

# From Toxic to Noble Competition: Implementing A New Perspective of Antitrust in Outer Space based on Ethics and Beyond

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*Science without conscience is but the ruin of the soul*  
-Rabelais

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**Abstract:** The purpose of this report is to formulate novel recommendations with regards to a proposed space antitrust framework built on the higher ethical principles enshrined within international space law. Several use cases and scenarios are analyzed through a legal lens in terms of potential detrimental effects by future space-based monopolies. This report argues that activating higher ethical principles of space law and transforming them into catalysts for compliance can help channel the competitive market forces in the direction of sustainable development and achieve collective purposes for the benefit of public interest, through transparency, trust and multilateralism. Moreover, this report argues that space is the ultimate arena to test such a novel antitrust framework, because it allows for regulators and policy-makers to establish best practices in a new domain.

**Keywords:** Noble Competition, Antitrust, Space Law, Ethics, Anti-Monopoly

## 1. Introduction

This report expands on a previous blog post entitled: “An Introduction to Space Antitrust” [1], presenting a proposal for a space antitrust regime based on a non-exhaustive selection of higher ethical principles of space law. These principles are most relevant to the antitrust lens, a perspective that is justified in today’s space sector, given the increasing privatization and commercialization of the space economy. The envisaged goal here is to channel competitive market forces from a race to the bottom (toxic competition) towards a race to the top (noble competition) through a series of incentivizing measures by activating the higher ethical principles of space law which are already adopted by consensus at the international level. To do this, public regulators and private stakeholders must align their sense of purpose (purposeful market), reinterpret certain key terms such as “peace” according to the current context (whereby commercial warfare requires a broader scope of the term), build transparency, mutual respect and trust, and agree on implementation measures and compliance indicators for the final purpose that is sustainability and beyond. This report explores several recommendations, after analysis of hypothetical use cases and applicable law. It further adopts competition law/antitrust as the main strategic force for attaining this purpose, owing to pragmatism, efficiency, and creativity.

## 2. Paths Towards a Purposeful Space Economy

Today’s society relies on space sector technology such as telecommunications, GPS, satellite imagery, and many other essential attributes. In fact, the components of the space sector are increasingly considered a part of terrestrial critical infrastructure, and not as a separate system, owing to significantly growing complex and intricate functions. However, the current tensions within the geopolitical context and the highly competitive economic dynamics represent a



non-negligible potential of interference with the harmonious and healthy development of a sustainable space ecosystem. For these reasons, new paths towards guaranteeing such a positive outcome must be explored. For example, considering space as a purposeful market unveils creative approaches towards reducing the zero-sum forces and contention points that are typically found behind a race to the bottom. Such a productive strategy can find its roots in “enabling” mechanisms destined to trigger certain economic functions for “shaping” [2] a given behavior and thus attain desired outcomes. In the private sphere, which gains in scope due to the increasing privatization of the space sector, besides regulators and other stakeholders that are involved, shareholders can play an important role by influencing the “overall strategic direction of the firm, its activities and business models, and hence, its purpose” [3]. Hence the need to focus both on top-down hard law (binding rules, norms and compliance) and bottom-up soft law (non-binding self-regulation, best practices and guidelines). This translates into the need to intervene since “we cannot trust that market forces alone will guide the industry to its desired destination” [4].

Interestingly, it is not that difficult to find purpose in the space sector. Owing to the rising space privatization and entrepreneurialism, pitches about purposeful outcomes have become quite frequent, especially since the most prominent entrepreneurs have considerable personal fortunes and act accordingly, in part, to meet their philanthropic interests, which requires meaning, fulfillment and purpose. Purpose is “not the sole pursuit of profits, but the animating force for achieving them” [5].

Ultimately, aligning such a self-fulfilling idea of purpose with the purposes benefiting public interests through incentivizing mechanisms has all the chances of resulting in a win-win situation. Indeed, policy makers and regulators should:

“seek to adopt the **lens of purpose** when looking at **new rules**. Before new regulation is adopted, they should be explicit about their “**theory of change**”; how the **regulation in question will create a more purposeful industry**. They should regularly test whether their assumptions have proved correct, and learn from those assessments” [6]. (emphasis added)

In short, there is a need for a mindset “which is based on purpose and metrics” [7] that leads to “the exploration of new policy approaches” [8] emphasizing the regulators’ and space actors’ fiduciary duty to act towards achieving public interest (i.e. the sustainable development of the space ecosystem, benefiting all nations, equally, in accordance to international space law).

However, how is this possible when today’s competitive market is based on Schumpeter’s “gale of creative destruction” [9]? The following sections aim at answering this by providing recommendations for a new purposeful lens to be applied to competition in the space sector, to be applied to competition law in space while bringing the broad ethical principles of space law into the spotlight.



### 3. From Toxic to Noble Competition

World renowned scholars who have dedicated their entire lifetime in teaching about competition law and the benefits of antitrust are now reflecting on the adverse effects of competition [10]. Adam Smith’s writings on the invisible hand are being eclipsed by a new reading of his writings on morals and ethics, such as benevolence [11]. Indeed, the dynamics of a “toxic” competition which is based on a zero-sum game and does not benefit society at large, thus impeding its advancement. At the other spectrum of competition, there is what scholars such as Stucke and Ezrachi are calling “noble” competition, which on the contrary of the previous case, focuses on a constructive and collective “race to the top”, instead of classic “race to the bottom” (see *Table 1*).

*Table 1: Competition Continuum [12]*

Competition Continuum			
Toxic Competition	Zero-Sum Competition Motivated by Self-Interest	Positive-Sum Ethical Competition	Noble Competition

#### 3.1. Competition vs Concentration?

However, what the authors failed to focus on is the fact that today’s competition is, in reality, an antithesis of competition since increasing highly concentrated markets kill competition and impose oligopolistic market dynamics, themselves subject to monopolization. Regulators can intervene in these cases thanks to antitrust law and break, in theory, these monoliths. In reality, though, the regulators limit themselves to giving fines (and rare injunctions). Nevertheless, the worst effect of antitrust law is that it is a double-edge sword. In fact, in an ever escalating competitive environment, some industries envisage lessening their drastically competitive behavior and opting for a more sustainable strategy, collectively. According to competition law, this can spill into concerted practice and collusion that are forbidden. In the name of such a competition -- as perceived by Adam Smith, and interpreted by the “Chicago School” [13] -- everything in the regulator’s power must be done to protect competition *per se*, which, in line of fierce competition advocates’ thinking, is the best way to maintain efficiency and lower prices for consumers. There are two problems with this rationale. First, low prices are not exclusively destined to benefitting the end customer, but rather, primarily, to sink competitors, regardless of the high impact on quality. Second, the regulator’s role as envisaged by the Chicago School means, in truth, deregulation. In other words, their rationale defends deregulation to ensure pure competition success, for better and for worse.



### 3.2. Competition Law vs Deregulation

This line of thought is quite unsettling indeed, since, according to history, antitrust deregulation led to financial chaos [14]. In 1986, in the United Kingdom (UK), an antitrust case settlement led to massive deregulation in the financial sector. This deregulation has inspired subsequently other such deregulation waves throughout the world. For example, in the United States (US), in 2000, the Commodities Futures Modernization Act (CFMA) [15] represents such a contemporary deregulation example, which arguably led to the 2008 financial crisis. It follows that deregulating antitrust can lead to seriously detrimental consequences.

### 3.3. To Depoliticize or Not to Depoliticize Antitrust: That is the Question!

It is posited by a new set of experts that antitrust -- although considered, on the one hand, arbitrary because it is being politicized and tends to favor “national champions” through protectionism -- is in fact, not sufficiently politicized on the other hand [16]. It is argued that regulators have their hands tied, and that they cannot intervene enough to protect fair competition when it is opposed by a fiercer one. The proposed solution brought forth by this new doctrinal wave is to further empower regulators with regards to their fiduciary role towards benefiting society at large [17]:

“1. Open, competitive markets, working together with publicly provided services and neutral infrastructure, are necessary for economic liberty. There is **no one-size-fits-all answer** to every industry, **but unregulated private monopoly poses a unique threat**. Private corporations with too much power raise prices for consumers, depress wages for workers, choke off democracy and regulate all of us.

2. To preserve rough economic and political equality, **we should make it easier to organize people and harder to organize capital**. It should be as easy to unionize, or to create a cooperative, as it is hard to merge goliaths.

