

Inhibitors to a Thriving Economy in Outer Space: A Commentary on the Weakening International Framework & the Rise of National Legislation

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Abstract

Entrepreneurs and blue-chip corporations alike are seeking to capitalize on outer space's bountifulness, setting industry growth ablaze and establishing an engine for an economic and technological revolution. However, there remains meaningful impediments that could stifle the industry's growth. The paper begins with an examination of the growing legal uncertainty of activities in outer space. Significant debate regarding the current international law's permissibility of space activities has left private businesses perplexed about the legal status of their endeavors. Next, this paper investigates the recent resulting proliferation of conflicting national legislation in response to the uncertainty on the international level. It finds that the rise in state regulations is constructing an environment of regulatory competition, threatening to lower the standards of policies. This paper concludes with an assessment of some of the competitions already underway, speculates on future competitions, and warns of an already convoluted regulatory system becoming more challenging. Ultimately, this paper seeks to encourage scholars, lawmakers, and industry leaders alike to reexamine the international regulatory framework, making updates as needed to curb regulatory competition. In doing so, it becomes possible to avoid the growing possibility of inhibiting the development of NewSpace and the resulting technological and economic revolutions.

Keywords: *ecosystem – hereinafter NewSpace; Konstantin Tsiolkovsky; colonization; New Space entities; War-era regulatory regime*

Introduction

In today's AI-powered, globally digital world, the line between science fiction and scientific prowess has become degraded. With the advancement of technology, opportunities abound that were once the realm of science fiction. One such prospect is the building of a thriving commercial economy in outer space. However, where there are opportunities there are also competing interests. Competition is not inherently worrisome but, often, requires proper governance to validate the integrity and efficacy of the industry's actions. Examples of such a need are ubiquitous, from financial firms to healthcare and even telecommunications. In all instances, the role of a regulatory framework is to provide an endorsement to firms' actions and to maintain market justness. As one scholar notes,

“law never seeks to regulate technology, but rather aims to place order in the competing human interests that result from that technology.”

The current state of the commercial space ecosystem – hereinafter New Space – is one of uncertainty, with an ambiguous international regulatory environment supplemented by competing national legislations. Together, these elements create an inappropriate regime that can derail further development of NewSpace. At stake is the rise of new business technologies, and

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even an economical and technological revolution. Although the prospect of civilians traversing the galaxy in deep-space-worthy ships is still a distant goal, the capabilities to mine an asteroid, build a colony on Mars, or establish functioning 3D manufacturing machines in microgravity exists as of today. It should, therefore, be the priority of international leaders to ensure the existence of a proper legal regime capable of governing this unique, burgeoning market. This regime should dually promote space-based businesses through the elimination of unnecessary barriers while also preserving outer space as a peaceful environment ripe for all of humankind.

While limiting in some regards, the paper purposefully does not offer much in the way of potential recommendations. Instead, this paper is meant to spotlight the current and further developing chaotic challenges that pose a significant risk to New Space, and relatedly, the advancement of humankind. This paper hopes to incite scholars, politicians, and stakeholders alike to ponder deeply about the brewing turbulence over the industry's foundational regulatory framework and take action to develop significant, internationally cooperative legal modifications needed to unleash and stimulate enterprises in "the final frontier."

Background

Space exploration begins with rockets – the current method utilized to reach outer space. Modern rocketry can trace its roots back to Soviet scientist Konstantin Tsiolkovsky and his 1903 manifesto *The Exploration of Cosmic Space by Means of Reaction Devices*. In 1912 Tsiolkovsky's American counterpart Robert Goddard published *A Method of Reaching Extreme Altitudes*, a book born from Goddard's research at Princeton University, which espoused the use of liquid engines in rockets.² By 1957, only 54 years after the release of Tsiolkovsky's book, the Soviet Union successfully launched Sputnik-1, the first artificial satellite put into orbit around the Earth.

Rocket science is hard, but once in space the challenges do not end as the ability to function and survive becomes dependent upon other sophisticated technologies. Accordingly, advancements in modern rocketry are paralleled by advancements in broader technologies, allows human kind to venture farther and more boldly into outer space. For instance, consider the computing power of a modern iPhone; an iPhone has more than 100,000 times the processing capability than the Apollo 11 Guidance Computer, which helped the United States successfully put the first humans on the Moon in 1969. [1]

This growth of technology has led to viable New Space entities, proving that space is no longer the province of only states. In 2018 alone, 187 investors financed 82 space startups – many of which are or will soon be generating revenue. Although exploration and colonization are ambitious and futuristic goals, most space entrepreneurs have set their sights on ventures that will yield a faster return on investment. Startups involved in remote sensing, satellite maintenance, manufacturing in microgravity, and planetary or asteroid mining are all currently pursuits of multiple entities across the globe.

