Space Mining & Exploration: Facing a Pivotal Moment

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I. INTRODUCTION

Space, often considered the "final frontier," has been a target of human exploration and exploitation for countless years. The 1960s and the Cold War perpetuated a space race that propelled humans into that frontier. With the space race, and the ensuing threat of conflict, a legal framework was hastily crafted to govern space. While this framework has served its purpose, technological developments and shifting geopolitics have changed the landscape. The rise of militaristic rhetoric regarding space by increasingly isolationist nations, as well as asteroid mining and the emerging space economy, has altered the status quo. With these changes comes an increased chance of conflict.

In this Note, Part II explores the history and development of the current space law

framework and its impact on the growing space economy, including the recently adopted laws by the United States and Luxembourg allowing private companies to mine in space. Additionally, Part III will discuss models for governing space mining that have been proposed by various legal scholars. Finally, Part IV will recommend that the United States and other spacefaring nations return to the negotiating table to adopt one of these proposed models, and to develop a legal regime that recommits to the demilitarization of space.

II. BACKGROUND

To better understand why a new cooperative international regime governing space would actually benefit the United States and its allies, it is important to contextualize the space mining industry, and the various treaties and obligations that already govern space. This Background provides insight into the developing space mining industry, the "Common Heritage of Mankind" principle, various space and sea treaties, and the decline of international treaties in favor of "soft law."

A. Space Mining Industry

Private investment into commercial space ventures, including research on asteroid mining, has increased exponentially in recent years, with some experts speculating commercial space commerce will soon develop into a multi-trillion-dollar industry.[1] Asteroid and celestial body mining appeals to investors and space exploration enthusiasts because it has the potential to provide valuable raw materials, such as rare metals and ice.[2] The value of space metals is staggering, with estimated worth stretching the imagination.[3] While some materials have the potential to replace resources used on Earth, space mining will likely first be used in orbit to convert metals into spacecraft materials.[4] This conversion benefits space exploration corporations because "[m]anufacturing in orbit from materials available in space promises to be more economical than making things on Earth and lifting them into orbit."[5]

Two private U.S. companies, Planetary Resources and Bradford Space (formerly Deep Space Industries), have already begun developing space mining technology with the goal of mining by 2020 to 2025.[6] Other companies, like SpaceX, may also play a role in

1. Clive Cookson, *Space Mining Takes Giant Leap from Sci-Fi to Reality*, FIN. TIMES (Oct. 19, 2017), https://www.ft.com/content/78e8cc84-7076-11e7-93ff-99f383b09ff9 [https://perma.cc/5Q7A-4YLH] (quoting Chris Lewicki, chief executive of Planetary Resources).

2. *Id.*

3. Monique Scotti, *NASA Plans Mission to a Metal-Rich Asteroid Worth Quadrillions*, GLOBAL NEWS (Jan. 14, 2017), https://globalnews.ca/news/3175097/nasa-plans-mission-to-a-metal-rich-asteroid-worth-quadrillions/ [https://perma.cc/9GNZ-E6WQ] (quoting NASA scientist Lindy Elkins-Tanton's speculation of one asteroid's iron being "worth US $10,000 quadrillion").

4. *NEO Basics: NEAs as Resources*, CTR. FOR NEAR EARTH OBJECT STUD., https://cneos.jpl.nasa.gov/about/nea_resource.html [https://perma.cc/7HHZ-53KZ] (last visited Jan. 30, 2020).

5. Cookson, *supra* note 1.

6. Amanda M. Leon, *Mining for Meaning: An Examination of the Legality of Property Rights in Space Resources*, 104 VA. L. REV. 497, 502–03 (2018); Jeff Foust, *Deep Space Industries Acquired by Bradford Space*, SPACE NEWS (Jan. 2, 2019), https://spacenews.com/deep-space-industries-acquired-by-bradford-space/ [https://perma.cc/GPD8-HZJD] (discussing Bradford's purchase of Deep Space, and noting that although the company is presently pivoting technologies, the company still views space mining as a "real future" with the company hoping to play a part in that future).

the mining economy, as their Falcon Heavy spacecraft could be used to land on asteroids.[7] Additionally, the U.S. government has expressed its interest in space mining, with NASA conducting various studies on space mining's plausibility and benefits.[8] NASA has also already launched a probe in 2016, with the mission of exploring a near-Earth asteroid and returning with a sample.[9] The space mining industry has even expanded into U.S. higher education, with the Colorado School of Mines now offering a Space Resources graduate program.[10] However, even with the space industry's advances, an outdated international legal framework and increased threat of the militarization of space may create uncertainty for investors.

B. The Common Heritage of Mankind

While there is no globally agreed to definition, the "Common Heritage of Mankind" can generally be summarized as the principle that there are certain resources that belong to all humankind, and should be protected for future generations.[11] Because of its equitable nature, this theory protects less industrialized nations from resource exploitation. The United States has shown support of this principle in the past,[12] but has also displayed more self-centered "economic protectionist" behavior by declining to ratify various treaties due to the inclusion of Common Heritage language.[13] The United States is not alone in their treatment of this principle, with a tension running between developed and developing nations over the ability to effectively create and equitably manage such a resource system.[14] The Common Heritage principle has woven its way into an array of diverse legal regimes, including those which govern space, the sea, and Antarctica. Scholars have speculated that, as resources become scarcer, this principle and its communal property implications "in the international commons will either be reinterpreted or rewritten outright."[15] The question then remains whether the international community will

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7. Kristin Houser, *Falcon Heavy Could Make Asteroid Mining a Reality*, FUTURISM (Feb. 20, 2018), https://futurism.com/falcon-heavy-asteroid-mining [https://perma.cc/RHL3-BPLD] (quoting Harvard professor Martin Elvis).

8. Leon, *supra* note 6, at 503–05.

9. OSIRIS-REX, NASA, https://www.nasa.gov/osiris-rex [https://perma.cc/V96Y-6ZY4] (last visited Jan. 27, 2020).

10. *Graduate Programs*, COLO. SCH. MINES, https://space.mines.edu/graduate-programs/ [https://perma.cc/5L7E-RADC] (last visited Jan. 27, 2020).

11. Scott J. Shackelford, *The Tragedy of the Common Heritage of Mankind*, 28 STAN. ENVTL. L.J. 109, 110–11 (2009) (combining various definitions of the Common Heritage of Mankind into a five element breakdown).

12. David Hartley, Note, *Guarding the Final Frontier: The Future Regulations of the International Seabed Authority*, 26 TEMP. INT'L & COMP. L.J. 335, 338 (2012) (noting President Lyndon Johnson's support of international cooperation in respect to the international seabed to avoid a potential resource race and ensuing conflict).

