsible for the oversight of a corporation doing business beyond the atmosphere of Earth.[76]

Although national oversight of aerospace companies is reasonable on its face, the Regulation Clause may be relied upon to impede the capabilities of the American commercial space sector.[77] For example, if a state regulatory body authorizes a nongovernmental entity to appropriate the Moon and regulates that appropriation pursuant to the Regulation Clause, one can argue that the nongovernmental entity's appropriation of the Moon is actually "national appropriation" under the Appropriation Clause due to the term's ambiguity.[78] This is a strong argument because the Regulation Clause makes any commercial appropriation of outer space or a celestial body unlawful without a state regulatory body authorizing and supervising that appropriation.[79] As a result, one could contend that any commercial appropriation is national appropriation since appropriation cannot occur without national oversight.[80] Thus, this interpretation of the Regulation Clause may severely inhibit the ability of American commercial space companies to maximize their business capabilities beyond the Earth's

72. *Id.*

73. Frank G. von der Dunk, *The Origins of Authorisation: Article VI of the Outer Space Treaty and International Space Law*, SPACE, CYBER, AND TELECOMMS. L. PROGRAM FAC. PUBL'NS (2011), https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1068&context=spacelaw.

74. Michael J. Listner, *A reality check on Article VI and private space activities*, SPACENEWS (June 6, 2017), https://spacenews.com/a-reality-check-on-article-vi-and-private-space-activities/.

75. *Id.*

76. *See* Christopher D. Johnson, Daniel Porras, Christopher M. Hearsey, Sinead O'Sullivan, *The Curious Case of the Transgressing Tardigrades*, THE SPACE REV. (Aug. 26, 2019), https://www.thespacereview.com/article/3783/1.

77. Cristin Finnigan, *Why the Outer Space Treaty remains valid and relevant in the modern world*, SPACENEWS (Mar. 12, 2018), https://thespacereview.com/article/3448/1 (Arguing generally, if the United States does withdraw from the Outer Space Treaty, it should incorporate language pulled from the Regulation Clause that would give the United States government control to regulate the industry. Just as other industries in the United States are regulated by the appropriate United States government office, the regulation of the commercial space sector would need to be enforced by the appropriate governing body).

78. *Id.*

79. *Id.*

80. *Id.*

atmosphere because their activities in outer space may reasonably be regarded as national appropriation under the Outer Space Treaty.[81]

Since the Outer Space Treaty is an international treaty ratified by the United States, the judiciary has an obligation to enforce its laws pursuant to Article VI of the United States Constitution.[82] If a legal claim arose under the Outer Space Treaty within United States jurisdiction, whether commercial appropriation is considered to fall under the veil of national appropriation will ultimately rely upon the legal interpretation of a federal judge.[83] Anticipating how a judge will rule is unpredictable and can vary drastically.[84] Thus, it would be safer for the prosperity of the American commercial space sector if a judge was never required to interpret the Regulation Clause of the Outer Space Treaty at all.[85] Although the purpose of the Regulation Clause should not be entirely rejected in future legislation, the law as it stands within the Outer Space Treaty threatens the welfare of the American commercial space industry and the United States should replace the Outer Space Treaty with new legislation that clearly permits commercial appropriation to some extent.

3. Article VII: The Liability Clause

Under the Liability Clause of the Outer Space Treaty, a nation is liable for any and all objects and people it sends into outer space, including objects or people belonging to a nongovernmental entity.[86] Further, signees to the Outer Space Treaty retain jurisdiction, ownership, and control of items on their registry that are left in outer space or on celestial bodies.[87] Specifically, the Liability Clause provides:

> A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body. Ownership of objects launched into outer space, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space or on a celestial body or by their return to the Earth. Such objects or component parts found beyond the limits of the State Party to the Treaty on whose registry they are carried shall be returned to that State Party, which shall, upon request, furnish identifying data prior to their return.[88]

81. *Id.*
82. Listner, *supra* note 74.
83. *See* Frank H. Easterbrook, *Legal Interpretation and the Power of the Judiciary*, 7 HARV. J.L & PUB. POL'Y 87, 94-95 (1984).
84. *Id.* at 96.
85. *Id.* at 94-95.
86. Bozzo, *supra* note 44, at 610. (When a private American business launches an object into outer space, the object is registered under the United States' registry).
87. *See* Outer Space Treaty, *supra* note 37.
88. *Id.*

Essentially, the Liability Clause "[holds] state parties responsible for the actions of their nongovernmental entities,"[89] and provides that the proper signee maintains jurisdiction, ownership, and control of everything it vacates beyond the Earth's atmosphere.[90]

The Liability Clause leaves the United States vulnerable to liability for all American commercial activities in outer space,[91] including those that have been regarded as common practice in the commercial space industry for decades.[92] American nongovernmental entities have long possessed the ability to send satellites into outer space.[93] Launching objects beyond the Earth's atmosphere is not a newfound practice for commercial space companies.[94] Due to the increasing capabilities of the American commercial space sector, this common practice will only continue to develop.[95] Therefore, due to the Liability Clause's language regarding liability, there is a seemingly incomplete regulatory framework that governs the commercial space sector which subjects the United States to liability it should not bear the burden for.[96]