These ventures, and the capital supporting them, have led to a thriving and growing NewSpace industry. In 2018, one industry expert valued the global space economy at \$360 billion.⁷ Likewise, analysts at Morgan Stanley, Goldman Sachs, and Bank of America believe by 2040 the global space economy could reach a value of \$1.1 trillion.⁸ Put differently,

humanity is no longer confined to Earth. Be it tourism, resource procurement, manufacturing, or scientific discovery, outer space promises endless possibilities and rewards for those willing to pursue the journey. [2]

Consequently, the need for a sensible and functioning regulatory framework to govern this flourishing industry is paramount. Today, that framework consists of five international treaties – hereinafter referred to collectively as the ISL9 – created by the United Nations’ Committee on the Peaceful Uses of Outer Space (COPUOS) between 1967 and 1979.¹⁰ The ISL was birthed during the Cold War and has been assisting states in journeying safely into space for the past 60- plus years. Yet, while part of the space race was undertaken for reasons of scientific discovery, the ISL, like any agreement, is a product of its time. Accordingly, the ISL has a strong undercurrent to decrease the growing tensions and competition for technological prowess and military superiority between the United States and the Soviet Union.¹¹ Further, given the concentration of space flight technology, the ISL was developed with state actors in mind, not private entities. Thus, it would be inappropriate to consider the ISL without also considering the militaristic backdrop under which these regulations were effectuated or what actors operating in space the ISL conceives. [3]

In applying the ISL to today’s environment, one faces much uncertainty. Such an exercise begets the questions of whether this Cold War-era regulatory regime lacks the reliability and capability to properly regulate advanced technology being utilized by private actors for private commercial endeavors. In the face of this uncertainty coupled with the bountifulness of opportunities available and to promote space entrepreneurship, states have begun filling the regulatory vacuum through national regulations. Such actions have created an environment known as regulatory competition. This paper is an examination of both the uncertainty generated by the ISL, the emerging governing ecosystem created by regulatory competitions, and the challenges these variables create for the NewSpace industry. Accordingly, this paper seeks to highlight known dangers but also spotlight troubling symptoms receiving less attention .[4]

The paper begins with an introduction and review of the ISL to provide the requisite background on the current legal landscape. Particular focus is given to the Outer Space Treaty and the Moon Agreement given the relevancy to private businesses. Part II then investigates the subcomponents comprising the first substantial impediment to a thriving space economy – the ongoing debate and general lack of clarity the ISL produces for NewSpace. Part III discusses various national legislatures’ responses given these shortcomings. Countries discussed include the United States, Luxembourg, and the United Arab Emirates, among others. Part IV then considers these national legislations and the potential outcomes from increased regulatory competition as states seek to capture NewSpace market share. Finally, Part V concludes with final thoughts and a call for scholars and political leaders to combat the increasingly competitive regulatory environment, which could scratch the NewSpace industry’s liftoff if left unrestrained.

Part I: The Outer Space Legal Framework

Subpart A: The Outer Space Treaty (1967)

While modern rocketry has been developing for the past 100-plus years, the legal framework concerning activities in outer space is about half that age. On October 10, 1967, the Outer Space Treaty (OST), more formally known as the Treaty on

Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, went into effect.¹³ As of January 1, 2019, 109 countries have ratified the OST, and another 23 have signed.¹⁴ Importantly, any state able to reach space independently is a party to this agreement.¹⁵ The OST is one of the rare U.N. Resolutions that made its way through the U.N. General Assembly and received widespread ratification, even despite being ratified in the middle of the Cold War.¹⁶ The OST is also unique in that it is open to all states, not just members of the U.N.

At the time of the OST's birth, only two states could operate in space: the U.S. and the Soviet Union. Thus, these two states needed to support the OST if it were to survive. The widespread ratification of the OST is likely due to the support of the Soviet Union and the United States as well as the United Kingdom acting as an additional depository.¹⁸ At its core, the OST provides a codified set of rules and principles to govern activities in outer space and has served as the foundation for proceeding regulations. Even though the OST does not establish a means for enforcement, advocates of the OST argue the legal value of the OST itself has been immeasurable. As the foundational document, many have aptly described the OST as the Magna Charta of space law.

The OST is an amalgamation of previous U.N. Resolutions. Although it is not the first treaty legislating rules involving outer space,²⁰ the OST is the first international treaty focused solely on governing outer space in a comprehensive manner. Nevertheless, like many treaties, the OST is derived from previously accepted agreements. For the OST, the international community relied heavily upon the Antarctic Treaty of 1959.²¹ Accordingly, the OST has many similarities to that of the Antarctic Treaty, such as maintaining accessibility for peaceful and scientific purposes, promoting cooperation, disallowing state territorial claims, and banning the use of nuclear weapons testing or nuclear waste disposal. [5-8]

To modify the OST, a party must propose an amendment. This change will then come into effect upon the approval of a majority, but only upon the accepting parties. Afterward, other parties will see the modification in force from the date of their acceptance to it. Should a party wish to withdraw from the OST, a one year's notice must be provided before the official withdrawal.