13. *See* UN General Assembly, *Convention on the Law of the Sea* (Dec. 1982) [hereinafter UNCLOS]; *see also* UN *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies* (1979) [hereinafter Moon Treaty]; *see also* Shackelford, *supra* note 11, at 128–29 (discussing the difficulty faced by several Presidential administrations in ratifying UNCLOS due to "fear[s] that the legislature risked both placing limitations on national sovereignty in the commons that would potentially lead to the under-exploitation of available resources").

14. Shackelford, *supra* note 11, at 119 (discussing the natural tension between developed and developing nations in their interpretation of the CHM principle).

15. *Id.* at 111.

incorporate this principle in some manner when looking at untapped regions like space, or whether less-fortunate nations will be left entirely in the cold.

C. International Space Law Treaties

The starting point for much of today's space law discourse can be traced back to two international treaties: The Outer Space Treaty of 1967 (OST) and the Moon Treaty of 1979.[16] While other space treaties have been ratified by space-faring nations, these are the two that are most relevant to the issues of space's resource scarcity and space conflict.[17] The OST is arguably the most pertinent because the United States, and several other nations, declined to sign the Moon Treaty due to its inclusion of strong Common Heritage of Mankind language.[18]

1. The Outer Space Treaty

Due to its widespread adoption amongst nation-states, the OST is commonly regarded as the "Magna Carta of space."[19] The treaty was formed during an uncertain political time period, with the Cold War looming, causing tension between Western nations and Russia. As both the United States and Russia began to see space exploration as a tangible goal, the United Nations began to advocate for more widespread international co-operation regarding conduct among space-faring nations.[20] While the creation of the OST was motivated in part to avoid potential conflict between nations, the treaty also served the purpose of outlining procedures for exploration, scientific research, and the exploitation of land. Some relevant language of the treaty is included below:

> Article I: The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind. . . .
>
> Article II: Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.
>
> Article III: States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the moon and other celestial bodies, in accordance with international law . . . in the interest of maintaining international

16. G.A. Res. 2222 (XXI), Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (Dec. 19, 1966) [hereinafter OST]; *see also* Moon Treaty, *supra* note 13.

17. Some additional ratified treaties include the following: (1) Convention on Registration of Objects Launched into Outer Space, (2) Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, and (3) Convention on International Liability for Damage Caused by Space Objects. For more information about these treaties, including the list of ratifying countries, see *Status of International Agreements Relating to Activities in Outer Space*, UN OFF. FOR OUTER SPACE AFF., https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/status/index.html [https://perma.cc/958Y-D7XG] (last visited Feb. 28, 2020).

18. Shackelford, *supra* note 11, at 143 (noting the Moon Treaty's failure due to the world's "principle space powers" moving away from the Common Heritage of Mankind towards "free market orientation").

19. FRANCIS LYALL & PAUL B. LARSEN, SPACE LAW: A TREATISE 51 (2d. ed. 2018).

20. J.F. McMahon, *Legal Aspects of Outer Space*, 38 BRIT. Y.B. INT'L L. 339, 396 (1964).

> peace and security and promoting international co-operation and understanding. . . .
>
> Article VI: 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 . . . .[21]

In short, the OST not only mandates that space activity will be conducted in accordance with the Common Heritage of Mankind (Article I), but also restricts claims of territorial sovereignty (Article II) and attempts to ensure peace through its language in Articles III and VI.

2. Moon Treaty

In sharp contrast to the popular OST, the Moon Treaty failed to garner support from major space-faring nations, including the United States, Russia, and China. Among other issues, the Treaty addressed the possible appropriation rights of mineral resources, a subject that was addressed in the OST. While the Moon Treaty is still active, with Armenia joining as recently as January 2018, only 22 nations are party to it.[22]

Notably, the Carter Administration initially supported the Moon Treaty, but critics prevailed and the United States withdrew.[23] A primary reason for the United States' decision to abstain from signing the Treaty was the use of the Common Heritage of Mankind language.[24] This language created economic concerns, as there was a belief that

> [P]rivate actors, and indeed state-owned enterprises, need to be incentivized if they are to conduct the hazardous and capital-intensive activities associated with remote mining. One such incentive is legal: to guarantee that minerals are the title of those who extract them, thus allowing them to be freely sold once they reach market.[25]

In the end, the Moon Treaty and its language proved to reflect "a socialized/collectivist mind-set" that was too difficult to embrace for a capitalist nation.[26]

3. International Sea Law

During the same era that the aforementioned treaties were crafted, the international community was considering another analogous frontier: the sea. Like space, the sea, in particular the deep-sea, presents considerable economic and scientific opportunity for nation states. To regulate international waters, the international community developed the U.N. Convention on the Law of the Sea (UNCLOS).[27]

UNCLOS covers a wide array of territorial issues, but the most relevant one to this

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21. OST, *supra* note 16, at 207–09.
22. AGREEMENT GOVERNING THE ACTIVITIES OF STATES ON THE MOON AND OTHER CELESTIAL BODIES, UNITED NATIONS TREATY COLLECTION, https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=XXIV-2&chapter=24&clang=_en [https://perma.cc/RV2R-F6FY] (last visited Jan. 27, 2020).
23. Timothy G. Nelson, *Mining Outer Space: Who Owns the Asteroids?*, N.Y. L.J. (July 29, 2015).
24. *Id.*
25. *Id.*
26. *Id.*
27. UNCLOS, *supra* note 13.

Note is UNCLOS's creation of the International Seabed Authority (ISA). The ISA is composed of three bodies: an Assembly, Council, and Secretariat.[28] Together, these bodies develop regulations regarding the prospecting, exploring, and exploitation of deep-sea resources.[29] Specifically, the ISA "was given specific rights to control and regulate the extraction of the Area's mineral resources."[30]

While UNCLOS (and, as a result, the ISA) underwent more than one revision, the ISA's original draft language was premised on the Common Heritage of Mankind principle, with less-developed nations potentially receiving the benefits of the deep-sea riches.[31] The ISA requires any private or government entity applying for a permit to mine the deep seabed to pay a $500,000 fee and select two mining sites, one of which the ISA will mine on behalf of developing nations.[32] Additionally, for each year of operation, mining corporations will be assessed a $1,000,000 fee, and the corporation "must transfer to the [ISA] the technology it is using to mine the seabed" which the ISA may then use for ten years in order to distribute wealth to developing nations.[33]

Like the Moon Treaty, the United States considered the initial draft language of UNCLOS and the ISA deep sea mining provisions "irreconcilable with free market principles."[34] The United States continued to chip away at the Common Heritage of Mankind language in an attempt to shape UNCLOS to its liking.[35] In 1994, the United States finally signed an amended version of the treaty, recognizing it as general international law, but Congress has yet to ratify the treaty.[36] UNCLOS's International Seabed Authority controls access to deep seabed minerals, and without ratification of the treaty, U.S. government agencies and private corporations cannot gain access to deep seabed minerals.[37]

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28. *Id.* at 458 (Article 158(2)).