Under separate bodies of law that govern other industries, the United States is not held liable for damages that strain from the actions of corporate actors.[97] Thus, it does not make sense for the United States to be held liable for the actions of American commercial space companies pursuant to the Liability Clause. For example, when an American company owns a vessel that is operated by its crew members on international waters, and those crew members collide that American vessel with a foreign vessel, the United States government is not liable to pay damages on behalf of the American company.[98] Conversely, when an American company owns a spacecraft that is operated by private astronauts in outer space, and those private astronauts collide with a foreign satellite, the United States is liable to pay damages on behalf of the American company pursuant to the Liability Clause.[99] The reality is that the Liability Clause abates a risk of liability for any activities

89. James A Vedda, *The Outer Space Treaty: Assessing its Relevance at the 50-Year Mark*, AEROSPACE CORP. (June, 2017), https://aerospace.org/sites/default/files/2018-05/OuterSpace Treaty.pdf.

90. *See Mind the Gap (In Space Law That Is)*, FOR ALL MOONKIND, https://www.forallmoonkind.org/2018/12/09/mind-the-gap/ (last visited Nov. 8, 2020).

91. Outer Space Treaty, *supra* note 37.

92. *See* Johnny Wood, *The countries with the most satellites in space*, WORLD ECON. F. (Mar. 4, 2019), https://www.weforum.org/agenda/2019/03/chart-of-the-day-the-countries-with-the-most-satellites-in-space/.

93. *See Telstar*, SMITHSONIAN NAT'L AIR & SPACE MUSEUM, https://airandspace.si.edu/collection-objects/communications-satellite-telstar (last visited Nov. 8, 2020).

94. Wood, *supra* note 92.

95. Grush, *supra* note 29.

96. Johnson, Porras, *et al., supra* note 76.

97. *See* 46 U.S.C. § 30505.

98. *Id.*

99. *See* Outer Space Treaty, *supra* note 37.

conducted in outer space for American commercial space companies because all liability is automatically shifted to the United States government.[100]

In actuality, the Outer Space Treaty negating the liability of commercial space companies for actions occurring off Earth[101] is damaging to the American commercial space sector. First, without a culture of accountability, the commercial space sector will likely suffer.[102] If there are limited consequences for the failures of commercial space companies, there is a heightened chance of ineffective execution.[103] Second, if there is a commercially related accident occurring in outer space and the United States becomes liable for damages due to that commercially related accident, the United States would be less inclined to authorize commercial space activities pursuant to the Regulation Clause in fear of being held liable for future damages. In the same token, investors may decide to withdraw their funding from the American commercial space industry.[104] Third, if the United States becomes hesitant to authorize commercial space activities, it will become significantly harder for American commercial space companies to achieve their business initiatives.[105] Therefore, the United States should abandon the Liability Clause, withdraw from the Outer Space Treaty in order to protect the financial interests of the United States government, and establish a high standard of care for American commercial space companies looking to expand business to outer space.

II. WHY ADDITIONAL AMERICAN COMMERCIAL SPACE LAWS ARE INADEQUATE TO GOVERN THE IMPENDING BOOM OF THE COMMERCIAL SPACE SECTOR

Since the United States signed the Outer Space Treaty in 1967,[106] American legislation supplementing the treaty has been adopted sparingly despite the gradually increasing prevalence of the commercial space economy.[107] For better or for worse, the United States has embraced select legislation that has significantly impacted the commercial space sector.[108] First, the Convention on International Liability for Damage Caused by Space Objects (the Liability Convention) is an international treaty signed by the United States that serves as an auxiliary to the Liability Clause of the Outer

100. *Id.*
101. *Id.*
102. *See* Craig Hickman, *6 Pitfalls of a Lack of Accountability in the Workplace — and How to Fix Them*, PARTNERS IN LEADERSHIP (Apr. 10, 2018), https://www.partnersinleadership.com/insights-publications/pitfalls-of-lack-workplace-accountability/.
103. *Id.*
104. *See* Outer Space Treaty, *supra* note 37.
105. *Id.*
106. *Id.*
107. *See Space Law*, SPACE POL'Y ONLINE https://spacepolicyonline.com/topics/commercial-space-activities/#us-aerospace-companies (last visited Nov. 8, 2020).
108. *Id.*

Space Treaty.[109] Second, the 1984 Commercial Space Launch Act (the Launch Act) designates the Department of Transportation (DOT) as the federal agency responsible for overseeing American commercial space launches and commercial space flight.[110] Third, the 2015 Commercial Space Launch Competitiveness Act (the SPACE Act) awards American companies property rights to resources mined from asteroids.[111] This Part explores the Liability Convention, Launch Act, and SPACE Act in depth, and explains whether each provision is beneficial for the welfare of the American commercial space sector, as well as describing how these regulations are still insufficient to govern the unremitting boom of the commercial space economy.