However, advocates point to the widespread acceptance of the treaty and deduce that its principles have become enshrined in customary international law.²⁴ Such status would imply the principles are binding on all states, not just parties to the OST, and cannot be circumvented even if a party were to withdraw its commitment to the treaty. If any part of the OST were to have obtained such status, it would likely be one or all of the four primary principles embedded within the framework.

The first fundamental principle of the OST is the role of international law in outer space. Simply put, this principle ensures that space is not lawless, nor is it free from international obligations.²⁵ Article III of the OST states this fact clearly in one sentence: "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, including the Charter of the United Nations, in the interest of maintaining

Subpart B: Private Actors – Does the ISL Apply?

A likely extension from the question discussed in Subpart A – ‘whether the ISL is outdated and therefore no longer relevant’ – is if the framework applies to private actors. An outdated framework may no longer be applicable if the landscape for which it was meant to control has fundamentally shifted. For Dissenters, this is the case with the ISL given the proliferation of private enterprises in space and the evolution of technology to pursue previously unfeasible operations, such as asteroid mining. [9]

At the time of the ISL’s development, there were no private actors in space. Since 2000, private startup space ventures have secured almost \$22 billion of investment, with record fundraising occurring in 2018.⁶⁷ Dissenters argue that ISL does not apply to private actors because none of the treaties mention private individuals and, therefore, their actions are outside the scope of the ISL.⁶⁸ For instance, although the ISL prohibits national appropriation of outer space, according to some, “an individual acting on his own behalf or on behalf of another individual or a private association or an international organization could lawfully appropriate any part of outer space.”

Dissenters will also argue that even if the ISL intended to capture private actors, it could not properly regulate them due to the change in technology between the 1970s and today. Put more entertainingly, “[the] Treaty was signed into being at a time when space tourism, commercial satellites, and a sports car in solar orbit were mere figments of quixotic science fiction.”

Even NASA experts has taken issue with some of the limitations of the ISL, especially its roots in 1960s technological thinking. For instance, a committee put together at the request of NASA regarding the Mars 2020 Rover found, “the current planetary protection policy development process is inadequate to respond to progressively more complex solar system exploration missions.” [10]

In general, the Dissenters’ argument usually stipulates that the ISL writers could not have foreseen the technological capabilities available today to develop a framework that can still suitably function. Furthermore, they argue that even if the ISL intended to persist, it has failed to maintain relevancy given technological advances.⁷² A commonly referenced example of the ISL’s failure in this regard is ‘dual-use’ technologies – designs that function for both peaceful and aggressive purposes.⁷³ Dissenters will say the OST has failed to prevent the militarization of space while also curbing space innovation and operations, such as allowing property rights that would ensure the ability to mine celestial bodies.

Supporters have vigorously attacked Dissenters’ private actor exclusion claim, and with the agreement of most scholars. One such scholar has noted that such an interpretation, that private actors are excluded from the ISL since they are not specifically mentioned, is illogical and untenable.⁷⁴ Indeed, this rationale would not only nullify most of the ISL’s provisions, making it no more than ink on a page, but also go against the overall purpose of the framework, fight against the recorded negotiating history, and contest commonly accepted legal interpretations.⁷⁵ In other words, just because a specific party or group goes unmentioned does not mean they are devoid of accountability. [11]

Moreover, the OST declares that outer space is for the use and exploration of all States, not just those party to the agreement. The OST further requires that entities of a state must receive authorization and ongoing supervision from their state to pursue

any actions beyond the atmosphere.⁷⁶ Supporters, therefore, conclude the private entity exception espoused by Dissenters is unfounded. Although the OST does not explicitly name private entities, Supporters argue the language and intent of the provision captures non-state actors.^[12-15]

Supporters have also strongly argued against the ISL failing to consider future technological advances. For instance, the OST uses the broad term, ‘space activities,’ instead of naming specific activities. Additionally, at the time of the OST’s negotiations, then U.S. President Lyndon Johnson stated the treaty was an, The former President’s view was that the OST provided the basic principles that would adapt with developments in technology rather than be a comprehensive yet inflexible framework.⁷⁸ As such, Supporters believe the general provisions set forth within the ISL were explicitly designed to be mendable as technology improved.