29. Hartley, *supra* note 12, at 336.

30. *Id.* at 340.

31. UNCLOS, *supra* note 13 (noting that Article 136 of the Convention states that the "Area defined as the seabed floor-is 'the common heritage of mankind'"); *see also Who Owns the Deep Seabed*, INT'L SEABED AUTHORITY, https://www.isa.org.jm/faq/who-owns-deep-seabed [https://perma.cc/4PM9-M7CK] (last visited Feb. 12, 2020).

32. Brian M. Hoffstadt, Comment, *Moving the Heavens: Lunar Mining and the "Common Heritage of Mankind" in the Moon Treaty*, 42 UCLA L. REV. 575, 596 (1994).

33. *Id.*

34. *See* Elliot L. Richardson, *Treasure Beneath the Sea*, N.Y. TIMES (July 30, 1994), https://www.nytimes.com/1994/07/30/opinion/treasure-beneath-the-sea.html [https://perma.cc/RD66-PEX3] (highlighting the issues surrounding the Common Heritage of Mankind and the United States' ratification of UNCLOS).

35. *Id.*

36. *See Full Committee Hearing on the UN Convention on the Law of the Sea (T. Doc. 103-39) Before the S. Comm. on Foreign Relations*, 108th Cong. 14 (2003) (statement of Vice Admiral Roger T. Rufe, Jr., President, The Ocean Conservancy) (Oct. 21 hearing). Also, for an interesting discussion regarding the struggle to convince Congress to ratify UNCLOS, see Stewart M. Patrick, *(Almost) Everyone Agrees: The U.S. Should Ratify the Law of the Sea Treaty*, ATLANTIC (June 10, 2012), https://www.theatlantic.com/international/archive/2012/06/-almost-everyone-agrees-the-us-should-ratify-the-law-of-the-sea-treaty/258301/ [https://perma.cc/VSG9-472E]. Additionally, for more reasons why the United States should consider adopting UNCLOS and the ISA, see Katherine Liljestrand, *The Deep Sea Reasons for the Accession of the United States to the 1982 Convention on the Law of the Sea*, GEO. ENV'T L. REV. (Feb. 8, 2018), https://gielr.wordpress.com/2018/02/08/the-deep-sea-reasons-for-the-accession-of-the-united-states-to-the-1982-convention-on-the-law-of-the-sea/ [https://perma.cc/EW36-ATH8].

37. Liljestrand, *supra* note 36.

4. Antarctica: An Alternative Approach

One last region to consider in relation to developing a framework for space mining is Antarctica. Antarctica is governed by a series of treaties that have evolved since 1959, but are collectively known today as the "Antarctic Treaty System" (ATS).[38] The ATS uses Common Heritage language, stating that "it is in the interest of all mankind that Antarctica shall continue forever to be used exclusively for peaceful purposes and shall not become the scene or object of international discord."[39] The treaty has served a dual purpose, by both inhibiting conflict on the continent, as well as furthering scientific exploration and cooperation.[40]

In contrast to the deep sea and ISA, Antarctica's resources are not overseen by a singular governing body. Instead, the treaty has divided member states into consultative and non-consultative parties.[41] Consultative parties (of whom there are currently 28) are able to determine the uses of Antarctica by "participat[ing] in decision-making at Antarctic Treaty Consultative Meetings."[42] Non-consultative members are countries that have agreed to the terms of the treaty, but are not consultative members and cannot vote because they have not "complied with the 'demonstrated interest' test."[43]

A final distinguishing aspect of the rules governing the continent is the prohibition of all non-scientific mining.[44] This decision was led by environmental groups in the 1970s, and this binding treaty has ensured Antarctica is not commercialized.[45] Therefore, mining corporations remain unable to exploit resources in the region and benefit economically.

5. The Privatization of Space

In 2015, the United States adopted the Commercial Space Launch Competitiveness Act (SPACE Act), which allows private citizens to explore and exploit space resources for commercial purposes.[46] The Act is controversial, with many scholars arguing it violates international law and the United States' obligations through the Outer Space Treaty.[47] Notably, there has been some attention paid to whether the OST's Common Heritage

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38. *See* ANTHONY AUST, HANDBOOK OF INTERNATIONAL LAW 328–39 (2d ed. 2010) (discussing the Antarctic Treaty System at length).

39. The Antarctic Treaty, Dec. 1, 1959, 402 U.N.T.S. 71, 72, https://treaties.un.org/doc/Publication/UNTS/Volume%20402/v402.pdf [https://perma.cc/6WTM-QRUN].

40. *Id.*

41. *Antarctic Treaty*, U.S. DEP'T OF ST., https://2009-2017.state.gov/t/avc/trty/193967.htm [https://perma.cc/LK8R-NCHM] (last visited Feb. 3, 2020) (providing narrative commentary on the treaty).

42. *Id.*

43. Benjamin David Landry, *A Tragedy of the Anticommons: The Economic Inefficiencies of Space Law*, 38 BROOK. J. INT'L L. 523, 537 (2013) (citing Andrew H. Pontious, Note, *A Proposed Regime and Its Ramifications on the Commercialization of Outer Space*, 7 SANTA CLARA COMPUTER & HIGH TECH. L.J. 157, 164 (1991)).

44. *See The Protocol on Environmental Protection to the Antarctic Treaty*, SECRETARIAT OF THE ANTARCTIC TREATY, https://www.ats.aq/e/protocol.html [https://perma.cc/C7RG-RJYJ] (last visited Jan. 27, 2020) (containing related documents).

45. Landry, *supra* note 43, at 537.

46. U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, 129 Stat. 704 (2015) [hereinafter SPACE Act].

47. Elliot Reaven, *The United States Commercial Space Launch Competitiveness Act: The Creation of Private Space Property Rights and the Omission of the Right to Freedom from Harmful Interference*, 94 WASH. U. L. REV. 233, 238 (2016); Leon, *supra* note 6, at 497.

language may prohibit the granting of property rights in space.[48]

Regardless of the scholarly debate, the Act appears to provide sufficient legal certainty for some private U.S. companies like Planetary Resources, SpaceX, and Bradford Space to push forward in their pursuit to economize space. Additionally, Luxembourg has followed in the United States' footsteps after passing similar legislation in 2017.[49] The small yet prosperous European nation has even "earmarked €200m to fund NewSpace companies that join its new space sector[,]"[50] fueling a potential trend for nations to compete for private space sector business.