A. THE LIABILITY CONVENTION

The Liability Convention was signed by the United States in 1972 and creates supplemental law that acts as a companion to the Liability Clause of the Outer Space Treaty.[112] The Liability Convention provides "that a launching State shall be absolutely liable to pay compensation for damage caused by its space object[s] on the surface of the Earth or to aircraft in flight,"[113] and "[the launching state is] liable for damage due to its faults in space."[114] Further, the Liability Convention lays out a procedural method to bring a claim for damages which maintains "[a] State which suffers damage, or whose natural or juridical persons suffer damage, may present to a launching State a claim for compensation for such damage."[115] The Liability Convention is designed to reinforce the Liability Clause of the Outer Space Treaty and seeks to accommodate for space-related accidents[116] by creating

109. *See* 24 U.S.T. 2389.

110. Commercial Space Launch Act, Oct. 30, 1984, 84 CIS PL 98575 (In 1998, Congress also passed the 1998 Commercial Space Act, which broadened the regulatory power of the DOT to include the authority to police any American commercial spacecraft as it reenters the Earth's atmosphere from outer space). *See* Commercial Space Act of 1998, Oct. 28,1998, P.L. 105-303.

111. *See generally* United States Commercial Space Launch Competitiveness Act, May 12, 2015, 114 H.R. 2262.

112. *See* 24 U.S.T. 2389.

113. *Id.* (The term "damage" is defined by the Liability Convention as "loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations." The term "space object" is defined by the Liability Convention as "component parts of a space object as well as its launch vehicle and parts thereof").

114. United Nations, *Convention on International Liability Caused by Space Objects*, https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introliability-convention.html (last visited Nov. 8, 2020).

115. 24 U.S.T. 2389.

116. Pavle Kilibarda, *Space law revisited: The regime of international liability in space*, MEDIUM (Apr. 27, 2017), https://medium.com/law-and-policy/space-law-revisited-the-regime-of-international-liability-in-space-66a864fa5157.

procedural law for "presenting and resolving claims for damages caused by space objects on the Earth, to aircraft, or to other space objects."[117]

Similar to the Liability Clause of the Outer Space Treaty,[118] the Liability Convention continues to leave the United States vulnerable to liability for all American nongovernmental activities occurring in outer space or on celestial bodies.[119] Although the Liability Convention implements a procedure for a claim to be brought under the Liability Clause, there is still an insufficient regulatory substructure governing the American commercial space sector that exposes the United States government to liability it should not bear the burden for.[120] Instead of adding legislation that would hold American commercial space companies accountable for their actions in outer space or on celestial bodies, the Liability Convention only makes it easier for parties to bring a claim for damages against the United States for the activities of its nongovernmental entities.[121]

The Liability Convention is a step backward for the American commercial space sector.[122] The Liability Convention bolsters the design of the Liability Clause by creating a clear and concise set of procedural law, which any American commercial space company can easily cite to avoid claims brought against it for damages straining from extraterrestrial commercial activities.[123] This is problematic for the commercial space sector because such conduct can diminish a culture of accountability.[124] As previously mentioned, the United States will become hesitant to authorize commercial space activities if the country is in jeopardy of being held liable for damages straining from the actions of aerospace entities.[125] The Liability Convention can be troublesome for American commercial space companies given that limited authorization from the United States government will damper opportunities to enhance commercial space initiatives,[126] which may result in reduced cash flow and harm the overall commercial space economy.[127] Therefore, the Liability Convention negatively impacts the American commercial space sector and its work in tandem with the Liability Clause of the Outer Space Treaty is not sufficient to govern commercial liability in outer space or on celestial bodies.

117. *See Space Law*, SPACE POL'Y ONLINE, https://spacepolicyonline.com/topics/space-law/#domestic (last visited Nov. 23, 2019).
118. *See generally* Outer Space Treaty, *supra* note 37.
119. *See generally* 24 U.S.T. 2389.
120. Johnson, Porras, et al., *supra* note 76.
121. *See* 24 U.S.T. 2389.
122. *See generally* Outer Space Treaty, *supra* note 37.
123. *See* 24 U.S.T. 2389.
124. Hickman, *supra* note 102.
125. *See* Outer Space Treaty, *supra* note 37.
126. *Id.*
127. *See generally* Jean Murray, *Cash Flow – How It Works to Keep Your Business Afloat*, THE BALANCE SMALL BUS. (July 17, 2019), https://www.thebalancesmb.com/cash-flow-how-it-works-to-keep-your-business-afloat-398180.

B. THE LAUNCH ACT

The Launch Act was passed by Congress in 1984 and appointed the DOT as the federal agency in charge of regulating launch activities of the American commercial space sector.[128] The Launch Act maintains that the "DOT [is] the principal oversight agency for commercial launch operations and licensing" and is responsible for "facilitat[ing] commercial space launches."[129] In 2004, the Launch Act was amended to broaden the DOT's regulatory power to include the oversight of commercial human spaceflight.[130] In retrospect, the Launch Act was a motion by Congress to appoint an American regulatory body to authorize and regulate commercial space activity in a manner consistent with the Regulation Clause of the Outer Space Treaty.[131]