Overall, the questions regarding ‘whether the ISL applies to private actors,’ in most scholars’ opinions, are answered yes. In fact, there have been efforts by both states and private individuals to circumvent the ISL, which have been nullified. As previously discussed, the first attempt was in 1976 by eight equatorial countries in the Bogota Declaration, which, to reiterate, claimed that, Moreover, appropriation claims have also come from individuals but have been met the same rejection from the international community. For instance, in 2012, Canadian courts barred Sylvio Langevin from bringing further suits claiming ownership over nine planets, four of Jupiter’s moons, and the space between each after repeated efforts by him to enforce his believed ownership rights.⁸⁰ Even earlier, in 2001, U.S. courts ruled against Gregory Nemitz as he tried to charge NASA a \$20 fee for landing on Asteroid 433, also known as Eros, which he claimed to have owned.⁸¹ Such rejection is not only seen on the state and individual level from western courts but also on the private enterprise level and eastern courts as well. One example is from 2007 when a Chinese court ruled against Denis Hope and his company, Lunar Embassy, which was selling plots of land on the Moon.⁸² In all cases referenced, the courts have cited the relevant provisions in the ISL.

Subpart C: Customary Law – Does the Private Actors Debate Matter?

The issue of application does not end with the above discussion. Whether or not the ISL is determined to include private actors, it still must be decided whether the ISL has achieved customary law status. Customary law status is significant because once achieved, a provision becomes binding on all states, not just those currently involved in the practice.

Unlike formal treaties, customary law finds its teeth in established and pervasive state practices. Indeed, no formal declarations are announced to declare new customary laws, nor is there a bright-line rule to easily determine such status. Instead, customary law status is achieved through satisfying two subjective components. First, there must be widespread acceptance and consistent practice of the provision, especially among states involved. Full acceptance is not necessary, however, the more actors that adhere to the regulation, especially among the important actors regulated by the provision, the more likely a provision has obtained customary law status.⁸⁴ Second, states must believe there is a legal obligation to uphold the regulation, that they may not disregard the rule when convenient.⁸⁵ As such, the question for the ISL becomes: is the ISL so pervasive and fundamental, having been accepted and adhered to by so many parties for so many years, that it is binding international law on all parties and not just the members of the treaties?

Dissenters put forth two reasons as to why the ISL may not be customary law. The first argument claims the ISL never obtained customary law status. Dissenters argue that the decrease in ratification by states in the latter ISL treaties indicates a lack of widespread acceptance for many of the framework's provisions. Specifically, Dissenters reference the Moon Agreement as failed international law since it was unable to garner widespread adoption and did not receive ratification from any of the Big Three.⁸⁶ The Moon Agreement was an attempt to eliminate the exploitation of space resources and remove any possibility of property rights without approval from an international body.⁸⁷ Dissenters, therefore, see the lack of ratification of the Moon Agreement as a rejection not only of the treaty itself but also the OST's curtailing of national appropriation within outer space. Through negating some of the OST's provisions, Dissenters believe, more broadly, that the ISL cannot be considered to have achieved the status of customary law.

Even if customary law status is conferred upon the ISL, Dissenters contend that such a status is no longer appropriate with the recent proliferation of national laws constructed to circumvent the spirit and intentions of the ISL. Such laws are further examined in Part III. Thus, Dissenters argue, such action indicates a lack of continuing widespread acceptance amongst states, which threatens any customary law status the ISL may have obtained.

To the Dissenters' first point, that the ISL never obtained customary law status, Supporters vehemently disagree.⁸⁹ Most notably, Supporters will reference the widespread adoption of the OST and three of the four preceding treaties. Moreover, they argue that the Moon Agreement's failure to secure as many ratifications as its predecessors does not negate the other treaties' tremendous number of ratifications. Even further, Supporters point to the international community referencing the framework to negate undesirable laws, such as the Bogota Declaration. For Supporters, this satisfies all components of customary law: acceptance and practice of a provision as well as an expectation of a legal obligation by a vast portion of the international community, especially those with the largest space-faring capabilities.

Supporters also naturally disagree with the Dissenters view that any customary law status obtained has been undone through recent national legislation. In fact, Supporters see the rollout of national legislation as further validating the customary law status of the ISL. Indeed, some recent laws seemingly oppose provisions in the ISL but simultaneously affirm capitulation to the ISL itself. This is a more convincing argument by the Dissenters and is one the Supporters have struggled to quell. As such, the result is additional uncertainty, which is further explored in Subpart D.

While some Dissenters continue to argue that none of the ISL ever achieved customary law status, most scholars disagree. Although the Moon Agreement is considered to be failed international law, the widespread opinion among scholars is that the rejection of the Moon Agreement does not negate aspects of the other treaties governing outer space, particularly the OST and its four main principles. Although the Moon Agreement did seek to build upon these principles of the OST, its failed adoption is not widely believed to be an attack on the OST broadly.

Part III: National Regulation – Lack of Action & Reaction

As any first-year law student can attest, the most common answer to a legal question is “it depends.” In practice, this response is often frustrating to non-lawyers seeking a clear go, no-go response from their legal adviser. The law is

complicated though, and often such a direct and simple response is improper. In NewSpace, the frustration is even more acute because the answer to a regulatory-based question will be more akin to “it depends, but we don’t know on what.” This answer is rooted in the ongoing uncertainty surrounding the ISL coupled with the rise of potentially conflicting legislation on the national level.