III. ANALYSIS

A. U.S. Obligations to the Outer Space Treaty

The 2015 SPACE Act has generated a host of legal concerns with respect to the already ratified OST.[51] Additionally, although the United States remains unbound by the Moon Treaty,[52] it too is frequently cited in this discussion, due in part to its inclusion of controversial Common Heritage language. While this debate continues, so too does the progression of the United States in its building of a private space mining economy.

The 2015 SPACE Act includes soft language regarding United States international obligations when developing the space-mining economy,[53] but some scholars have argued that this is just window dressing.[54] As the United States and other nations like Luxembourg move forward with their space mining development, it is clear they do not feel bound to the language of the OST. It is evident by the scholarship claiming the SPACE Act is legal and does not violate the OST[55] that the language of the OST was not explicit enough on property rights in space to deny countries from adopting private mining legislation. With the mining of asteroids soon becoming a reality,[56] it is time to shift the argument away from the legality of existing treaties and consider if a new international treaty could be created to better govern the future of space—ensuring peace while still allowing for prosperity.

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48. Leon, *supra* note 6, at 526.

49. *Legal Framework: International Space Law*, LUX. SPACE AGENCY, https://space-agency.public.lu/en/agency/legal-framework.html [https://perma.cc/TQ3B-UP6H] (last visited Jan. 27, 2020).

50. Atossa Araxia Abrahamian, *How a Tax Haven is Leading the Race to Privatise Space*, GUARDIAN (Sept. 15, 2017), https://www.theguardian.com/news/2017/sep/15/luxembourg-tax-haven-privatise-space [https://perma.cc/BD87-7N6F].

51. *See, e.g.*, UNCLOS, *supra* note 13.

52. Moon Treaty, *supra* note 13.

53. SPACE Act, *supra* note 46, at 721 (directing the President to "discourage government barriers to the development in the United States of economically viable, safe, and stable industries for commercial exploration for and commercial recovery of space resources in manners consistent with the international obligations of the United States").

54. Leon, *supra* note 6, at 500–01.

55. Reaven, *supra* note 47, at 237–41 (providing four reasons why the SPACE Act does not violate the OST); John Myers, *Extraterrestrial Property Rights: Utilizing the Resources of the Final Frontier*, 18 SAN DIEGO INT'L L.J. 77, 82 (2016) (arguing that "the U.S. Commercial Space Launch Competitiveness Act is fully consistent with international law").

56. *See* Susanne Barton & Hannah Recht, *The Massive Prize Luring Miners to the Stars*, BLOOMBERG (Mar. 8, 2018), https://www.bloomberg.com/graphics/2018-asteroid-mining/ [https://perma.cc/US7B-AQYC] (discussing how space mining is becoming a reality, and providing a general timeline of how the development of space mining may take place).

B. Changing Political Landscape

Considering that mining space is a fast-approaching reality, the potential for a conflict centered on space and its resources is also not out of the question. Following the Cold War, there was a "shift in the purpose behind space exploration from being primarily concerned with national competitiveness to being primarily concerned with scientific progress and international cooperation."[57] Perhaps the best example of nations putting aside differences to strive for a common purpose is the International Space Station (ISS). The ISS was structured through an international agreement known as the Intergovernmental Agreement (IGA)[58] and was signed by a number of nations including the United States, Russia, and various European Union nations. A treaty like the IGA exemplifies the *sui generis* status of space, and illustrates those nations that typically compete can put aside political and cultural differences in furtherance of humanity at large.

But with a change in geo-politics following the 2016 election in the United States, this scientific co-operative trend appears to be changing. A primary example would be U.S. President Donald Trump's desire to budget for, and create, a Space Force.[59] When discussing the addition of this new military branch, Trump proclaimed "[i]t is not enough to have an American presence in space, we must have American dominance in space," adding later that the United States cannot allow other nations like China to overtake the lead in space.[60] Such militaristic rhetoric surrounding space development could change the cooperative dynamics currently shown through initiatives like the ISS, and could encourage other nations to militarize space as well.[61] Although it may be easy to point to the United States as the sole problematic actor, nations like Russia and China have also been working on militarizing space.[62]

Aside from this dangerous military game, the United States has also changed its foreign diplomacy tactics since the presidential election, and is taking a more isolationist

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57. Myers, *supra* note 55, at 78.

58. Agreement Among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America Concerning Cooperation on the Civil International Space Station, Belg.-Can.-Den.-Fr.-Ger.-It.-Japan-Neth.-Nor.-Russ.-Spain-Swed.-Switz.-U.K.-U.S., Jan. 29, 1998, aerospace.org/sites/default/files/policy_archives/Space%20Station%20Intergovernmental%20Agreement%20Jan98.pdf [https://perma.cc/46P7-MN6F] [hereinafter Intergovernmental Agreement].

59. Sarah Kaplan & Dan Lamothe, *Trump Says He's Directing Pentagon to Create a New 'Space Force'*, WASH. POST (June 18, 2018), https://www.washingtonpost.com/news/speaking-of-science/wp/2018/06/18/trump-says-hes-directing-pentagon-to-create-a-new-space-force/ [https://perma.cc/GZA4-PAXS]; *see also* Dartunorro Clark, *Trump Touts Space Force Plans at Pentagon*, NBC NEWS (Jan. 17, 2019), https://www.nbcnews.com/politics/white-house/trump-touts-space-force-plans-pentagon-n959861 [https://perma.cc/P36G-78ME] (demonstrating President Donald Trump's plans for a Space Force).

60. Kaplan & Lamonthe, *supra* note 59.

61. Liu Zhen, *US's Ambitious Space Force Plan Takes Rivalry with China and Russia Out of this World*, S. CHINA MORNING POST (Aug. 11, 2018), https://www.scmp.com/news/china/diplomacy-defence/article/2159249/us-sends-rivals-china-and-russia-orbit-ambitious-space []https://perma.cc/Q9D7-SYV3 (noting that analysts believe the U.S. proposal could accelerate a Space arms race).