3. **It’s better to err on the side of decentralized private power. Democratic governance is messy and will lead to mistakes, but corporate government will lead to tyranny**” [18]. (emphasis added)

Last, to summarize the importance of the above, focus can be directed towards morals and ethics [19].

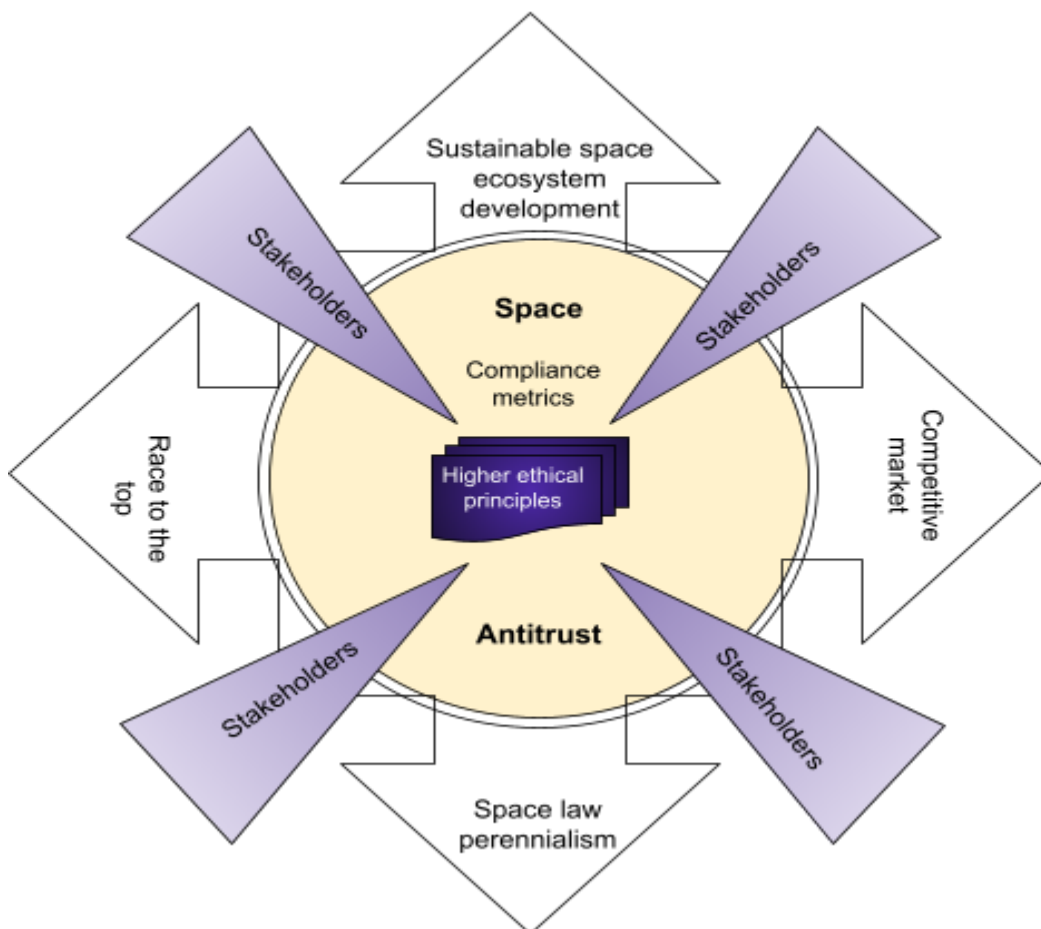
### 3.4. The Nexus between Ethics and Space

It is widely considered that law follows ethics [20]. It is therefore important, as mentioned *supra*, to focus on ethics to anticipate in which direction they lead society to and thus generate new legal norms. One of the most relevant examples is international space law and the fact that its “*magna carta*” is a treaty based on higher ethical principles [21] [22]. Additionally, since there are no competition law cases involving space-based monopolies yet, it will be interesting to observe the emerging trends of a space antitrust, from scratch, in a commercialized space-related context.

### 3.5. Space Antitrust: From Toxic to Noble Competition

Space law relies on ethical principles, thus outer space can be considered the legal laboratory *par excellence* to test “noble” competition in a new domain. Noble competition is destined to be “beneficial” to society at large and space law consists of principles such as *benefit sharing*, stemming from the Outer Space Treaty of 1967 [23] and the Space Benefits Declaration of 1996 [24]. Moreover, according to the continuum depicted at the beginning of this report, “ethical” competition precedes “noble” competition. Noble competition goes even further indeed, but at this stage, it is not yet precisely defined by literature. This report takes the liberty to bring forth recommendations to that regard, in order to preclude toxic competition in space. Scholars such as Stucke and Ezrachi consider that even “fair competition” does not reach far enough at this point, and that nobleness is not only recommended, but truly essential. Antitrust with an agenda that has the collective interest as a priority is also advocated by authors such as Teachout (2020) and Wu (2018). The illustration below (Figure 1) summarizes the key role to be played by such a proposed framework within the space sector. It can further reach out in the direction of a *purposeful market* and *monumental goals*, as advocated in compliance law.

Figure 1. Noble Competition: Ethical Antitrust at the Centre of the Space Market





## 4. Implementation

To better illustrate the complexity between future use cases where competition law can play a major role with regards to different functions and activities of the space market, the table below provides one way to look at things by dividing the space sector into telecommunications, launchers and other services (e.g., *in situ* space resources utilization (ISRU), etc.), as shown in *Table 2*, below:

*Table 2. Space Economy Segments: A Proposal*

Segment	Type of services	Law Applicable (relevant to commercial activities)	Relation to Antitrust	Relevant higher ethical principles for a space ethical antitrust regime
Payload	Information; Data; Big Data; Data storage (e.g. cloud; blockchain, etc.); High Frequency Trading; Telecommunications; Internet of Things; Internet of Space; On-Orbit Servicing (OOS), Space Traffic Management (STM), Space Situational Awareness (SSA), Commodities.	Telecommunications Law; Contracts Law; Intellectual Property Law (IP), Insurance Law; Finance Law; Commercial Law; etc.	Telecommunications sector broken up by antitrust to be reiterated in the space context. Abundant jurisprudence of Earth-related telecoms disputes vs rare space-related telecoms. Growing antitrust concern over data industry (GAFA).	Space law ethics: Mutual Assistance Non-discrimination Equality Benefit sharing; Equality Free Access Cooperation Due Regard Non-harmful Interference Equitable Distribution
Bus	Launching; Transportation; Space Tourism, STM; etc.	Contracts Law, Space Law, IP, Environmental Law; Insurance Law; etc.	Disputes between States defending national champions with State aid; new entrants busting incumbent monopolies. Abundant case law (though mostly settled through arbitration).	Space law ethics: Mutual Assistance Non-discrimination Equality Benefit sharing; Equality Free Access Cooperation Due Regard Non-harmful Interference Equitable Distribution  Duty to assist spacecraft personnel  Environmental law ethics: Intergenerational sustainability Precautionary Principle





<p>Other space objects (stations, installations, rovers, infrastructure elements, etc.)</p>	<p>In situ resource utilization (ISRU); data storage (e.g. cloud, blockchain, etc.); Telecommunications; Terraforming, Settlements, Commodities, other services, etc.</p>	<p>Contracts Law; Space Law; Telecommunications Law; IP; environmental law, etc.</p>	<p>Risk of ISRU rampant monopolization or unfair competition (e.g. predatory low pricing through cross-subsidization) ; etc. No jurisprudence on this topic yet. New academic literature over concern with regards to blockchain consolidation and concentration and IP enclosure.</p>	<p>Space law ethics: Mutual Assistance Non-discrimination Equality Benefit sharing; Equality Free Access Cooperation Due Regard Non-harmful Interference Equitable Distribution</p> <p>Duty to assist spacecraft personnel</p> <p>Environmental law ethics: Intergenerational sustainability Precautionary principle</p>
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#### 4.1 Use Cases

The table *supra* gives a brief overview of the likelihood of antitrust incidence on several space-related activities and it also demonstrates that a singular solution is unfeasible. As a matter of fact, antitrust solutions must be tailored to the corresponding space services. For this reason, the concept of polycentricity is an interesting approach to tackle and reconcile the multiple legal issues at hand. It is to be compared from a system of systems (SOS) perspective, whereby each system and subsystem must be dealt with separately for the whole complex SOS to function appropriately. In this case, the overall SOS is the noble competitive environment of the space economy.