The Launch Act's designation of the DOT as the managerial body tasked with governing the commercial space industry was a positive movement for the American commercial space sector because it created an American space arena that is impartial.[132] The purpose of the Regulation Clause of the Outer Space Treaty does not independently threaten the American commercial space industry.[133] Yet, when the Regulation Clause is combined with the language of the Appropriation Clause, it threatens the welfare of the American commercial space industry by potentially barring select commercial space endeavors.[134] Regardless of whether or not the United States withdraws from the Outer Space Treaty, there should remain a governmental regulatory body responsible for the oversight of American aerospace companies since it will best ensure that the law is administered equally throughout the American commercial space sector.[135]

Even though the Launch Act's purpose was a step in the right direction for the American commercial space industry, it is not the best foundation of law for the future regulation of the commercial space sector. Until now, the Launch Act served a relevant purpose for the United States, but the law omitted language necessary to permit the DOT to regulate upcoming commercial space initiatives.[136] For example, the Launch Act fails to grant the DOT regulatory powers to oversee commercial robotic spaceflight.[137] American commercial space companies not only plan on sending private

128. Space Law, *supra* note 117. (Since the passing of the Launch Act, the DOT has designated the Federal Aviation Administration's Office of Commercial Space Transportation as the proper DOT branch to regulate commercial launches and commercial human spaceflight).

129. Commercial Space Launch Act, Pub. L. No. 98-575, 98 Stat. 3055 (1984).

130. Space law, *supra* note 117.

131. *See generally* Outer Space Treaty, *supra* note 37.

132. *See* Commercial Space Launch Act, Pub. L. No 98-575, Oct. 30, 1984, 98 Stat. 3055.

133. Finnigan, *supra* note 77.

134. *Id.*

135. *See generally* Commercial Space Launch Act, Pub. L. No 98-575, Dec. 23, 2004, 98 Stat. 3055.

136. *Id.*

137. *See* Commercial Space Launch Amendments Act of 2004, Pub. L. No. 108-492, Dec. 23, 2004,, 118 Stat. 3974.

astronauts into outer space, but also unmanned spacecraft.[138] Thus, the Launch Act should either be amended to include a wider variety of commercial space activities or be replaced entirely prior to the impending boom of the commercial space sector.

The United States government has already identified that the Launch Act may be ill-equipped to regulate the commercial space industry.[139] On May 24, 2018, President Donald Trump issued Space Policy Directive-2 (SPD-2),[140] which outlined a plan to designate the Department of Commerce (DOC) as a "one-stop shop" for any and all regulations concerning the American commercial space sector.[141] Further, in response to SPD-2, the Secretary of Commerce, Wilbur Ross, introduced the idea of moving all commercial space regulatory functions into a newly created DOC office: the Bureau of Space Commerce.[142] Although the new plan did not pass in Congress,[143] the idea of creating a new administrative agency to oversee the future of the American commercial space industry may not be a bad idea.[144] Given the complexity of the commercial space sector and the unknowns that the industry will certainly face, housing all regulatory power under one roof may eliminate the disadvantages of bureaucracy.[145] Therefore, the creation of a "one-stop shop" regulatory body could be increasingly positive for the American commercial space economy.[146]

C. THE SPACE ACT

The SPACE Act was passed by Congress in 2015[147] and serves as the only law since the Outer Space Treaty to address American property rights in outer space and on celestial bodies.[148] The purpose of the SPACE Act is "[t]o facilitate a pro-growth environment for the developing commercial

138. *See* Matt Williams, *Robotic asteroid mining spacecraft wins a grant from NASA*, UNIVERSE TODAY (June 14, 2019), https://www.universetoday.com/142524/robotic-asteroid-mining-spacecraft-wins-a-grant-from-nasa/.

139. *See* Jen Rae Wang, *New Space Policy Directive Calls for Human Expansion Across Solar System*, NASA (Dec. 11, 2017), https://www.nasa.gov/press-release/new-space-policy-directive-calls-for-human-expansion-across-solar-system.

140. *See Commercial Space Activities*, SPACE POL'Y ONLINE, https://spacepolicyonline.com/topics/commercial-space-activities/ (last visited Nov. 8, 2020).

141. *Id.*

142. Jeff Foust, *Commerce Department seeks to increase American space industry's global competitiveness,* SPACENEWS (Apr. 9, 2019), https://spacenews.com/commerce-department-seeks-to-increase-american-space-industrys-global-competitiveness/.

143. Commercial Space Activities, *supra* note 140.

144. Foust, *supra* note 142.

145. *See Remarks by U.S. Commerce Secretary Wilbur L. Ross at the Sixth National Space Council Meeting*, http://spaceref.com/news/viewpr.html?pid=54536 (last visited Nov. 8, 2020) [hereinafter *Remarks*] (statement of U.S. Com. Sec'y Wilbur L. Ross).

146. Foust, *supra* note 142.

147. United States Commercial Space Launch Competitiveness Act, May 12, 2015, 114th Cong. (2015).

148. *See* Outer Space Treaty, *supra* note 37.

space industry by encouraging private sector investment and creating more stable and predictable regulatory conditions[.]"[149] The SPACE Act's impact on the commercial space sector is drastic because it grants property rights to American commercial space companies that mine elements and minerals from resources located beyond Earth's atmosphere.[150] Ultimately, the SPACE Act's allowance of limited celestial property rights demonstrates Congress' narrow interpretation of "national appropriation" pursuant to the Appropriation Clause of the Outer Space Treaty. Therefore, the SPACE Act indicates how American legislation governing the commercial space sector may develop in the future.