Many involved in the NewSpace industry, rightfully so, have decried the lack of clear regulations. Regulatory ambiguity can stunt businesses’ ability to access capital, talent, resources and, ultimately growth. In some ways, the lack of clear regulation is worse than strict regulation. For instance, the early automobile regulations were stringent and delayed advances in automobile development by decades. Yet such restrictions still permitted for some innovation, however limiting.

Conversely, in the early years of the internet, the decoupling of information and broadband services allowed internet companies to flourish given the minimal regulation.¹¹³ It is worth adding, however, that the lack of regulation for internet companies helped create over-valued assets and assisted in the developing and bursting of the Dot-Com bubble.

The automobile and internet illustrations exemplify the point that regulation must strike the balance between support for enterprises and protection of the public. In other words, it needs to live in a “Goldilocks Zone” of being just right to properly achieve its purpose of being an enabler for private investors and ensure rational decision making.

The lack of certainty NewSpace faces is undisputed. Supporters may argue the uncertainty is artificially manufactured to produce gray areas that allow states to permit self-advantageous actions; opposingly, Dissenters could retort the uncertainty is generated from broadly written provisions that are incapable of properly regulating technological advances 50+ years after the framework’s inception. Nevertheless, the uncertainty is still present. Given the potential wealth and prosperity NewSpace can generate, it is unsurprising that many states are adopting national legislations with a less restricting interpretation of their commitments to the ISL in hopes of capturing market share of the NewSpace industry. Such commentary has been made in the past by scholars: The divergence between international and national regulations over a global market, such as NewSpace, is not a new phenomenon. Scholars have been writing on the topic for decades, with most noting that the involvement of multiple regulators governing an international market incites the regulators themselves to compete. Example industries include Telecommunications, Finance, and Shipping, all of which have found pockets around the globe to root foundations in states that extend the least oversight, yet with minimal impact to daily operations.

In NewSpace, the body of laws, both international and national, that collectively sum to the framework are becoming more disaggregated and less coordinated. For instance, in 2015 the

U.S. brought forth the Space Act, which permitted the ownership of recovered space resources, despite possibly being in direct contradiction to the ISL’s prohibition of appropriating space. After the U.S. authorized this activity, naturally, other states began implementing similar national legislation. Indeed, as one scholar notes, This section seeks to examine the overarching responses states have initiated to satisfy the legal void generated by the ambiguity and uncertainty of the ISL in addition to states’ desire to encourage NewSpace enterprises. A detailed review of states’ legislated provisions would be improper as it would detract from the over-arching purpose of these legislations. Provisions that receive little to no attention

here, but which can be further reviewed in complementary literature, include regulations on jurisdiction, registration, liability, licensing and authorization, license

Subpart A: The United States

The U.S. was the first country to implement national space laws and has maintained that position of leadership by continuing to add legislative acts over the years. As opposed to a state such as France, which includes its NewSpace laws into a single document, known as the comprehensive approach, the U.S.' NewSpace laws are divided among several different acts, colloquially known as the piecemeal approach. The volume of this legislation includes, but is not limited to, the National Aeronautics and Space Administration Act of 1958, the Land Remote Sensing Commercialization Act of 1984 and its related Policy Act of 1992 and the Commercial Space Launch Act of 1984 and amended in 1988 and 2004.

The U.S. continued its trailblazing legislative role in 2015 when it enacted the Commercial Space Launch Competitiveness Act (Space Act). The Space Act can be thought of as "patient zero" for the beginning of the movement towards national legislation that challenges the ISL in some capacity, despite the wording of the act explicitly stating its intention not to do so. Nevertheless, Article IV of the Space Act permits U.S. citizens or entities, The Act goes on to define space resources as an "abiotic resource in situ in outer space," which includes minerals and water (§ 51301(2)), as well as a "space resource found on or within a single asteroid" (§ 51301(1)).¹²⁰ The Act only permits the actions of U.S. citizens, which according to Title 51 encompasses both natural persons with U.S. citizenship as well as legal entities under U.S. law. There is also an exception for foreign-controlled corporations.¹²¹ As such, most foreign corporations are not eligible for legal rights to 'space resources' under this U.S. law.

To qualify under the Act, the operators of the venture must obtain authorization from U.S. authorities; however, doing so is unnecessarily complicated, even for a rocket launch approval. This is because the process has yet to be simplified or streamlined, thus requiring the approval procedure to go through multiple U.S agencies, including the FAA, the Federal Communication Commission (FCC), the Department of Commerce, and the State Department. ¹²² Such a cumbersome procedure is the result of the approval process being a derivative of the FAA's payload review process, which is quite burdensome and requires interagency cooperation.¹²³ It is also the result of divided responsibility amongst the various U.S. federal agencies. For instance, the FAA oversees rocket launches and re-entry, the FCC regulates communication satellites, and the Department of Commerce oversees the commercial remote sensing satellites. Although such segregation of oversight can be rational, New Space objectives often overlap with all these areas, pulling in multiple independent and often repetitive review processes.