62. Harry Cockburn, *China and Russia Developing 'Destructive' Weapons for Space Conflict, US Warns*, INDEP. (Feb. 14, 2018), https://www.independent.co.uk/news/world/americas/us-space-wars-russia-china-conflict-antisatellite-directed-energy-weapons-lasers-cia-fbi-a8211181.html [https://perma.cc/9WAW-MV6A] (discussing China and Russia's development of anti-satellite energy weapons).

approach.[63] Of particular relevance is Trump's disdain for multilateral treaties.[64] As French President Emmanuel Macron recently stated, "Multilateralism is going through a major crisis which collides with all our diplomatic activity, above all because of U.S. policy."[65] From Trump's refusal to sign the Paris Climate Accord or the Trans-Pacific Partnership, the United States has shown that it is wary of being bound to international obligations. This is a marked shift from previous U.S. administrations,[66] and such actions only further destabilize the rule of law.[67]

While not perfect, multilateralism has proven to be a positive way for the international community to engage with one another and "take our common agenda forward."[68] Multilateralism has also been viewed as a key way to avoid the spread of global conflicts, with the United Nations Secretary-General António Guterres recently calling for a "return to international cooperation" to overcome divisions.[69] Through Twitter, he further stated: "Multilateralism has averted a third world war. At this time of multiplying conflicts, advancing climate change and deepening inequality, multilateralism is needed more than ever."[70]

Additionally, and perhaps more important in respect to the space mining economy and private corporations in the United States, multilateralism and international trade have demonstrated over time that they actually enable economic growth.[71] Relating back to

63. *See* Gideon Rachman, *America's Exit from the World Stage*, FIN. TIMES (Oct. 4, 2018), https://www.ft.com/content/8ed5135e-c642-11e8-ba8f-ee390057b8c9 (reviewing three books that detail Trump's isolationist foreign policy approach); John Brinkley, *What Trump Calls Nationalism Looks More Like Isolationism*, FORBES (Mar. 21, 2018), https://www.forbes.com/sites/johnbrinkley/2018/03/21/what-trump-calls-nationalism-looks-more-like-isolationism/#3102be0a28f1 [https://perma.cc/XV5N-UBRL] (analyzing Trump's various policy decisions including recent tariffs with China that portray isolationism).

64. *See* Brinkley, *supra* note 63 (stating that Trump's withdrawal from the Trans-Pacific Partnership, trade war with China, and demand for renegotiation of the Korea-US Free Trade Agreement "go beyond unilateralism" and "Trump's disdain for multilateral trade agreements, . . . approach[es] the kind of isolationism unseen seen [sic] since the Great Depression").

65. Michel Rose & Richard Lough, *Macron Says Brexit Cannot Divide EU, Criticises Trump's Isolationism*, REUTERS (Aug. 27, 2018), https://www.reuters.com/article/uk-france-diplomacy/macron-says-brexit-cannot-divide-eu-criticises-trumps-isolationism-idUSKCN1LC0ZY [https://perma.cc/8CGU-9FK3].

66. *See* Jeffrey Goldberg, *The Obama Doctrine*, ATLANTIC (Apr. 2016), https://www.theatlantic.com/magazine/archive/2016/04/the-obama-doctrine/471525/ [https://perma.cc/MHR7-9QJQ] (discussing former President Obama's internationally grounded foreign policy). This Article also notes that "he was quite obviously an internationalist, devoted as he is to strengthening multilateral organizations and international norms." *Id.*

67. *See, e.g.*, Press Release, General Assembly, Rule of Law Core to Successful Multilateral Treaties, International Cooperation, Sixth Committee Hears as Debate Begins on Principle, UN Press Release GA/L/3498 (Oct. 14, 2015), https://www.un.org/press/en/2015/gal3498.doc.htm [https://perma.cc/D74C-USVE]; *see also* Speech of H.E. Mr. Abdulqawi Ahmed Yusuf, President of the International Court of Justice, Before the Security Council, MULTILATERALISM & THE INTERNATIONAL COURT OF JUSTICE (Nov. 9, 2018), https://www.icj-cij.org/files/press-releases/0/000-20181109-PRE-01-00-EN.pdf [https://perma.cc/4AE9-72JQ] (addressing the value of multilateral treaties and their significant support to the international community's rule of law).

68. UN Press Release GA/L/3498, *supra* note 67.

69. *Multilateralism More Vital than Ever, As World War Centenary Looms: Security Council*, UN NEWS (Nov. 9, 2018), https://news.un.org/en/story/2018/11/1025331 [https://perma.cc/VA2Y-GYW9].

70. António Guterres (@antonioguterres), TWITTER (Nov. 9, 2018, 12:30 PM), https://twitter.com/antonioguterres/status/1060962785931210752?lang=hi [https://perma.cc/Q92F-RHBQ].

71. *See, e.g.*, Sèna Kimm Gnangnon, *Multilateral Trade Liberalization and Economic Growth*, 33 J. ECON. INTEGRATION 1261, 1261 (June 2018) (finding that, against a backlash of multilateral trade agreements, these agreements assessed through a "dataset comprising 150 countries over the period 1995~2015 [show a] strong positive impact of multilateral trade liberalization on economic growth"), *available at*

aspects of the Common Heritage of Mankind principle, multilateral trade agreements have also been shown to benefit developing nations.[72] As stated by a representative of the United Nations Industrial Development Organization when discussing developing nations, "assisting countries to integrate into the multilateral trading system through trade capacity-building was the 'main vehicle for social inclusiveness, environmental sustainability and economic competitiveness.'"[73] In other words, it is clear that such trade agreements are vital to ensure access to markets for developing nations, and for them to enjoy measured growth.

With respect to space, aside from the outdated OST and controversial Moon Treaty, a substantial amount of space law is governed through soft-law.[74] In short, soft-law in space consists of "non-binding principles, norms, standards or other statements of expected behavior in the form of recommendations, charters, terms of reference, guidelines, codes of conduct, etc."[75] Because of its unenforceable nature, soft-law opens the door for potential conflict.[76] However, in order to ensure a well-rounded analysis, it is important to note that there are some scholars who advocate for soft-law governance in space.[77] This Note takes the stance that, although soft-law may have merit in certain circumstances, any risk of conflict outweighs such benefit. Additionally, regardless of whether or not an actual conflict arises, even the threat of conflict may slow economic progress. Thus, it would be a mistake for the United States to ignore the security benefits of multilateral agreements and retreat inwards at a time of uncertainty for space development.

C. Potential Governing Models

While the rise in potential conflict in space has developed recently, the call for a new governing space regime is long-standing and diverse in approach.