To achieve this, an interdisciplinary governance group should be inserted in a sixth column in the table *supra* which is tasked with taking action based on the “applicable antitrust solution”. Additionally, it must be underlined that the applicable legal fields in each case have their own relevant ethics. For example, intergenerational equity has been added in the Moon Agreement of 1979, however only a handful of States have ratified it and its fate remains highly uncertain. Nonetheless, environmental law comprises, *inter alia*, the concepts of intergenerational sustainability [25] and of precautionary principle [26] which could be applicable to space antitrust as environmental law is susceptible to apply to space activities and their impact on the environment of outer space and celestial bodies. For now, environmental law, in the context of space activities, applies on Earth in the unfortunate event of a launching malfunction. The damages incurred on the Earth’s surface qualify under a strict (absolute) liability regime (which takes place regardless of fault, as provided by Article II of the



Liability Convention of 1972<sup>2</sup>). For the purposes of this report's discussion, nevertheless, only the space law ethics are retained for demonstrative efficiency.

For example, in the payload segment of space traffic management (STM), the selected space law ethics which pertain to this report's rationale prevent monopolizing rules of the road, both upstream and downstream, such as in the case of orbit monopolization through mega constellation trajectory design [27]. Moreover, spectrum is already considered a limited natural resource and managed by the United Nations' International Telecommunications Union (ITU) to prevent radio frequency (RF) harmful interference and to ensure "equitable" access and distribution of RF allocations. During the privatization of space telecommunications consortia, such as Inmarsat and Intelsat, ITU principles ensured that their successors respect a certain minimum threshold of fair competition given the ITU's Constitution sections on equitable distribution [28].

In the STM case, this would extend even further to include not only spectrum allocation, but trajectories, orbit design and safety measures. ITU relies on a first-come, first-served basis and satellite operators rely on this to get in line as fast as possible to file for allocations which in several instances results in "paper satellites". ITU therefore adapted its regulation to prevent this anomaly [29] and mitigate attempts at a race for RF grabs. Nonetheless, the race for grabs is not fully circumvented given the advent of mega constellations and their *de facto* monopolization of orbits simply by designed capacity (comprising tens of thousands of individual items). Under a space antitrust regime, such a constellation should take into account the interests of competitors and refrain from bad faith tactics that would prevent successful deployment of that new entrant's project. To enable this, due regard for potential competitors' business model shall be invoked, under the condition that both first-come actors and new entrant put forth a reasonable business model, meaning that the new entrant must also play fair and design a "reasonable" business model exempt of the intention to bust the plans of initial incumbents in order to interfere with their competitive advantage. That would be an example of toxic competition, with no long-term sustainability of the entire space ecosystem. Furthermore, the OST brings forth principles such as non-discrimination and cooperation, which warrants a constructive and collaborative environment, opportune for testing noble competition.

## 4.2. Hypothetical Scenario

To better illustrate a hypothetical use case drawn from the variables of the previous table, the following example elaborates on the narrative of intricate interactions between space activities and antitrust (see *Figure 2*).

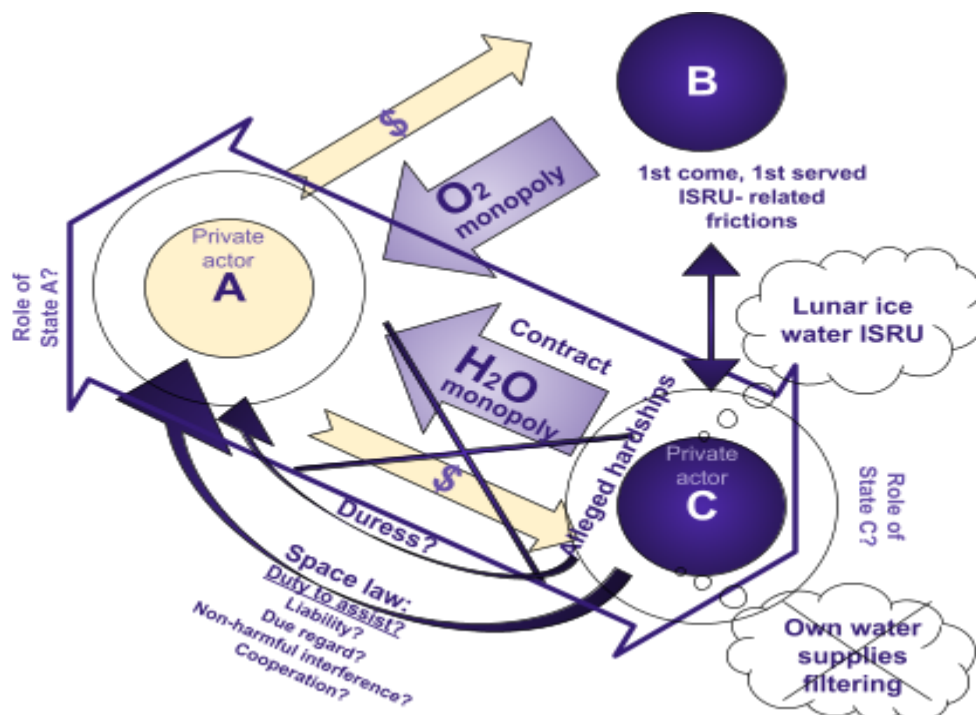
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<sup>2</sup> Convention on International Liability for Damage Caused by Space Objects, available at: <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/liability-convention.html>.

#### 4.2.1. Part 1: Hypothetical Facts and Questions

Private actor A establishes a human settlement on the Moon and builds a facility that depends on the oxygen produced by private actor B, which already has a facility on the Moon, and depends also on private actor C, which filters water, also on the Moon, for its own use and for potential clients such as A. B and C have the monopoly over their services and A relies on them totally for survival, through a contractual relationship. At some point, C decides to cut water supplies to A unless A is willing to pay more. The threat is not due to bad faith, but to financial hardship as water filtering on the Moon proves technically more difficult and C wants to process lunar ice water instead to compensate for reduced capacity.

Figure 2. Example of a Lunar Hypothetical Monopolistic Scenario



In this situation, several legal problems arise. First, questions such as whether prices can change once agreed upon contractually. Further examination of the contractual clauses would be needed in this case. Second, does such a threat amount to unfair competition because C has the monopoly over water production? In this instance, it can be argued that it does not since C can qualify as a legitimate “natural monopoly” (it has a *de facto* monopoly because there are simply no other actors involved in the commerce of lunar water) and because it encounters financial hardships. Third, in its intention to process lunar ice water, does C proceed to unfair competition because it interferes with the space activities of other actors, based on a first-come, first served, self-attributed rationale?



Under international space law (OST, Article IV), C would have to notify all other potentially impacted nations of its intention to process that specific resource. What would A have to say in that case? Would C obtain another market monopoly (over an *in situ* space resource)? Would that amount to unfair competition due to an abuse of a dominant position by taking advantage of the fact that A has no other choice but to: 1) pay more and; 2) let C take over the processing of lunar ice water? In such a sensitive case, would the State of registry of Actor C (responsible for supervising the activities of its nationals, under OST, Art. VI) be required to act and help out C in order to avoid infringing on the wellbeing of Actor A? If nothing is done and A cannot afford to pay more, would State A be required to intervene? Would forcing both actor and State A into complying with higher pricing constitute duress? Would cutting access to supplies of critical resources for survival amount to violating Article V of the OST (on the duty to assist astronauts in outer space or on celestial bodies) and the Rescue Agreement [30]? Would that deliberate act, even though committed under technical and financial constraints, amount to fault under the Liability Convention [31]? Would it also violate other higher ethical principles in international space law such as due regard and non-interference?

These are only the first reflections on a long list of existential legal questions which will be asked in relation to the development of the space ecosystem, commercial space activity, and the law. This explains the notable need to foresee such scenarios and anticipate contention points which could result in mission- or life-threatening circumstances. Both natural and artificial monopolies must be regulated within a flexible, adaptive, but comprehensive framework.

#### 4.2.2. Part 2: Applying the Law to Secure Basic Human Rights in Space Thanks to Antitrust

This section presents an alternative that helps to solve, in theory, the hypothetical scenario which appears *supra*. The alternative conveyed below chooses to argue the right to equal access to supplies of critical space resources for survival based on the higher ethical principles enshrined within international space law.