One example of the crippling effect this bureaucratic tape can have is from 2015, before the Space Act's enforcement. Moon Express sought to have a launch authorized but struggled to understand the labyrinth process necessary to do so. The company had a detailed mission plan and had even secured investors' capital, yet there was no process to get approval for the mission. Moon Express spent over a year working with the FAA, FCC, the Department of Commerce, and the State Department to get approval.

Similarly, another example from the same year involves Bigelow Aerospace. Unlike Moon Express, however, Bigelow only approached the FAA about securing approval to attach its inflatable habitat on the U.S. portion of the ISS. While the FAA approved, many critics decried the fact that the FAA did not actually have the authority to make such an authorization since the activity did not involve any sort of transportation.

One unique aspect of the U.S. New Space legal framework is its regulation over only launches and re-entry. Thus, once in space, the U.S. typically does not oversee or supervise activities. Indeed, the U.S. is not alone in this regard, as Australia also takes a similar approach.¹²⁵ This is in direct contradiction with Article IV of the Outer Space Treaty. In fact, it has been reported that the U.S. State Department declared the current framework for U.S. authorization of space activity leaves the country,

Subpart B: China

China has generally not adopted legislation that encourages private businesses to pursue space-based ventures. This is mostly due to the control the Chinese government wishes to keep over the industry. However, this has begun to change. In 2014 the Chinese government permitted private companies to pursue selected activities, including providing launches for smaller payloads and the manufacturing of satellites. While the government still manages all heavy payloads, the private launch industry in China is quickly gaining traction. From 2018 to 2019, the number of Chinese space startups has increased from 30 to over.

In keeping with its intent on continued control, China has not indicated it plans to allow private enterprises to pursue broader and more ambitious activities, such as asteroid mining. Moreover, the government has been hesitant to permit access to foreign-based entities. Google, for instance, was unsurprisingly put through a slow and cumbersome review process when the company sought to produce high-resolution space-imaging of the country. Ultimately, Google withdrew its application because Chinese law was going to severely limit its operations. However, that does not mean that the state is not engaging in ambitious space-objectives itself. In fact, China, despite being critical of the U.S.' Space Act, has been clear that it plans to undertake such activities.

Subpart C: Russia

Russia's approach to New Space legislation is more akin to China's than it is to the U.S.' or most other states involved in space activities. Russia, like China, has established laws that prioritize granting authorization for launches to state agencies, not private actors. Accordingly, Russia has been slow to the idea of private commercialization of outer space, an unsurprising fact since it was Russia's predecessor, the Soviet Union, that drafted the inclusion of the language deemed to require governmental oversight for non-governmental entities operating in outer space.

Although the Russian government still does not favorably view private actors in the industry, the government has recognized the need to be more competitive in the market. When the U.S. retired its Space Shuttle, Russia was the sole provider of transportation to the ISS. This was the case until SpaceX developed its rockets.¹³⁸ During this interlude, Russia's economy was heavily.

Subpart D: Japan

Japan's approach to private enterprise activity in space has been like neither the U.S. nor China and Russia. It does not oppose private involvement, but it also has been slow to update its laws to encourage such activities. However, Japan does appear poised to unshackle its space entrepreneurs and follow in the footsteps of the U.S. and many others. Recently, the Prime Minister declared a goal of increasing the size of Japan's space industry to \$21 Billion by 2030 through the encouragement of private space businesses. Following this announcement, the government passed the Space Activities Act, which creates procedures for the licensing and supervision of rocket and satellites launches by private companies.

The shift in policy is an important step for Japan but some wonder about the impact of its late arrival as almost 20 western states already had similar laws previously enacted. Further, the Japanese government was hesitant to permit private activity in the industry because of its longstanding national policy to refuse using space for national defense. Accordingly, much of the necessary technology that would be useful was discouraged. That said, the Japanese Aerospace Exploration Agency (JAXA), Japan's counterpart to the U.S.'s NASA, has been on the cutting edge of much space technology, including asteroid mining, so scholars do not expect a large impact on the Japan's New Space community.

As Japan begins to embrace private enterprises, its laws have been written to do so in some unique ways. For instance, unlike many other states, such as the U.S. or China, Japan only requires government authorization when the launch or control facility is territorially in Japan. Thus, a citizen of Japan launching in a foreign territory does not need to seek approval from the Japanese government. This approach is quite novel with unique pros and cons. On the one hand, it avoids double licensing requirements when a Japanese national undertakes a launch in another state. However, it also may lead to Japanese nationals facing regulatory voids when conducting space activities in states without national acts or proper governmental administrations.