Various models have been proposed, including one that draws heavily from the U.N. Convention on the Law of the Sea and its International Seabed Authority.[78] By reflecting

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https://www.jstor.org/stable/pdf/26431808.pdf; *see also Stronger Open Trade Policies Enable Economic Growth for All*, WORLD BANK GROUP (Apr. 3, 2018), https://www.worldbank.org/en/results/2018/04/03/stronger-open-trade-policies-enables-economic-growth-for-all [https://perma.cc/7Y6R-47P6] (stating countries that participate in international trade perform better).

72. Press Release, United Nations General Assembly, Fair Multilateral System Essential to Sustained Growth for Developing Countries, Second Committee Hears in Debate on International Trade, Development, U.N. Press Release GA/EF/3404 (Oct. 22, 2014), https://www.un.org/press/en/2014/gaef3404.doc.htm [https://perma.cc/8WTG-9M7R].

73. *Id.*

74. Icho Kealotswe-Matlou, The Rule of Law in Outer Space- A Call for International Cooperation 6 (Mar. 2018) (unpublished manuscript), https://www.law.upenn.edu/live/files/7811-kealotswethe-rule-of-law-in-outer-spacepdf [https://perma.cc/THQ8-L9PC].

75. Jack M. Beard, *Soft Law's Failure on the Horizon: The International Code of Conduct for Outer Space Activities*, 38 U. PA. J. INT'L L. 335, 342 (2017) (quoting and citing Marco Ferrazzani, *Soft Law in Space Activities - An Updated View*, *in* SOFT LAW IN OUTER SPACE: THE FUNCTION OF NON-BINDING NORMS IN INTERNATIONAL SPACE LAW 99, 100 (2012)).

76. Kealotswe-Matlou, *supra* note 74.

77. *See, e.g.*, Geoffrey Palmer, *New Ways to Make International Environmental Law*, 86 AM. J. INT'L L. 259, 269 (1992) (discussing the advantages of soft-law, including the speed it can be developed and its ability to allow for agreement by nation states); *see also* Anne-Marie Slaughter et al., *International Law and International Relations Theory: A New Generation of Interdisciplinary Scholarship*, 92 AM. J. INT'L L. 367 (1998).

78. *See generally* Jeremy L. Zell, Note, *Putting a Mine on the Moon: Creating an International Authority to Regulate Mining Rights in Outer Space*, 15 MINN. J. INT'L L. 489 (2006).

the ISA structure, this concept incorporates the Common Heritage of Mankind Principle. Although this principle is one the United States should arguably value because it increases international trade and assists partner nations in developing their economies, the country has shown its general contempt for it in the past.[79] The idea of the United States adopting such a proposal under today's trade and foreign policy perspective is almost certainly a non-starter. Additionally, the 2015 SPACE Act allowed private companies to invest and use their own funds to pursue rewards; to require such companies to give back to countries not involved in the space industry would likely spark an outcry. To the corporate world, these non-investor countries may be viewed as nothing but free-riders.

Jonathan Thomas proposed a sharply contrasting model, centered around the free market and the principle of first-come, first-serve.[80] Thomas argues against the existing Outer Space Treaty laws, and advocates a move away from reliance on "a philosophy of common ownership."[81] He further details a system that allows private corporations to acquire a charter from a granting state, allowing them to put other nations on notice of their claim and subsequent possession.[82] Harkening back to "The Age of Discovery," Thomas contends that this free-market model grounded in traditional property law is based on "human nature" and incorporates order and equity.[83]

From the perspective of an increasingly isolated United States, this model may appear attractive at first blush. Adopting Thomas's approach would almost certainly spur growth in the private sector, and the United States would further separate itself in the space economy buildup. However, the United States would also distance itself from the international community. It is hard to imagine any developing nation agreeing to these terms, considering it is almost a mirror-image of "Age of Discovery" policies that were not beneficial for them.

While there is a myriad of other models that have been proposed, the final model worth examining is rooted in the Antarctic Treaty. The idea, pitched by Lynn Fountain, is to adopt a free-market approach, but with an overarching regulatory scheme.[84]

Emulating the Antarctic Treaty, Fountain's envisioned regulatory body would be composed of two tiers, including the decision-making Consultative Parties and the Observers.[85] She further details possible membership fees to ensure active participation. This structure would allow developing nations to benefit, but also to give back—both economically by paying fees and materially by potentially providing scientists and engineers to further space exploration and resource exploitation.

In a way, this model is a middle-ground approach to the Common Heritage-backed sea model, and Thomas's first-come, first-served concept. It does not go so far as to require redistribution of wealth to nations not participating, as the sea model does, but the approach also gives back to those nations that would likely be left behind through Thomas's

79. The United States' contempt, as mentioned in Part II.B, can be illustrated by the government's decision to pull out of various treaties that have incorporated the CHM language, including UNCLOS and the Moon Treaty.

80. *See generally* Jonathan Thomas, *Privatization of Space Ventures: Proposing a Proven Regulatory Theory for Future Extraterrestrial Appropriation*, 1 BYU INT'L L. & MGMT. REV. 191 (2005).

81. *Id.* at 194.

82. *Id.* at 195.

83. *Id.* at 219.

84. Lynn M. Fountain, *Creating Momentum in Space: Ending the Paralysis Produced by the "Common Heritage of Mankind" Doctrine*, 35 CONN. L. REV. 1753, 1774–86 (2003).

85. *Id.* at 1780–81.

approach. If adopted, Fountain's idea would allow the United States to continue its economic development, but also re-enter the world stage and garner favor from allies and developing nations.

IV. RECOMMENDATION

A. Reengaging with the International Community

As mentioned above, United States foreign policy has undergone a dramatic transformation since President Trump's election.[86] While this Note will not address the Trump administration's decision to become more isolationist as a whole, it will argue in favor of a return to a more globally engaged approach in respect to space and more specifically, space mining.

If the United States returns to the international table and encourages the development of new multilateral space treaties to replace soft-law, the positive effects will be twofold. First, dialogue between nations, and the resulting treaties from this dialogue, will allow for a more stable environment in space.

In particular, treaties that address and reaffirm the demilitarization of space will help ensure conflicts involving space mining do not arise in the near future. With the United States considering the creation of a Space Force,[87] and other spacefaring nations like Russia and China also eyeing similar armaments, it is vital that the issue is revisited.[88]

If no treaty is created, and soft-law is allowed to continue to govern space, it is not hard to imagine powerful spacefaring nations navigating and manipulating soft-law, potentially allowing conflicts to arise in space. Because soft-laws generally do not include enforceable mechanisms, countries have been known to exploit soft-laws to their benefit.[89] With binding treaties in place, however, and with the full support of the international community behind them, it would be considerably more difficult to conduct this type of behavior. Nevertheless, the binding effect of a treaty requires an enforceability aspect. One way to address this issue is through what has been dubbed the "mobilization of shame," an informal way to pressure nations that are not agreeing to the terms of an agreement.[90] For example, treaties that use this method will often require nations to periodically report on compliance to a treaty-monitoring body, allowing the monitoring body and other nations to weigh in on progress and possibly coerce certain behavior.[91] Because of the "club-like atmosphere" of many international organizations, such pressure from monitoring bodies and other nations in the organization can influence decision making.[92]

Another potential way to increase enforceability is to include language that makes it

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86. Rachman, *supra* note 63; Brinkley, *supra* note 63.