##### **4.2.2.1. Duty to Assist: Critical Resources for Survival Cannot be Monopolized**

Another interesting instance where space law provides a solution against monopoly might seem far-fetched at this stage, but it is likely to prove its value once the circumstances arise. This idea crystallizes when a public or private entity provides goods or provides services (e.g. processes a space resource) which proves critical for survival (e.g. oxygen, water, etc.) and when a space station/settlement in close proximity inadvertently suffers from lack of such critical resources and finds itself in distress. If the astro/cosmo/spatio/taikon-aunts on board, known as “spacecraft personnel” within the Rescue Agreement of 1968 [32] (who are considered either as “envoys of [hu]mankind” or as “exclusively” space tourists [33]) are in danger, there is a legal duty of other State parties to the Rescue



Agreement to assist and help out the endangered crew, in any way possible if within reach [34]. The Rescue Agreement is an extension of the Articles V and VIII of the OST which provide respectively that “astronauts” are envoys of [hu]mankind and need to be rescued by any means possible, and that launching States retain jurisdiction and control over space personnel and objects in outer space [35].

“Article V

States Parties to the Treaty shall regard **astronauts as envoys of mankind** in outer space and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of another State Party or on the high seas. When astronauts make such a landing, they shall be safely and promptly returned to the State of registry of their space vehicle.

In carrying on activities in outer space and on celestial bodies, the astronauts of one State Party shall **render all possible assistance to the astronauts of other States Parties.**

States Parties to the Treaty shall immediately inform the other States Parties to the Treaty or the Secretary-General of the United Nations of any phenomena they discover in outer space, including the Moon and other celestial bodies, which could constitute a danger to the life or health of astronauts”. (emphasis added)

As of this writing, this agreement was mostly resorted to in cases whereby spacecraft personnel landed in remote areas on the surface of the Earth. The State on whose surface the crew landed has a rescue duty. Until recent times, if a problem occurred in outer space, the duty, operational and logistical in nature, concerned only a handful of space faring nations with considerable space capability. However, as the space economy evolves, involving an ever increasing number of non-traditional public and private actors, and is likely to host human stations or settlements in outer space or on celestial bodies in the not so distant future, there is a risk of critical resource shortages at some point. In that case, it can be argued that the duty to assist and rescue extends to sharing these critical resources, if possible. If so, conditions such as how, how much, and for how long must be agreed upon *ex ante*, multilaterally. If there are two stations or neighboring settlements, sharing might prove challenging in a zero-sum context, whereby both parties rely on the said resources for survival. Nevertheless, in the light of the rationale presented in this section, a minimum threshold must be reserved for sharing in case of distress (i.e., the least necessary according to reasonable standards) to ensure survival until other measures can be implemented (e.g., evacuation, other sources of supplies, etc.).

Article IX of the OST summarizes judiciously the above-argued dynamic:

“In the exploration and use of outer space, including the Moon and other celestial bodies, States Parties to the Treaty shall be guided by the principle of **cooperation and mutual assistance and shall conduct all their activities in outer space**, including the Moon and other celestial bodies, **with due regard to the corresponding interests of all other States Parties to the Treaty.** States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration of them so as to **avoid their harmful contamination** and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter and, where necessary, shall adopt appropriate measures for this purpose. If a State Party to the Treaty has reason to



believe that an activity or experiment planned by it or its nationals in outer space, including the Moon and other celestial bodies, would cause potentially harmful interference with activities of other States Parties in the peaceful exploration and use of outer space, including the Moon and other celestial bodies, it shall undertake appropriate international consultations before proceeding with any such activity or experiment. A State Party to the Treaty which has reason to believe that an activity or experiment planned by another State Party in outer space, including the Moon and other celestial bodies, would cause potentially harmful interference with activities in the peaceful exploration and use of outer space, including the Moon and other celestial bodies, may request consultation concerning the activity or experiment". (emphasis added)

That would particularly hold true when the producing actor has a monopoly on a specific resource. This duty to assist ensures a minimal threshold of space resources to be shared if survival comes to depend on them. Indeed, the Rescue Agreement can thus guarantee a basis for human rights on space-based infrastructure by controlling monopolies within an extreme and unforgiving environment [33]. Subsequent discussion on compensation can be conducted, but at this stage, this submitted interpretation of the Rescue Agreement is a first step into investigating instruments to limit potential monopolistic abuse since the context of space activities is changing, although it can be argued that, ultimately, the financial burden related to compensation remains on the State.

On the one hand, according to the OST, the obligation of rescue falls on the launching States. Indirectly, the private actors are targeted, through the State's responsibility provided by Article VI of the OST. For this reason, it is logical to infer that States incur the financial burden of compensating the commercial operator, although there is no such a jurisprudence as of this writing. However, on the other hand, interestingly, the Rescue Agreement explicitly applies to international intergovernmental organizations as well:

"Article 6

For the purposes of this Agreement, the term "**launching authority**" shall refer to the **State responsible for launching, or, where an international intergovernmental organization** is responsible for launching, that organization, provided that that organization declares its acceptance of the rights and obligations provided for in this Agreement and a majority of the States members of that organization are Contracting Parties to this Agreement and to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies." [37] (emphasis added)

This use case, which can be perceived, contestably, as far-fetched, answers doctrinal questions, raised several decades ago by eminent space jurists and scholars [38], whose reflections on the risks of first-come, first-served abuses and monopolization have been reiterated ever since [39] [40]. Indeed, questions brought forward issues such as whether a human settlement on a celestial body could take advantage of a resource (e.g., water ice on Mars) at the detriment of future settlements [41]. Invoking Articles V and VIII of the OST and the Rescue Agreement to pursue the goal of securing basic human rights in outer space can better resonate with both the public and private stakeholders as this argument addresses, *ex ante*, anti-monopoly queries.



These few examples show how space law and antitrust can cross paths for a constructive purpose. Competition does not have to be toxic. Quite on the contrary, it can result in a win-win situation. Since space is fundamentally characterized by a spirit of cooperation, the relevance and usefulness of a competitive environment can be challenged. If constructiveness and cooperation are the purposes of peaceful uses of outer space, why should one bother with competition at all? The answer is to protect economic liberty and restrict abusive monopolies<sup>3</sup>. This report asserts that banning competition equates with banning market opportunity and freedom, which, at length, develops into relying on monopolies that, as history proves, are not the most sustainable option in the long run. For this reason, competition must be sustained, and regulated clearly and with incentives shaped by policy with the collective purpose of benefitting society, the space ecosystem and sustainability.

#### **4.2.2.2. Intellectual Property (IP) Threat of Enclosure Over Human Rights in Space**

There is a further challenge in terms of monopolies in outer space. By nature, IP pushes towards monopolization by enclosing knowledge [42]. Claiming property over knowledge is a slippery slope with serious consequences, particularly scalable within an extreme environment such as outer space. Terrestrial examples of detrimental knowledge enclosure with life-threatening consequences are best represented by the current situation with regards to COVID-19 vaccines. The market is characterized by a very restrictive oligopoly, with a creeping monopolization strategy, based on exponential return on profits that are borderline to constituting bad faith.

As a consequence, States have come together to negotiate a temporary waiver of the World Trade Organization (WTO) Agreement on Trade Related Aspects of Intellectual Property (TRIPS) to lift copyright restrictions and disseminate vaccine-related technology to the wider community and save lives through the “prevention, containment or treatment of Covid-19” [43]. Normally, TRIPS requires WTO nations to “guarantee pharmaceutical corporations expansive monopoly controls” [44], but this amounted to a “key obstacle” in providing access to life-saving formulas around the world during the crisis. When extrapolated to the space sector, such a monopoly can directly violate the duty to assist spacecraft personnel in distress. It can also be argued that it violates the principles of benefit sharing, equal access and non-discrimination. As illustrated by the current dispute, TRIPS are, in truth, economically discriminatory and this directly violate the non-discrimination principle of Article I of the OST which provides that:

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<sup>3</sup> The expression “economic liberty” in this context comes from the US Executive Order on Competition of July 9, 2021 which provides that economic liberty can be protected by competition law (antitrust). See: <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/07/09/executive-order-on-promoting-competition-in-the-american-economy/>. (Accessed on December 15, 2021).



“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.