Another distinctive provision in the Japanese legislation is the liability requirements for launch providers. Many countries, including the U.S., ease liability concerns on launches. In doing so, the government provides a ceiling for liability should the rocket malfunction and destroys the payload or other property. In essence, this is a subsidy to the launch provider by the government through the lowering of the insurance requirement needed to launch as well as the maximum exposure the launch provider faces. Oppositely, Japan has provided no such liability relief for launch businesses.¹⁴⁶ The effect of this is that clients of launches, the owners of the payload, must entrust their property to the launch service provider without reassurance from the government in a worst-case scenario. As such, Japan's legislation can be considered less favorable for launch providers as it may be harder to attract clients.

Subpart E: United Kingdom

The U.K.'s approach to New Space legislation is rooted in three legislations: the Outer Space Act of 1986, the Communications Act of 2003, and the recent Space Industry Bill of 2018. With the 2018 bill, the U.K. updated its New Space legislation with the stated purpose of increasing the state's share of the global space industry by 10% by 2030. The primary method of achieving this growth is through the bill's permissance of and supports for private space enterprises.

To achieve this goal, the bill creates a path for, among other activities, the U.K.'s first spaceport to launch its own pursuits as well as offer the spaceport's excess capacity to private launch operators. Further still, the bill also encourages space tourism

by establishing the necessary qualifications for travelers, including proper training and a thorough medical evaluation.¹⁴⁹ Science Minister Sam Gyimah corroborates the goal by reaffirming the importance of, One similarity U.K. laws share with many other states, including Japan, is the reduced logistical burden of launching in a foreign territory by a citizen. To ease the process, the U.K. has waived its required authorization for citizens seeking to launch from another territory if that citizen files an application for launch with the appropriate foreign government and the application is approved. Although this is meant to alleviate bureaucracy, as discussed previously, the concern is whether an overly ambitious enterprise could seek out a state willing to permit a launch without conducting a rigorous review. Skeptics retort that while such a case is possible, building a spaceport requires significant capital, and any government willing to invest in a spaceport will be discouraged from approving quasi-safe launches. Indeed, the U.K. itself is only now investing in the creation of one. Overall, however, the U.K. has long been an active participant in the private space industry, particularly telecommunications, and its enactment of the 2018 act signals further support for the expanding New Space industry.

Part IV: Regulatory Competition

Regulatory competition occurs when states compete with one another in their capacity as regulators and rule-makers to attract people, resources, and entities into their jurisdictional authority. States engage in this behavior because, through securing a diverse pool of talent and interests, states realize increased economic activity, which in turn decreases unemployment, lowers social welfare costs and raises tax revenues. Given the economic and technological potency the New Space industry could input into an economy, the allure of attracting New Space visionaries is undeniable. Hence, the uprising competition among states is unsurprising.

While this paper is not a discourse on regulatory competition, it is nonetheless vital to understand its basics to appreciate the role it has in the development of an evolving New Space legal framework. A brief review is, therefore, appropriate.

The rise of globalization and the mobility of people, resources and entities alike has created an environment in which market participants can choose the jurisdiction under which they wish to be regulated. Armed with mobility and information, market participants can partake in a form of legal arbitrage – exploiting competitive advantages via differences in the state regulations to create a competitive legal advantage. Such advantages can be seen in the form of lower tax rates, reduced liabilities, increased subsidizations, or access to more capital or a greater talent pool, among many other benefits. Broadly speaking, this form of arbitrage can provide legal, financial, social and political advantages.

Subpart A: Taxation

Perhaps the most common and easiest aspect state regulations can compete upon are those around taxation. Such competition has been widely discussed in both academic and news publications across numerous industries. As one scholar notes,

“The paradigm of Westphalian tax sovereignty is being assailed by efficient corporate tax planning, resulting in considerable profit shifting and base stripping by multinational enterprise. The supply side of policy is engaged in a race to the bottom competition, and the demand side benefits from treaty shopping and elective residence.”

The NewSpace industry will certainly not be an exception to this competitive tax game. Therefore, competition among states in the realm of taxes is almost inevitable and creates the natural starting point for an analysis of regulatory competition.

Subpart B: Operational & Forum Shopping / Flag of Convenience

Forum shopping is a term typically used in matters of litigation. It is the practice of a plaintiff choosing the court likely to be the most favorable to his or her lawsuit.²¹⁸ In the shipping industry, the comparable term would be flag of convenience, which describes the ability of a ship's owner to register a commercial ship in the registry of a country other than the owner's to attain friendly business terms.²¹⁹ The New Space industry, particularly the launch service sector, is quite comparable to the shipping industry. Both are in the business of constant transportation, can depart from and arrive to countless locales, and spend most of their journey in international territory. As such, both are presented with an ability to choose jurisdictions without much consequence to operations. This, in turn, promotes regulatory competition, which, in the shipping industry, has developed a race to the bottom competition with degrading oversights seen in employee rights, ship safety standards, and cheaper operating costs.²²⁰ In New Space, similar concerns abound, in particular, whether small, less technologically capable equatorial states can provide the appropriate level of technological review and safety checks before authorizing a launch.