87. Kaplan & Lamothe, *supra* note 59. For further reading on the makeup of the proposed space force, see Sandra Erwin, *Space Force Policy Memo Being Drafted to Establish New Military Branch*, SPACE NEWS (Oct. 22, 2018), https://spacenews.com/space-force-policy-memo-being-drafted-to-establish-new-military-branch/ [https://perma.cc/GM93-EM7L].

88. Zhen, *supra* note 61; *see also* Cockburn, *supra* note 62.

89. *See generally* Beard, *supra* note 75 (discussing the ineffective ability of soft law to govern space, particularly in the face of growing military developments from China, Russia, etc.).

90. Frederic L. Kirgis, *Enforcing International Law*, AM. SOC'Y INT'L L. (Jan. 22, 1996), https://www.asil.org/insights/volume/1/issue/1/enforcing-international-law [https://perma.cc/M95J-HB6N].

91. *Id.*

92. *Id.*

difficult for a nation to withdraw under a single political administration. This type of language would not be a first in an international agreement, with the Paris Climate Accord being a recent example of a treaty that included a timed withdrawal requirement.[93] This will safeguard such agreements from dramatic policy shifts that occur when nations change leadership.

Additionally, nations may wish to consider enforceable economic penalties that could occur in the event of a violation or withdrawal. Keeping in line with the aforementioned "mobilization of shame" method of enforcement,[94] these economic penalties could be enforced by a monitoring body if a nation breaches the agreement.

These penalties and time delays would be in sharp contrast to the current soft-laws that, aside from the OST, primarily govern space. By crafting self-enforcing treaties, countries would have more incentive to stay in line with their signed agreements, which would naturally increase stability. However, the downside of time-withdrawal requirements and economic penalties being built into treaties should be considered: namely that it may be difficult for nations to garner domestic support and consent to signing any treaty that has these types of safeguards in place. With that said, the Paris Treaty is yet again an example where nations put aside self-interest-based concerns and signed on.[95] Yet, considering how opposed President Trump and his administration appears to be to multilateral treaties,[96] such a feat may not be achievable for the United States until there is a change in leadership.

In addition to the decreased chance of conflict arising as a result of multilateral negotiations, the increase in overall stability will boost the U.S. space economy. Multilateral agreements have been shown to increase economic growth,[97] and as the space economy develops and more nations gain the ability to participate, the United States would clearly stand to benefit through increased global trade. Private companies would also benefit from the added security of knowing space remains a demilitarized zone, as companies investing private money require stable environments to thrive.

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93. Paris Agreement art. 28, Dec. 12, 2015, https://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf [https://perma.cc/C526-XN2K] (publication in the United Nations Treaty Service forthcoming, currently marked No. 54113 for temporary identification) (stating that a nation may only withdraw three years after the accord has entered into force). While this language serves as an example, the suggestion in this commentary is to include an increased duration of years that would ensure a change could not be implemented in a single U.S. Presidential administration.

94. Kirgis, *supra* note 90.

95. Note that the Paris Climate Accord does not include an economic penalty for withdrawing, and only includes the aforementioned time-based requirement. For more details on what the Paris Agreement requires of nations and why this is such a success for multilateral agreements, see Fiona Harvey, *Paris Climate Change Agreement: The World's Greatest Diplomatic Success*, GUARDIAN (Dec. 14, 2015), https://www.theguardian.com/environment/2015/dec/13/paris-climate-deal-cop-diplomacy-developing-united-nations [https://perma.cc/ZJ7H-A23C]. *See also* Brad Plumer, *Q. & A.: The Paris Climate Accord*, N.Y. TIMES (May 31, 2017), https://www.nytimes.com/2017/05/31/climate/qa-the-paris-climate-accord.html [https://perma.cc/2F8Y-NZAN].

96. For an interesting read discussing President Trump's disdain of multilateral treaties, see Uri Friedman, *Donald Trump, Dealbreaker*, ATLANTIC (Oct. 12, 2017), https://www.theatlantic.com/international/archive/2017/10/donald-trump-dealbreaker/542730/ [https://perma.cc/ZM6T-MBPP].

97. *See, e.g.*, Gnangnon, *supra* note 71, at 1285.

B. Adopting the Right Model

As part of these negotiations with the international community, and in addition to a reinforced treaty on demilitarization, the United States should push for the adoption of a specific legal model to govern space mining. Once again, such a binding agreement would increase stability, and would add legitimacy to the United States' decision to privatize space mining. As previously discussed, several possible models have been proposed by legal scholars.[98] While each of these models has pros and cons, this Note argues for the adoption of the structure proposed by Lynn Fountain[99] because it allows for the United States to continue to build its space economy, while also including other interested parties to help further develop space technology.

Fountain's proposal borrows the two-tier regulatory body structure from the working Antarctic Treaty, allowing the United States to continue to mine, but also creating an opportunity for less developed nations to actively participate in the growing space economy. If the United States pushed for the adoption of such a model, it would have the benefit of sanctioning the U.S. SPACE Act's allowance of the privatization of space mining. This added backing from the international community would increase stability for private companies, which may encourage any companies that were previously on the fence to pursue space mining further.

1. Benefits of Partnering with Developing Nations

In previous treaties that included Common Heritage of Mankind language, critics viewed developing countries as something akin to free-riders.[100] In this case, however, the two-tiered structure of Consultative Parties and Observers guarantees that developing nations would add value. This structure and the included participation fee for Observers filters out nations that do not have an interest in pursuing space mining development, further ensuring a free-rider problem isn't created. In fact, this Note argues that the United States would stand to benefit from such an arrangement for a number of reasons.

First, while developing nations may not have the economic ability to create their own spacefaring agencies and companies outright, they would still inject funding into spacefaring projects. In an environment where NASA appears to be perennially underfunded and dealing with yearly budget fluctuations,[101] it would be hard to imagine the U.S. government turning down additional money. As for private companies, they too

98. *See supra* Part III.C.