The SPACE Act is a legislative milestone that revolutionizes the American commercial space industry because it contains provisions creating the first instance of commercial extraterrestrial property rights in the United States.[151] The SPACE Act grants American commercial space companies the power to mine space resources and retain property rights over what is collected from celestial bodies.[152] As a result of this legislation, American commercial space companies can own, sell, and distribute any elements or minerals they mine in outer space.[153] Given that several American companies have business initiatives that include mining celestial bodies for natural resources, the SPACE Act is a monumental feat for the American commercial space sector.[154] Further, the SPACE Act indicates that Congress does not consider commercial appropriation to be considered national appropriation under the Appropriation Clause of the Outer Space Treaty.[155] Therefore, the SPACE Act is likely the first of several laws that will substantially expand the rights of American businesses looking to exert property rights in outer space and on celestial bodies.[156]

149. United States Commercial Space Launch Competitiveness Act, May 12, 2015, 114th Cong. (2015)..

150. H.R. 1508, 114th Cong. § 2 (2015) (The term "space resources" is not specifically defined, thus, is broad enough to encompass resources found on celestial bodies).

151. *See* United States Commercial Space Launch Competitiveness Act, May 12, 2015, 114th Cong. (2015).

152. Space Law, *supra* note 117.

153. *See* Gbenga Oduntan, *Who Owns Space? US Asteroid-Mining Act is Dangerous And Potentially Illegal*, CONVERSATION (Nov. 25, 2015), https://theconversation.com/who-owns-space-us-asteroid-mining-act-is-dangerous-and-potentially-illegal-51073.

154. *See* Jesse Dunietz, *Floating Treasure: Space Law Needs to Catch Up with Asteroid Mining*, SCI. AM. (Aug. 28, 2017), https://www.scientificamerican.com/article/floating-treasure-space-law-needs-to-catch-up-with-asteroid-mining/.

155. *See* Kurt Taylor, *Fictions of the Final Frontier: Why the United States Space Act of 2015 is Illegal*, 33 EMORY. INT'L L. REV. 653, 662-63 (2019).

156. *See* Dominic Basulto, *How property rights in outer space may lead to a scramble to exploit the moon's resources*, WASH. POST (Nov. 18, 2015), https://www.washingtonpost.com/news/innovations/wp/2015/11/18/how-property-rights-in-outer-space-may-lead-to-a-scramble-to-exploit-the-moons-resources/.

Conversely, while Congress considers the SPACE Act to abide by the law contained within the Outer Space Treaty,[157] some signees of the Outer Space Treaty believe that the SPACE Act directly violates the Apprpriation Clause.[158] Specifically, Russia, Brazil, and Belgium claim that the SPACE Act "runs afoul of the [Outer Space] treaty[,]" and considers commercial mining to be national appropriation under the Appropriation Clause.[159] This argument is founded upon a broader reading of the term "national appropriation" under the Appropriation Clause.[160] Nonetheless, whether or not a signee considers the Outer Space Treaty to dictate that commercial appropriation is considered national appropriation under the Appropriation Clause, the Outer Space Treaty "[does not] provide [signees] with much guidance," and this dispute is likely to remain a perpetual argument of statutory interpretation.[161] Therefore, as long as the United States is a party to the Outer Space Treaty, fellow signees may choose to disagree with the legality of the SPACE Act which may result in sanctions against the United States for its "breach" of the Outer Space Treaty due to the "illegal" behavior of its commercial space companies.[162]

III. PROPOSED LEGISLATION

In an effort to manufacture a legislative regime that is stable, comprehensible, and well equipped to govern the growing parameters of the American commercial space sector, the United States should withdraw from the Outer Space Treaty and adopt new legislation that, at a minimum, creates a foundation of law which can serve as a legal substructure for the future of the American commercial space economy. Whether that legislation comes in the form of a domestic law or an international treaty replacing the current accord is irrespective of the fact that new legislation must remedy the shortcomings of the Outer Space Treaty and existing supplemental American commercial space laws.

Ultimately, there are three legal domains that the United States should consider after withdrawing from the Outer Space Treaty. First, the United States needs to expand on the limited commercial property rights provided by the SPACE Act[163] and adopt legislation that specifically outlines the boundaries of the commercial appropriation of outer space and celestial bodies. Second, the United States should secede from the Liability

157. *Id.*
158. Taylor, *supra* note 155, at 662.
159. Dunietz, *supra* note 154.
160. Finnigan, *supra* note 77.
161. Dunietz, *supra* note 154.
162. *See* Beth Delay, *The Outer Space Treaty has been remarkably successful – but is it right for the modern age?*, CONVERSATION (Jan. 27, 2017), https://theconversation.com/the-outer-space-treaty-has-been-remarkably-successful-but-is-it-fit-for-the-modern-age-71381.
163. United States Commercial Space Launch Competitiveness Act, H.R. 2262, 114th Cong. § 51303 (2015).