**Outer space, including the moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies.**

There shall be freedom of scientific investigation in outer space, including the moon and other celestial bodies, and States shall facilitate and encourage international co-operation in such investigation”. (emphasis added)

The industry has argued that copyright monopolies enable innovation and better preparedness, both financially and technologically, for the subsequent pandemics. However, historic facts have proven otherwise. Indeed, this argument does not stand since the pharmaceutical industry benefits from substantial public investment everytime a crisis hits:

“The miracle of speedy COVID-19 vaccines resulted from **taxpayers providing pharmaceutical firms billions** to develop and test COVID-19 vaccines and then billions more in pre-orders, **not from pharmaceutical firms investing monopoly-gained profits**” [45]. (emphasis added)

Surprisingly, representatives from the industry admitted that the lack of private investment into fundamental research is due to the lack of financial incentives [46]. Unfortunately, this situation is recurrent. In the late 1990s, millions of people in developing countries were dying of AIDS due to similar pharmaceutical copyright restrictions, denying affordable access to lifesaving drugs. However, a worldwide campaign culminated in the 2001 Doha Declaration, which mitigated pharmaceutical IP abuse that has a negative impact on public health [47]. Nevertheless, the Doha Declaration cannot be successfully applied in the COVID-19 case because of global supply chain complexities. Bottom line, IP monopolization and knowledge enclosure in the health sector are a dead end:

“The early HIV/AIDS experience and many examples since make clear that supplies adequate to meet global need will not be produced by relying on IP-monopoly-holding firms’ internal capacity or the arrangements they choose to make with other firms to manufacture for them via contract manufacturing deals and bilateral voluntary licenses” [48].

In other words, by illustrating the detrimental consequences of knowledge enclosure by creeping monopolization and its hypothetical application to the space context, such as demonstrated under *Figure 2, supra*, this section has provided further antitrust arguments towards securing basic human rights in space by positing that, in certain situations, monopolies can cause a direct violation of the duty to assist





## 5. The Antitrust Nebula: Antitrust Acts in Mysterious Ways

The space sector is gradually transitioning into a phase of privatization and commercialization, thus ushering in competition dynamics which, in theory, can be beneficial for the development of the space ecosystem. However, there are instances where this competition and ensuing lawsuits are perceived to be toxic by the public. The result of this outcome is a political divide and a misunderstanding by society of government procurement, State aid and contracting, and an overall questioning of the legitimacy of space budgeting which, in the public eye, it seems that a “club” of billionaires is profiting financially to pursue their “space hobby” [49]. However, in many cases, antitrust lawsuits hide behind the scandals and its obscure mechanisms yield apparently confusing and perhaps contradictory results, even though perfectly legal from a strict competition law perspective. Understanding competition law can solve this growing *impasse*. Nonetheless, this is a tricky task since understanding competition law in itself is quite a challenge. It remains a rather nebulous body of law, with unclear and ever changing boundaries. In other words, competition law, anti-monopoly law, or antitrust law (different names but with the same meaning) is unpredictable and tailored to a case-by-case basis, challenging thus any notion of consistency and coherence. It is arbitrary and it explains the reason why NewSpace companies (which are the new entrants), or unicorns (which are growing spectacularly), and incumbents (the pre-existing contractors, of monolithic sizes) invest heavily into lobbying efforts and unleash armies of antitrust lawyers to bust each others’ markets. Here are a few selected examples:

1) Launchers Market Monopoly Saga: SpaceX v United Launch Alliance (ULA) [50]

ULA is a joint venture between Lockheed Martin and Boeing, with the core mission to provide launching services and infrastructure to the US Department of Defense (DOD), as sole provider. SpaceX filed several lawsuits against ULA and DOD (more precisely the US Air Force) to break that monopoly by disputing the reality of ULA’s economies of scale. Ultimately, after several lost lawsuits, starting in 2006, SpaceX finally won the antitrust case based on lower costs and anti-monopoly law.

2) Disputes over State aid and national champions: SpaceX v ArianeGroup [51]

SpaceX filed in 2019 a complaint before the US Department of Commerce over European subsidies to Arianespace, its European competitor (now Ariane Group, a merger between Airbus and Safran Launchers), which according to SpaceX, amounts to unfair competition. Paradoxically, SpaceX itself benefits from State subsidies through NASA. European officials rejected the complaint, based on WTO standards which allow State aid.

3) Sea Landing IP: Blue Origin v SpaceX [52]



Blue Origin unsuccessfully tried to file a patent in 2014 over sea landing processes and to preclude SpaceX from doing so. However, SpaceX demonstrated that such a process already existed and was not new (and therefore not patentable).

4) Mega-constellation Orbit Design: Amazon v SpaceX [53]

Amazon-based Kuiper Project mega-constellation allegedly relied on existing SpaceX's Starlink mega-constellation orbit design to design its own orbit and avoid harmful interference with Starlink. However, it filed a complaint when Starlink proceeded to modify its orbit, earlier in 2021, according to Amazon, to interfere with Kuiper and to deny them access to their own slots. Amazon maintains that this is anticompetitive and dangerous.

5) NASA Human Landing Systems (HLS) Contracting: Blue Origin v SpaceX [54]

NASA's HLS program selected 3 competitors for the Artemis program. However, due to budget cuts, instead of further selecting 2 winners, it selected only 1: SpaceX, for its low costs. Blue Origin filed a complaint, earlier in 2021, where it maintains that NASA unilaterally changed the selection process during the competition and then proceeded to a flawed acquisition. Furthermore, Blue Origin maintains that this award would trigger a long-lasting monopoly by SpaceX and harms competitiveness and resilience. A bill was passed by the Senate to fund more competitors but failed in Congress. The protest, however, was submitted to the Government Accountability Office (GAO) but was denied in July 2021. Further, Blue Origin sued NASA but the Federal Court rejected the lawsuit as well, in November 2021.

In the case law listed above, most of which were settled through opaque arbitration and did not contribute much legacy in terms of substance that could enrich the discipline of antitrust, the priority was, and arguably still is, given to competition itself and not to the sustainability of the space ecosystem development. It can thus be said that the space sector has become the arena of legal battles and that the battlefield is competition law, torn inside out for lack of clarity and predictability. In short, there is a blatant need for antitrust transparency and coherence to help demystify the components of what competition law really consists of. However, such an endeavor can prove quite challenging since antitrust law parameters are rather vague and the maze of legal criteria added successively by lawyers, arbitrators and judges, case after case. It is indeed difficult to navigate the troubled waters of opaque rules to determine whether a given case represents a monopoly worth busting or consists of unfair competition practices worthy of injunction.



For instance, competition law theory requires answering questions such as; what constitutes a vertical or a horizontal monopoly in a specific market share and is that monopoly natural or artificial? Is there an overt action intentionally taken to create a monopoly or is the monopolistic status simply obtained *de facto*? Does the monopoly permit economies of scale or prevent competing new entrants from entering a given market through unfair competition practices such as predatory pricing? Additionally, space is a sensitive domain, for security reasons, where information is not readily accessible. While space is a sensitive geostrategic domain, it also falls under international law, although national law acts as a proxy, thanks to Article VI of the Outer Space Treaty of 1967 (OST) [55] to ensure compliance by the private sector. The fact that space falls mostly under international law as of this writing further complicates the antitrust situation since antitrust itself falls under domestic law (Sherman Act, Clayton Act in the US [56], and the transnational TFEU in Europe's case [57]).

In the light of the increasing commercialization of the space sector, international law (which applies between States), will evolve shoulder to shoulder with transnational law (which applies to public and private actors, regardless of frontiers). It is therefore interesting to speculate on the place to be played by antitrust law in this evolving legal backdrop. Ultimately, the main takeaways are that unless there is no international antitrust law besides non-binding guidelines, there will certainly be clashes between international space law and national antitrust (and/or protectionism).

## 5.1 Transparency: A Need For Building Trust

Antitrust is in a dire need for more transparency with regards to what's what. Otherwise, it continues to be perceived as arbitrary and potentially unfair, without an objective mind of its own. Transparency is already a challenge in the space sector and focus groups such as the Governmental Group of Experts (GGE) formulated a series of Transparency Confidence-Building Measures (TCBMs) [58] to help with the deconfliction of security-related issues. The result was acclaimed as being very promising, however the day-to-day implementation success remains relative [59].