Subpart C: Miscellaneous & Future Issues

The first two categories, Taxation and Operations, may be appropriately considered to be traditional legislative areas. In other words, these are topics that are common to the legislatures of states and are often being legislated upon to permit the state to govern as well as compete to attract businesses. Beyond these traditional areas, there exists topics that are atypical to space yet might become areas of contestation for one reason or another. These areas are all unique in their own way but share the commonality of being able to disrupt and transform the New Space landscape if they were to become contested grounds. By their nature these areas are unlikely to be included in current legislative agendas, yet, given their potential for disruption, it is appropriate to briefly examine this category and encourage policymakers to be thinking about them. Competitive advantages, even at high costs to the state and humankind. Taxation is the common subject matter in this type of instance. De Man's observation is entirely on point – the rise of national legislation as an interpretive tool removes any “teeth” international treaties had, rendering them closer to mere suggestions than foundations. Furthermore, it is particularly true when the activities involved can only be formed by a select number of states and actors. National legislation is essential, but when it is overtaking international commitments, and being spearheaded by a few states, the likelihood of change against the protection and safeguards of what the international framework was built to do is high and a race to the bottom, at least in some instances, becomes seemingly inevitable. Such a race puts into question the further development of the New Space industry and all the prowess and advancements it offers current and future generations.

Part V: Final Thoughts

Now, with a completed view of the current and potential future of the NewSpace landscape, a return to the question presented in Part III is appropriate: does the surge of competing national legislations with a weakening will of states to adhere to and uphold the ISL automatically threaten the development and maturity of the New Space industry, or can such national legislations alone function to generate a thriving economic environment for New Space ventures? To simplify this admittedly unsatisfying response, let's return to examples. First, consider Starlink, the constellation of satellites being launched by

SpaceX to provide global internet access. The U.S.' has limited incentive to minimize projects like these, given the wealth and opportunity such a constellation could create. This truth is seen in the FCC's approval of the project. Accordingly, other countries have little incentive not to approve such projects. However, the project does not come without its issues, most notably its light pollution that will interfere with scientists' investigations of the cosmos with ground-based observation tools. Thus, this creates a circumstance where regulatory competition will likely lead to a race to the bottom reaction.

Conversely, revisit the example of liability indemnification. National legislations can compete with one another to offer the best opportunities for New Space ventures. Such effects can be seen in the U.K. ultimately, actions like that in the U.K. provide more protection for New Space on the whole, and from the launch service providers to the clients they serve. Such an evolution is akin to corporations competing for highly skilled workers, as the competition raises the bar and promotes better opportunities, so too do its competitors. This then has positive ripples throughout the overall economy. As such, this is an example of competition developing a race to the top outcome. Thus, a yes or no answer to the question is inappropriate. However, unlike in terrestrial examples, such as taxing multinational corporations, in which the consequence is revenues received by the state, the outcomes from failed regulations in New Space have devastating consequences. Explosions, property destruction beginning in the tens of millions of dollars, and death are, sadly par for the course when New Space activities go wrong. Additional consequences include the potential loss of access to vital satellite transmissions and even the inability of space travel for fear of catastrophic collisions between a space vehicle and orbiting space junk. Thus, the stakes are much higher, and one failure can have a domino effect of consequences with limited correctional ability.

As such, it seems that national space legislation should be developed in collaboration with private industry to produce the proper balance between removing barriers to growth opportunities while not under or ineffectually regulating, which could result in a "wild west" scenario.²⁶⁷ Ultimately, this paper believes that the ISL was written in a time that does not reflect our current capabilities. Although it was written broadly to adapt to technological progress, it suffers from its own vagueness. This has led to uncertainty regarding what activities are and are not permitted in space. Meanwhile, New Space presents an unprecedented opportunity with some areas of the industry worth trillions alone. Furthermore, as space is only accessible by a select group, those states hold all the power. Therefore, it is untenable and naive to think these states will not interpret their limitations from the ISL as minimally as possible and then implement national regulations in favor of their self-interests. The opportunities and applications New Space can unlock when properly regulated are truly limitless. Accordingly, a good-enough regulatory framework is, in fact, not good enough. We must resist the urge to play the, "let's wait and see" game; to learn whether the ongoing regulatory competition produces a net positive or net negative outcome. We can and we must do better. Let us be thoughtful as to how to build the best future possible so that we may encourage the growth of private businesses in outer space under a responsible and cooperative banner that propels humanity to the stars and beyond. Let us not be reactive and scrambling to dull undesirable developments. I urge lawmakers and scholars alike to review these brewing problems discussed; to consider the gravity by which human beings will be burdened if we fail to govern the forthcoming activities in outer space properly. More simply, I call on these leaders and experts to think proactively because we need to get this right and, right now, dangerous outcomes loom.

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