Convention[164] and adopt legislation that shifts the burden of liability for extraterrestrial commercial activities from the United States government to the American commercial space sector. Third, the United States should adopt a configuration of the legislation proposed in SPD-2[165] and regulate the American commercial space industry under one roof through the utilization of a new government office tasked with solely regulating the American commercial space industry. While additional law will be needed to supplement this proposed legislation, these three domain proposals can serve as the foundation for American commercial space law as governance necessities continue to expand and develop with the growth of the commercial space industry in the future.

A. THE COMMERCIAL APPROPRIATION DOMAIN

Due to the far-reaching business aspirations of American commercial space companies,[166] the United States must elaborate on the limited property rights afforded by the SPACE Act.[167] Although the SPACE Act was a step in the right direction for the American commercial space sector,[168] the limited power of American nongovernmental entities to maintain property rights over materials mined from space objects[169] is not broad enough to sustain the growth of the industry.[170] While the United States should not expand property rights to incorporate sovereignty, modern technology is extending the limits of the commercial space sector[171] and American companies' business initiatives will require the ability to utilize lunar land in the near future.[172] Fortunately, legislators do not need to look too far to discover an American body of law which can serve as a substructure for commercial land use on the Moon. Legislation governing deep sea mining can be relied upon as provisional legislation governing extraterrestrial property rights and land use until the commercial space sector is better understood by legislators and commercial space law adapts to problems that are currently unforeseen in the industry.

Under the Deep Seabed Hard Mineral Act of 1980 (DSHMRA), the United States has consistently maintained the position that American businesses have the right to mine the seabed of international waters.[173]

164. *See* 24 U.S.T. 2389.
165. Wang, *supra* note 139.
166. Commercial Space Activities, *supra* note 140.
167. United States Commercial Space Launch Competitiveness Act H.R. 2262, 114th Cong. § 51303 (2015).
168. Dunietz, *supra* note 154.
169. United States Commercial Space Launch Competitiveness Act, H.R. 2262, 114th Cong. § 51303 (2015).
170. Delay, *supra* note 162.
171. Commercial Space Activities, *supra* note 140
172. Blue Origin, *supra* note 31.
173. 30 U.S.C. § 1401(12) (2002).

Similar to the SPACE Act, the DSHMRA gives American businesses property rights over materials mined from global commons.[174] However, unlike the SPACE Act, the DSHMRA explicitly allows American corporations to make claims to areas within international waters.[175] The only limitations to these claims are that (1) American corporations are unable to lay claim to sovereignty over these areas, and (2) activities conducted under the protection of the DSHMRA must respect the rights of other nations engaging in the same activities.[176] Therefore, although the high seas are considered an international global common,[177] the DSHMRA explicitly permits American businesses to utilize areas beyond the boundaries of the United States for commercial purposes without exercising sovereignty over those domains or preventing other entities from engaging in similar activities.[178]

Given the SPACE Act only allows American corporations to exercise property rights over materials mined from celestial bodies, it would be highly beneficial for American legislators to borrow language from the DSHMRA when crafting new commercial space legislation in the future. Incorporating law akin to the DSHMRA and applying it to the commercial space arena would grant American aerospace companies the ability to occupy areas in outer space or on celestial bodies for commercial purposes.[179] For example, similar to how an American corporation is permitted to assemble and operate an oil rig on international waters under the DSHMRA,[180] an American commercial space company should be able to construct and manage a lunar base on the Moon for business purposes so long as the corporation does not claim sovereignty and does not prohibit other entities from participating in similar activities. If the United States were to tailor the law within the DSHMRA to be applied beyond Earth's atmosphere, legislators can begin to chip away at the shortcomings of the SPACE Act and lay the groundwork for a relatively untouched area of law pertaining to extraterrestrial property rights and land use.

However, if the United States were to adopt language straining from the DSHMRA and apply it as provisional legislation governing outer space and celestial bodies, there is a possibility that the private sector can abuse the powers given to it through new legislation. Communal property systems have

174. *See* Steven Groves, *The U.S. Can Mine the Deep Seabed Without Joining the U.N. Convention on the Law of the Sea*, HERITAGE FOUND. (Dec. 4, 2012), https://www.heritage.org/report/the-us-can-mine-the-deep-seabed-without-joining-the-un-convention-the-law-the-sea.

175. *Id.*

176. *Id.*

177. Jeffery L. Dunoff, *Reconciling International Trade with Preservation of the Global Commons: Can We Prosper and Protect?*, 49 WASH. & LEE L. REV. 1407, 1408 (1992).

178. Groves, *supra* note 174, at 5.

179. 30 U.S.C. § 1401(12) (2002).

180. *Id.*

historically created an "incentive for individual over exploitation."[181] Given that a majority of the Earth's resources are in jeopardy of being exhausted by commercial entities,[182] "global commons are susceptible to overuse."[183] When incorporating provisions of the DSHMRA that would allow for corporations to occupy extraterrestrial areas, legislators must only provide leeway to occupancy rights as needed. Giving the American commercial space industry too much freedom in outer space can be dangerous, and until legislators better understand the byproducts of the commercial space sector, the law should tread lightly in these areas.