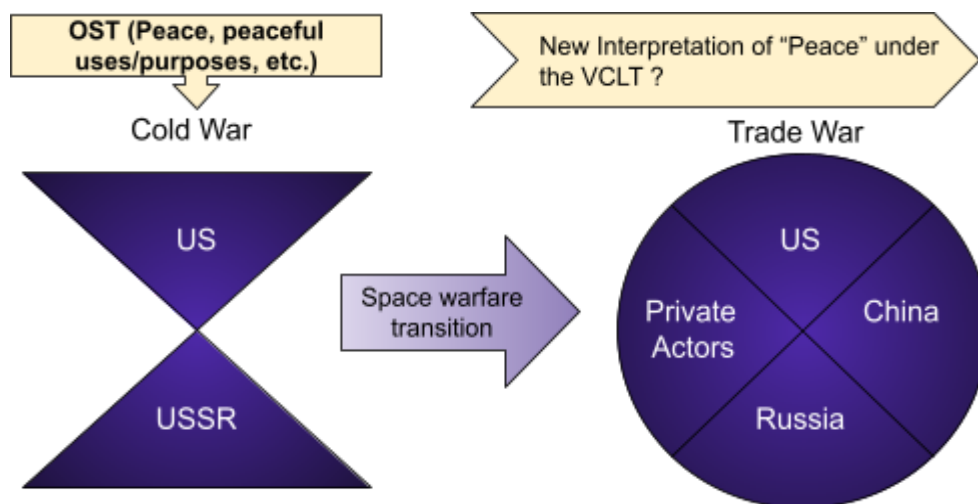
Transparency within space antitrust is consequently twice as strenuous since this specific area consists in a double layer of restricted access to information: antitrust and space. A clear set of criteria must be brought forward as the basis on which the private sector can build future business models accordingly and know beforehand the extent of competitive barriers and how they can be lifted through competition law. To increase the probabilities of success, adherence and efficiency of the said criteria, they must rely on widely accepted tenets to build consensus rapidly.

## 5.2. A New Peace, A New Beginning: Reframing “Peaceful Use” from Cold War to Trade War

The prime example of widely accepted tenets in this context is composed of the higher ethical principles embedded in international space law. Notably, they are highly amenable to being seen from an antitrust angle with respect to the purposes of fair competition (e.g., non-discrimination, benefit-sharing, equality of access and opportunity, freedom to explore, non-interference, peaceful purposes, etc.) [60]. These broad ethical principles are the core of the OST of 1967, ratified by 111 States, and signed by another 23 countries as of 2021, and it has thus reached the status of customary law. They should be met with similar compliance within an antitrust setting, but in this case, proper to space. These principles were initially established to stop the escalation of the Cold War into space. The main purpose was therefore to promote “peaceful use”.

Now, the need to prevent the escalation of warfare is still timely, but on a different level. Indeed, there is a need to mitigate the threat of escalating commercial warfare (trade war) and lawfare, as the growing privatization and commercialization of space lure both public and private actors into resorting to such an economic art of war, oftentimes relying on competition law, which intensifies the sector’s toxicity. It is high time to reframe the OST’s meaning of peace and other principles to fit this new backdrop. Both the public, directly, and the private sector, indirectly, have to respond and be accountable for complying with this revisited interpretation of “peaceful use”, under the conditions of Articles 31 and 32 of the Vienna Convention on the Law of Treaties (VCLT) of 1969 [61]. *Figure 3*, below summarizes the idea of an evolving notion of warfare in space which needs appropriate interpretation at the treaty level to foster an appropriate and adaptive environment where multilateral collaboration can thrive.

*Figure 3 Reinterpreting “Peaceful purposes and uses”*





### 5.3. Existing Competition Law Framework in the Space Sector

Reinterpretation and adaptation of the meaning behind “peace” is relevant and useful especially given the fact that, currently, there is no satisfactory comprehensive antitrust framework whatsoever equipped to face the challenges and obstacles raised by commercial warfare, protectionism and national champions financed through public and private subsidies, destined to monopolize entire markets [62].

At the international level, there is no harmonized antitrust law. Rather, a series of non-binding guidelines attempt such an alignment, with mitigated success. Indeed, there are several challenges which prevent a smooth harmonization of antitrust at the international level, despite numerous initiatives in that sense. The best examples are the International Competition Network (ICN) forum [63], the UN Conference on Trade and Development (UNCTAD) non-binding guidelines [64], the Organization for Economic Cooperation and Development (OECD) best practices [65], and further bilateral or multilateral agreements.

More precisely, the OECD defines antitrust as:

**“Anti-competitive practices refer to a wide range of business practices** in which a firm or group of firms may engage in order to **restrict inter-firm competition to maintain or increase their relative market position and profits without necessarily providing goods and services at a lower cost or of higher quality”** [66]. (emphasis added)

In the meantime, the UNCTAD discourages transnational corporations from:

**“Agreements fixing prices, including to exports/imports; collusive tendering; market or customer allocation; allocation by quota as to sales and production; collective action to enforce arrangements (e.g. concerted refusals to deal, etc.); concerted refusal of supplies to potential importers; collective denial of access to an arrangement crucial to competition; abuse of dominant position of market power unduly restraining competition (predatory behavior; discriminatory pricing; mergers, takeovers, JVs, etc. -- horizontal or vertical; price fixing, etc.”** [67]. (emphasis added)

Besides these initiatives, there have been attempts to negotiate an international antitrust framework at the WTO, but they all failed due to irreconcilable and divergent national interests. Since there is no international antitrust, envisaging the possibility of an international antitrust framework in the space sector is even more challenging. But, in every crisis, there is an opportunity. Hence, this report seized this opportunity to advance the hypothesis of a space antitrust framework that can serve as the foundation for an international regime given all the compliance ingredients which are provided by the higher ethical principles of space law, adopted by international consensus and which are considered as customary law ever since. What remains to be done is to convince the community of stakeholders that these principles can be reinterpreted through an antitrust lens, within this commercialized NewSpace context [68].



At the national level, domestic competition law is served on a case-by-case scenario, which oftentimes leads to incomprehension of the obscure forces behind antitrust in the eyes of the public. Throughout the world, competition law is composed of relatively similar ingredients (anti-monopoly measures, regulation vs collusion, abuse of dominant position, cartelization, price fixing, etc.), but their detailed application differs from one jurisdiction to another, which seems, *prima facie*, quite disconcerting. With regards to public procurement, for instance, in the United States, cases are brought forth to the Government Accountability Office (GAO), also known as the “congressional watchdog”, established in 1921, which is the agency of the federal legislative branch (the Congress), responsible for auditing public expenditures and ensuring that public funds enable the “greater economy or efficiency in public expenditures” [69].

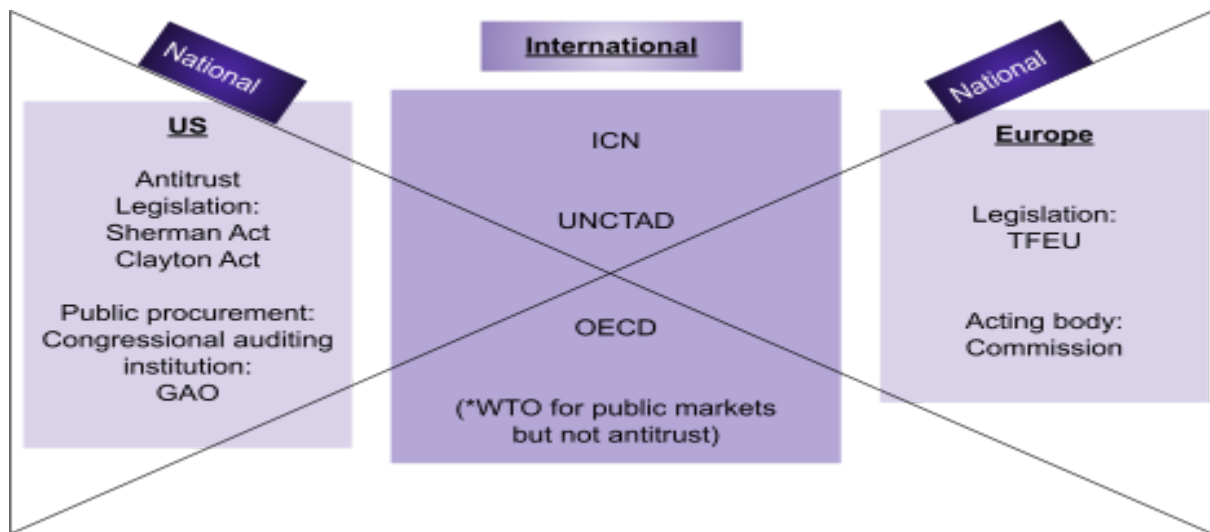
The most recent space-related antitrust case submitted to the GAO, at the time of this writing, apart from raising controversy, brought public scrutiny over testing the degree to which GAO’s mechanisms are truly transparent and predictable. The case concerns the NASA Human Landing System (HLS) contracts for the crewed lunar Artemis program. At the beginning, NASA invested in several competing contractors and selected three finalists for the HLS: SpaceX, Blue Origin and Dynetics. However, due to subsequent budget cuts, NASA awarded the final contract exclusively to SpaceX because its bid required the lowest costs. Expectedly, Blue Origin retaliated with a legal protest before the GAO, alleging that NASA unilaterally modified the competition criteria and proceeded to a flawed acquisition [70]. While the GAO has denied Blue Origin’s protest in July 2021, it is inferred that Blue Origin actively lobbied to have the Congress actively sustain further competitiveness and funding in the space sector, through the “US Innovation and Competitiveness Act” [71] which included NASA’s regular budget authorization bill, but with a considerably higher proposed budget. In fact, the amount, which is destined to sustain a second competitor in the race, would coincidentally cover the costs of Blue Origin’s HLS contract [72]. Officially, though, the bill urges the Congress to encourage further competitiveness and to ensure resilience through redundancy by having two winners instead of only one. In other words, the bill translates Blue Origin’s fear that SpaceX would inherit an HLS monopoly.