99. Fountain, *supra* note 84.

100. *See, e.g.*, SHAREFAH ALMUHANA, GOVERNING SHARED NATURAL RESOURCES OF THE INTERNATIONAL SEABED AREA (2016), https://www.aija.org/images/uploads/Sharefah-A.-Almuhana_Winner-of-BIFLA-2016.pdf [https://perma.cc/DH73-SB9S] (discussing an array of issues presented by the current framework of the ISA, including the free-rider problem presented by developing nations).

101. For more information on NASA's budget issues, as well as an example of NASA looking to partner with other nations and private companies, see Joel Achenbach, *NASA Is Going Back to the Moon—If It Can Figure Out How to Get There*, WASH. POST (Jan. 9, 2018), https://www.washingtonpost.com/news/post-nation/wp/2018/01/09/nasa-is-going-back-to-the-moon-if-it-can-figure-out-how-to-get-there/ [https://perma.cc/K29Z-7AYG]; *see also* Kelly Dickerson, *An Astronaut's Complaint about the President Perfectly Captures What is Wrong with NASA*, BUS. INSIDER (Jan. 26, 2016), https://www.businessinsider.com/astronaut-scott-kelly-nails-nasa-budget-problem-2016-1 [https://perma.cc/U3X3-NVHM] (highlighting NASA astronaut Scott Kelly's callout of the United States government for a lack of financial support of NASA).

could benefit from this structure. Unlike mining on earth, space mining is still in development and there are sure to be unforeseen challenges that they will need support in overcoming. By working in tandem with government agencies, as they are currently already doing in the United States,[102] private companies will be better equipped to address any issues that arise, and will be pushed to develop new technologies that both the government and corporations could use. Therefore, if government agencies are better funded, private companies stand to benefit. A recent example of this mutually beneficial relationship is NASA's $140 million investment into SpaceX's Falcon 9 rocket program, which has helped SpaceX go on to conduct business with other nations including Israel, Indonesia, Bangladesh, and Kazakhstan.[103] Additionally, it is worth noting that investing in developing nations, in general, benefits developed nations' economies as well.[104]

Beyond the added funding, developed nations surely could contribute through scientific research. Undoubtedly, there are individuals capable of assisting in space research who are inhibited due to a lack of access to opportunity in their respective country. With Fountain's model, such individuals would have the ability to connect with space entities they may not otherwise be able to. As noted by one scholar when discussing the benefits of such a global scientific exchange, "[t]his pooling of special talents and capabilities would have a valuable impact upon the identification of new ideas and processes."[105]

Finally, there may be an interesting alternative benefit of Fountain's proposal. It has been shown in the past that, regarding space technology development, developing nations focus more on scientific advancements that would improve conditions here on Earth.[106] Developed nations on the other hand, look to "activities of man in space."[107] Fountain's proposal would allow for a mixture of both of these goals. As a result, the average citizen in the United States may be more inclined to support space-related funding if they know that some of their funding will most certainly be used for their direct benefit.

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102. Examples include Blue Origin, Orbital ATK, SpaceX, Boeing, and others partnering with NASA to develop space tech. For more information on this mutually beneficial relationship, see Edgar Zapata, *An Assessment of Cost Improvements in the NASA COTS/CRS Program and Implications for Future NASA Missions*, NASA, https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20170008895.pdf [https://perma.cc/8DZU-T4VS] (last visited Jan. 27, 2019) (demonstrating a recent study done by NASA).

103. Dom Galeon, *The NASA-SpaceX Partnership Saved NASA Hundreds of Millions*, FUTURISM (Nov. 15, 2017), https://futurism.com/nasa-spacex-partnership-saved-nasa-hundreds-millions [https://perma.cc/9VSN-CH72]; Wendy Whitman Cobb, *How SpaceX Lowered Costs and Reduced Barriers to Space*, CONVERSATION (Mar. 1, 2019), https://theconversation.com/how-spacex-lowered-costs-and-reduced-barriers-to-space-112586 [https://perma.cc/9AML-BBNB].

104. *See, e.g.*, Jim Yong Kim, *Why Investing in Poor Countries Helps All of Us*, WORLD BANK (Mar. 24, 2014), https://blogs.worldbank.org/voices/why-investing-poor-countries-helps-all-us [https://perma.cc/QNQ6-49Z2] (discussing that there is often a misconception regarding global development, and highlighting that economic growth in developing nations "became an engine for the global economy after the 2008–09 financial crisis, accounting for roughly 50 percent of all global growth . . . [with] fully half of the United States' exports now go[ing] to emerging markets and developing economies").

105. Carl Q. Christol, *Space Joint Ventures: The United States and Developing Nations*, 8 AKRON L. REV. 398, 412 (1975).

106. *Id.* at 414.

107. *Id.*

2. Possible Drawbacks

One potential hurdle of Fountain's model is that the two-tier structure would likely require the United States and other spacefaring nations to be more open in their sharing of scientific developments. Depending on one's viewpoint, this could be either negative or positive. For nationalists, such an open proposition may make them wary. They may point to defense concerns in particular, as some tech may be harnessed for militaristic goals.

However, this Note would rebut these concerns by noting this issue would be mitigated if the previously mentioned multilateral treaty or treaties would be adopted to better govern space. It is also worth noting that the United States sharing space technology and information with other nations is not unprecedented.[108] Clearly, the U.S. government has figured out ways to share this type of information in a safe and secure manner. Additionally, space has shown its unique way of bringing nations together in the past,[109] and such collaboration would benefit humanity as a whole by furthering the development of space exploration technology.

V. CONCLUSION

In short, the United States and other spacefaring nations are facing a pivotal moment in history. With space mining fast approaching as a reality, enacting and agreeing to binding multilateral agreements to govern space has never been more important. Such agreements will ensure stability in space for nations and private companies, and will surely foster economic and scientific growth across both developed and developing nations. Although the United States is one of few nations that is likely to begin mining operations in the very near future, it would be shortsighted to not engage with other nations, both developed and developing, in building this economy together.

108. The International Space Station is one clear example, but NASA is also looking for international cooperation on other projects in the future, including further moon research. *See* Hanneke Weitering, *In New Moon Race, NASA Values Teamwork over Competition with China and Others*, SPACE.COM (Jan. 24, 2019), https://www.space.com/43096-new-moon-race-nasa-china-international-partners.html [https://perma.cc/TY7X-PG9Y].

109. The aforementioned Intergovernmental Agreement that helped establish the International Space Station is a prime example of nations coming together and sharing space technology. Another example of a joint technological effort is the building and launching of the Hubble Space Telescope, in which case the United States partnered with the European Space Agency. Intergovernmental Agreement, *supra* note 58.