Nevertheless, an adaptation of the DSHMRA can be overwhelmingly positive for the American commercial space sector. American commercial space companies looking to establish a sustained presence on the Moon,[184] mine on celestial bodies,[185] or deliver private astronauts to the lunar surface[186] need a body of law that clearly regulates the activities necessary to accomplish these business initiatives. Thus, the United States should implement law borrowed from the DSHMRA that will grant commercial space companies the ability to occupy areas on celestial bodies and in outer space for business purposes. In doing so, the law will better accommodate the ambitions of American commercial space sector while also constructing a legislative foundation that can be built upon when new problems arise in the future.

B. THE COMMERCIAL LIABILITY DOMAIN

In addition to new laws governing extraterrestrial property rights and land use, a revised legislative composition is required to best regulate the liabilities of American commercial space companies operating in outer space or on celestial bodies. The Outer Space Treaty, later reinforced by the Liability Convention, has left the United States government subject to liability it should not bear the burden for[187] while also diminishing a sense of corporate responsibility amongst the commercial space sector.[188] Ultimately, as the law currently stands, the United States is liable for all damages caused by American nongovernmental entities that occur beyond Earth's

181. *See* Erin A. Clancy, *The Tragedy of the Global Commons*, 5 IND. J. GLOBAL LEG. STUD. 601, 604 (1998).

182. *See* Anne-Sophie Brandlin, *The Earth is exhausted – we're using up its resources faster than it can provide*, DEUTSHE WELLE (Jan. 8, 2017), https://www.dw.com/en/the-earth-is-exhausted-were-using-up-its-resources-faster-than-it-can-provide/a-39924823.

183. Clancy, *supra* note 181, at 604.

184. Blue Moon, *supra* note 31.

185. *See* James E Dunstan, *Mining outer space may be cool but is it legal*, ROOM (Jan. 7, 2016), https://room.eu.com/article/mining-outer-space-may-be-cool-but-is-it-legal.

186. Starship, *supra* note 30.

187. *See* 24 U.S.T. 2389.

188. Hickman, *supra* note 102.

atmosphere.[189] Given that the legislation governing extraterrestrial liability was crafted during a time where the commercial space industry was dormant,[190] the United States is overdue for new liability policies. Again, legislators should examine the legislative framework regulating international waters to serve as a preliminary tool until lawmakers become more accustomed to issues unique to the commercial space industry. Specifically, the United States should adopt principles used by the United Nations Convention on the Law of the Sea (the Sea Convention) concerning the nationality of ships to influence and enforce commercial liability in outer space.

The United Nations created a legal system with the Sea Convention that can be useful for legislators looking to craft new liability policies for commercial activities beyond the Earth's atmosphere. First, under Article 91 of the Sea Convention, "[e]very State shall fix the conditions for the grant of its nationality to ships . . . and for the right to fly its flag."[191] Second, under Article 94 of the Sea Convention, "every State shall . . . assume jurisdiction under its internal law over each ship flying its flag and its master, officers and crew in respect of administrative, technical and social matters concerning the ship."[192] Simply put, a vessel sailing on international waters is subject to the law of the country whose flag it is flying, with the exception of select circumstances.[193] Utilizing principles contained within the Sea Convention, lawmakers may apply variations of Article 91 and Article 94 to commercial space vehicles, lunar bases, private astronauts, and other entities related to the commercial space sector while subjecting them to the laws of the United States. For example, similar to how a commercial vessel sailing on international waters that flies the American flag is subject to the domestic laws of the United States,[194] a commercial space vehicle or commercial lunar base dawning the American flag can be subjected to American commercial space laws. Thus, to reform legislation concerning commercial liability in space and on celestial bodies, lawmakers should first adopt language similar to Article 91 and Article 94 of the Sea Convention. This would give the United States jurisdiction to govern commercial space activities in a manner similar to the governance of the high seas.

Once legislators adopt a variation of the Sea Convention that grants the United States jurisdiction over American commercial constructs operating beyond the Earth's atmosphere, a redesigned commercial liability doctrine

189. Rachel Rogers, *The Sea of the Universe: How Maritime Law's Limitation on Liability Gets it Right, and Why Space Law Should Follow By Example*, 26 IND. J. GLOBAL LEG. STUD. 741, 755 (2019).

190. Lant, *supra* note 49.

191. United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397.

192. *Id.*

193. *See* Julia Layton, *If I'm on a cruise ship, what laws do I have to adhere to?,* HOWSTUFFWORKS (Apr. 7, 2008), https://people.howstuffworks.com/cruise-ship-law1.htm.

194. *Id.*

can be implemented to govern the commercial space sector. The Outer Space Treaty and the Liability Convention allow for commercial space entities to avoid liability for damages that occur in space or on celestial bodies.[195] Due to the rapid growth of the commercial space industry, this legislative structure is unsustainable and will ultimately result in the United States wasting funds on damages that should be covered by the private entities responsible for causing them. Further, corporate responsibility is weakened under the current liability legislation because the funds of commercial space companies are safeguarded from financial accountability.[196] For these reasons, the United States must implement a policy that places liability for damages on the American commercial space sector. In doing so, American commercial space companies will have a reinforced incentive to ensure that their actions in outer space and on celestial bodies are conducted in a manner that is safe, well thought out, and that limits the physical and fiscal risks that are associated with activity conducted beyond the Earth's atmosphere.