Both SpaceX and Blue Origin are familiar with antitrust moves as SpaceX first busted the United Launch Alliance (ULA) monopoly of government launches through lawsuits, as mentioned *supra*, and Blue Origin has protested multiple times over the fact that public procurement processes are anticompetitive because too restrictive in terms of admitting competing bidders. Both actors have approached the GAO, on the one hand, in the past with multiple protests while heavily investing, on the other hand, in concurring lobbying efforts. In this case, it is argued that, since protests submitted to the GAO have a low success rate, Blue Origin has decided not to wait for the GAO’s verdict, and to try its luck on another front: the Congress. Ultimately, however, although the Senate did indeed pass the

bill, it failed in Congress. [73]. The lawsuit before the Federal Court also failed a few months later but it is worthwhile to mention the fact that all parties involved present striking arguments but the result may be rather puzzling due to contradicting technicalities relative to the competition process itself. In the end, this case does a disservice to space antitrust because it adds to its opacity and complexity<sup>4</sup>.

For illustrative purposes, *Figure 4, infra*, resumes the existing theoretical antitrust framework both on the national and international scene.

*Figure 4. Mapping Out Existing National and International Antitrust (US, Europe, and International Non-Binding Initiatives)*



## 6. Setting the Table

Establishing thus, a clear set of ethical compliance standards to start off outer space activities can indeed ensure a fair start for space commerce. Entry barriers must take into careful consideration the above-mentioned ethics, in all transparency. This new set of reframed, ethics-based TCBMs, oriented towards commercial activities should be adopted in a multilateral fashion to ensure quicker and widespread adherence. *Ergo*, a polycentric approach [74] might prove effective as multiple implementation channels can operate simultaneously, in parallel, in order to build momentum organically. For instance, minilateral efforts, such as the Artemis Accords [75], could be activated in tandem with privately-led, bottom-up initiatives (e.g., Perpetual Purpose Trusts with the purpose of enhancing reliance on such norms); or top-down, publicly-led approaches (e.g., working groups at the United Nations Committee on Peaceful Uses of Outer Space or UNCOPUOS).

<sup>4</sup> The 47-page redacted Memorandum Opinion of the Federal Claims Court can be found at: <https://spacepolicyonline.com/wp-content/uploads/2021/11/BO-lawsuit-full-order-Nov-18-2021.pdf>. Accessed on December 15th, 2021.



National legislation can also be approached with amendments proposals in terms of licensing requirements. State aid should hence comply with such new requirements. Prior to this, to come up with a clearly defined set of ethical standards, the creation of an interdisciplinary working group composed of a variety of stakeholders, such as the Hague International Space Resources Governance Working Group (HISRGWG) [76] is strongly recommended. There needs to be consensus on determining the exact ethical principles to be selected, the correlating parameters to be relied upon and the key performance indicators (KPI) necessary for appropriate assessments. This is reminiscent of the Massachusetts Institute of Technology (MIT)'s recent Space Sustainability Rating (SSR) [77], which measures sustainability compliance to assess resulting eligibility for incentives. The product of this kind of cross-sectoral working groups represent a high potential of productivity as in the case of the HISRGWG which crystallized into recommendations that are: adopted by the now growing Artemis Accords (e.g., with regards to the "safety zones"). These recommendations are used both as a foundational start and as a pillar of academic debatable material, for instance, by the Outer Space Institute (OSI)'s Vancouver Recommendations [78], in terms of what "benefit sharing" should entail [79]. They are also cited at the UNCOPUOS for future international guidelines, recommendations and groundwork for the new working group on the governance of space resources [80], and they inspire international non-governmental organizations such as the Moon Village Association (MVA)'s Global Expert Group on Sustainable Lunar Activities (GEGSLA) (81).

These overarching realizations are expected to lay the foundations for a substantial harmonization in terms of standardizing a new competitive dynamic. The proposed working group, which could be tentatively called "Space Antitrust Group of Experts" (SAGE) must involve antitrust experts, space lawyers, ethicists, and so forth to find the perfect common ground where antitrust and space can best prevail. Designing a roadmap with these elements in mind is already underway, following a special session at the International Astronautical Congress (IAC), held in Dubai, in October 2021, where a multidisciplinary group consisting of over a dozen academic leaders and representatives from the public sector met, on a personal capacity, and helped to design, together with the audience, a roadmap to identify clashes between the emerging transnational space commercial law and international space law in its current state, and to anticipate contention points before formulating recommendations<sup>5</sup>. This is only the start for

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<sup>5</sup> Further details about the special session "Colliding Laws in Outer Space: Mapping Potential Clashes Between Space Law, Commerce, Antitrust and Ethics and their Solutions through Design" can be found at: <https://www.iafastro.org/events/iac/iac-2021/technical-programme-2021/special-sessions/thursday-28-october-2021/colliding-laws-in-outer-space-mapping-potential-clashes-between-space-law-commerce-antitrust-and-ethics-and-their-solutions-through-design-sprint.html>. Accessed on December 15th, 2021.





a long-term initiative to further develop the foundational pillars of this new discipline (e.g., noble space antitrust).

The resulting network of interdisciplinary nexuses is a most valuable asset for ensuring the perennial protection of space ethics that are enshrined within the OST while bearing in mind the growing role of the private sector. Finally, a group similar to SAGE should also include actors from the private sector, at the strategic level, because antitrust is part of competitive intelligence and not to be contained at a mere technical level. On the contrary, it can be the central pivot to a company's business model, and therefore this kind of feedback is critical for successful implementation.

## **6.1 Identifying the Applicable Jurisdiction and Mapping Out Attribution Links**

Other issues surrounding space commerce and competition that deserve discussion are related to space resources. More precisely, what is more intriguing from a legal perspective is their commercialization through several layers of dematerialization, rendering thus the applicable jurisdiction more difficult to identify. This is due to increasingly more complex montages. The widespread reflex within the space community is to declare that these dematerializing strategies generate a legal void and multiply loopholes. However, after more thorough research, legal experts can easily find an attribution link to the applicable jurisdiction, no matter how thin.

The future of space resources commerce is likely to include the transacting of intangible resources, besides the tangible ones (such as raw and processed materials). Intangibles can be commodities such as services and financial rights, which is nothing new *per se*. What is new, however, is the complexity of the potential montages into dematerializing these resources in order to seek yet deregulated markets. For example, a space resource such as regolith (lunar dust) can be used to demonstrate such a montage. The regolith can either be processed, or be directly transformed into cyber or digital resources. The physical or digital process can benefit from a patent and be subject to intellectual property rights (IP). This IP can in turn be commercialized as a commodity under the financial assets category, which falls under transnational law, itself more elusive than international space law, due to contractual architecture (e.g., choice of law, etc.). Finally, these transactions can take place within a cyber infrastructure like a decentralized ledger technology (DLT) such as the blockchain, which already poses challenges legally. Nonetheless, blockchain transactions often rely on smart contracts which involve arbiters/arbitrators acting as external oracles [82]. It is recommended that these arbiters be human and thus contractual law is easier to be attributed to a particular jurisdiction [83]. The antitrust issue that could be of



concern, in this scenario, is that the commercial transactions taking place are made through cryptocurrency and there is already, reportedly, a market oligopoly in that field. In fact, it is reported that, paradoxically, the DLT is concentrated and the market shares are divided between consortia [84]. This raises several issues pertaining to competition law.