Conversely, while shifting the burden of commercial liability from the United States government to American commercial space companies is necessary for the long-term health of the commercial space economy, many businesses may struggle to remain financially solvent if they are subjected to pay the full amount of damages for accidents in space.[197] Scholars have voiced concerns that, due to the high price tag that accompanies extraterrestrial commercial activities, single-party liability can be problematic for space exploration and ultimately harm the industry.[198] In response to these fears, arguments have been made in support of a commercial space limited-liability scheme that mimics the United Nations Convention on Limitation of Liability for Maritime Claims (the Limited-Liability Convention).[199] Under the Limited-Liability Convention, the owner of a commercial vessel operating on international waters may limit liability for maritime claims up to a maximum sum, regardless of the total amount of damages.[200] Thus, if a similar doctrine was applied to the commercial space industry, a monetary cap would limit the damages a commercial space company could be liable for and the threat of insolvency would be moderately diminished.

However, while the Limited-Liability Convention scheme is feasible and could be easily applied to the commercial space sector, a better system lives within the American private insurance industry. America's history of capitalism is the strongest argument to support a single-party liability

195. *See* 24 U.S.T. 2389.
196. *Id.*
197. Rogers, *supra* note 189, at 754.
198. *Id.*
199. *Id.* at 749.
200. *See* Convention on Limitation of Liability for Maritime Claims, *opened for signature* Nov. 19, 1976, 1987 U.N.T.S. 222.

scheme; the global space industry's financial value is expected to grow substantially over the next century.[201] In response to valuations of the commercial space economy, private insurance companies have released insurance products aimed to cover the activities of commercial space companies operating beyond the Earth's atmosphere.[202] Anticipating that the insurance industry will continue to evolve with the commercial space sector, legislators should not fear a single-party liability scheme that subjects commercial space companies to damages straining from their actions in outer space or on celestial bodies. Therefore, the United States should withdraw from the Outer Space Treaty and the Liability Convention and implement a single-party liability policy that shifts liability from the American government to the American commercial space sector.

C. THE REGULATORY LIABILITY DOMAIN

Finally, the United States should adopt a configuration of the legislation proposed in SPD-2[203] and regulate the American commercial space industry under one roof through the utilization of a new government office. Due to the niche professional fields that populate the commercial space sector, creating a new government office that houses a majority of governance functions is the best option to allow industry experts to regulate the growing capabilities of the American commercial space industry.[204] Further, the creation of a sole regulatory office would be a pro-business strategy that would allow American companies to shorten the time required to accomplish business initiatives by allowing the government to swiftly approve commercial space endeavors.[205] Consequently, due to the ease of operating beneath a single regulatory body, the American commercial space economy would flourish.

Conversely, the alternative to a single-bodied regulatory system would be a variety of government offices attempting to regulate bits and pieces of the commercial space industry independently. The result of a diversified governance scheme is a bureaucratic process that forces the American commercial space sector become sluggish.[206] Given that SPD-2 already voiced the bureaucratic concerns surrounding the commercial space sector, it can be anticipated the American government is already bracing itself to react to the imminent boom of the commercial space economy. Therefore, to best accommodate the needs of the commercial space industry, the United States

201. *See* Alicja Grzadkowska, *Lloyd's launches ground-breaking space insurance policy*, KEY MEDIA (Dec. 4, 2019), https://www.insurancebusinessmag.com/us/news/breaking-news/lloyds-launches-groundbreaking-space-insurance-policy-193870.aspx.

202. *Id.*

203. Wang, *supra* note 139.

204. *See Remarks, supra* note 145 (statement of U.S. Com. Sec'y Wilbur Ross).

205. Mike Wall, *Trump's new Space Policy Directive 2 Could Make Life Easier for SpaceX and Others,* FUTURE US, INC. (May 25, 2018), https://www.space.com/40700-trump-space-policy-private-spaceflight-deregulation.html.

206. *See Remarks, supra* note 145 (statement of U.S. Com. Sec'y Wilbur Ross).

should create a new federal office tasked with the regulation and governance of American companies participating in business beyond the Earth's atmosphere.

CONCLUSION

Just as NASA altered the perception of outer space with the success of the Apollo missions, American businesses have begun to reshape mankind's relationship with the stars once more. The excitement surrounding American aerospace companies continues to grow as the advancement of technology inches the private sector closer to creating a sustained human presence on the Moon and beyond. As space technology continues to evolve, the legislation governing the commercial space sector will be required to adapt as well. Given the far-reaching capabilities of the American commercial space sector, the United States should withdraw from the Outer Space Treaty and implement new legislation that redefines how American businesses operate in outer space and on celestial bodies. In doing so, lawmakers can open the door to commercial expansion that not only will lead to unimaginable business opportunities, but also the vast sophistication and advancement of mankind as a species. For that reason, one small step for legislators may serve to be one giant leap for mankind.

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