First, IP enclosure could cause access restriction to space resources due to patented technology and reduced technological know-how diversity [85]. Second, the monopolization effect could escalate on a concentrated DLT infrastructure. Third, the lack of transparency surrounding this scenario collides with fair competition efforts. Overcoming these obstacles is crucial to sustain efforts towards a sustainable commercial environment and to prevent toxic competition.

The new set of space antitrust-related TCBMs previously mentioned must acknowledge this dimension. It can be argued that transparency should be added as an ethical principle to the list of ethical space antitrust regime principles. By way of illustration, the Artemis Accords specifically added transparency to its principles, in second place, after peaceful purposes [86]. Moreover, equitable distribution is another ethical principle to consider in the DLT situation. Once the ethical principles are selected, the next phase is to determine how they are to be applied: whether they entail objective barometers with precise indicators or rather a more subjective test (i.e., the “reasonableness” test). This remains to be discussed within a group such as the proposed SAGE, for example, and between delegates and the UNCOPUOS farther down the road.

## 6.2. From Ethical to Noble Space Antitrust

Fair competition essentially means the following scenarios: legitimate monopolies due to only one entity on a given market or due to economies of scale and related efficiency; absence of deliberate action to become a monopoly; absence of collusion between consortia; non-predatory pricing enabled by, *inter alia*, State aid or private cross-subsidization; no abuse of a dominant position, no price rigging, etc. However, this is carried out regardless of the fact that the outcome results in a toxic environment or not and that there is a risk of a race to the bottom, justified by a need to achieve “efficiency” and “economies of scale”, and to reduce prices to be incurred by the final consumer.

Apparently, antitrust erred and lost its initial public policy mandate which was to control the growing imbalance of power between the government, elected by the people, *versus* privately owned trusts [87]. There seems to be a growing unrest and impatience with the current passive antitrust doctrine and the academic, political, and governmental spheres of influence join their voices in advocating a reform [88], criticizing the fact that antitrust has for too long been left out of public policy, and that there is a need to bring it back into the heart of a the political debate [89] to serve collective interest and benefit of society.



This means that governments have to work together to harmonize their thinking, although it has proven difficult in the past [90]. One striking example which proves that achieving international consensus around antitrust, no matter how laborious it seems at first sight, is the fact that the G7 met in the Summer of 2021 to agree on a 15% minimum tax regime to be applied to all multinationals, at the international level [91]. Prior to this proposed tax, there were multiple suggestions in that sense (e.g., the “Tobin tax”, etc.) but they were systematically downgraded as unfeasible or purely fictitious. This tax regulation culminates into a collective effort to efficiently terminate taxation-based “forum shopping”. As a result, one can expect that unfair competition between States based on their fiscal advantages will lose its alarming momentum.

There remains, however, the question of the space taxation regime. Indeed, a few States consider that taxation should apply according to the jurisdiction where the activity is being exercised, while other States consider the headquarters’ jurisdiction instead. This opens a whole new debate as France passed, in 2018, a bill to enable Eutelsat to declare space as the jurisdiction where the company makes benefits, since its satellites placed in geostationary orbits are considered as a stable installation and there are no taxes to be paid in space and therefore Eutelsat could be alleviated of that burden [92]. Consequently, Eutelsat agreed to remain in France. This illustrates that the space economy is on the brink of becoming a forum shopping issue, not to mention a tax haven in case more States decide to follow France’s example and exempt space from any taxation after all.

As a reminder, for the benefit of society’s collective interest, policy, in the case of space antitrust, as previously mentioned in Table 2. For example, the column entitled “relevant higher ethical principles for a space ethical antitrust regime”, must be based on a set of widely agreed upon ethics, preferably at the world level:

- Mutual Assistance
- Non-discrimination
- Equality
- Benefit sharing;
- Equality
- Free Access
- Cooperation
- Due Regard
- Non-harmful Interference
- Equitable Distribution [intergenerational]
- Duty to assist spacecraft personnel [93]

Building on this ethical foundation, which requires further multilateral elaboration in the future, space antitrust can explore supplementary paths to fulfill a public agenda and start off, through polycentric initiatives an overarching, harmonized, and comprehensive “noble space antitrust” framework that incentives, as a result,



a race to the top. The polycentric approach can take the following shape, as listed in *Table 3*:

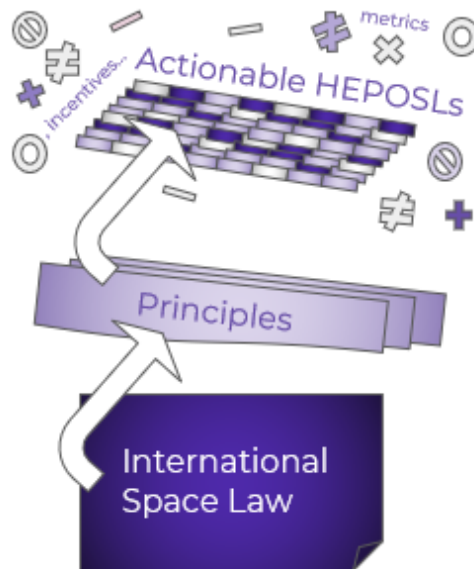
*Table 3 Polycentric Approaches to Implementing Noble Space Antitrust*

<b>Stakeholders (which could be subdivided into interest groups at a later stage)</b>	<b>Action</b>	<b>Challenge</b>	<b>Polycentric governance role related to antitrust</b>
Public (Governments)	Draft legal framework for economic space activity; adapt State aid according to new parameters and KPI; adapt licensing and technical requirements; adapt taxation of space commerce; To federate investments for large scale, multilateral projects of common interest	<p>Nationally: Solve the unfair competition equation whereby incumbents and new entrants protest technical requirements within procurement (incumbents must comply with technical requirements to win contracts while NewSpace entrants complain that these requirements favor incumbents and disqualify any competitor, which is unfair competition. NewSpace actors claim that they are entitled directly to the funds while incumbents reject this argument as the NewSpace entrants' competitive advantage contrasts with the heavy technical burden that falls upon the incumbents.)</p> <p>Internationally: Balance national vs international interests (e.g., national champions)</p>	Set up a dedicated legal infrastructure to ensure implementation and compliance (e.g., a dedicated conference, declaration, and/or commission)
Private (Companies)	Adapt their competitive intelligence departments according to new ethical compliance; incorporate selected ethics into their business models; adapt strategic thinking;	Risk of lawfare; cooperation/collaboration might be mistakenly taken for collusion (hard to draw the line);	Lobbying; data sharing; standards; consortia, etc.

	To federate investments where a common interest.		
International Organizations (IGOs/NGOs)	Draft guidelines	Risk of stagnation in further elaborating on the ethical principles;	Create a working group
Scholars	Create interdisciplinary, multi stakeholder working groups; doctrine; educate future experts	Risk of fragmentation	Spread out and work with governments, the private sector, IGOs, NGOs, and practitioners.
Jurists	Draft ethical compliance contractual clauses; model contracts	Need to agree on interpretation of standardized terms; clarify what is collaboration as opposed to collusion;	Create a special branch within legal associations

The stakeholders involved must agree on a common set of Higher Ethical Principles of Space Law (HEPOSLS) to act upon as a guiding grid in their future compliance discussions. These HEPOSLS can be activated as compliance measures and lead to policy, incentives or other instruments (see *Figure 5*.)

*Figure 5. Higher Ethical Principles of Space Law (HEPOSLS) Compliance Grid*





### 6.3. History Repeating

In short, there is work to be done in terms of defining new systems and services through contractual, regulatory and legislative instruments and mechanisms. These measures can be interpreted as a call for regulation. However, here lies a *caveat*. In several instances, active regulation can in reality hide a deregulation apparatus [94] and this is to be avoided in the space antitrust case, which already has an ubiquitous reputation of “Wild West”.

An example of such deregulation can be found in the United Kingdom (UK) “Big Bang” case whereby there was fear that too much antitrust would bar progress within the financial industry back in the 1980s and, therefore, an antitrust dispute was settled, through arbitration, that resulted in deregulating futures commodities trading [95]. This precedent was subsequently followed by similar deregulation in Asia and in the US, limiting thus regulatory control of speculative finance which ended in a backfiring crisis. The lesson to be learned from this is that unregulated antitrust can generate a financial disaster.

In this case, the issue concerned a stock exchange. Stock exchanges trade financial rights which are commodities. In the space sector, there are already space commodities futures exchange initiatives. It is judiciously advised, therefore, to proceed with care in this direction and avoid history repeating by ensuring that regulation meets the demands of sustainable development and higher purposes.

## 7. Discussion

In the light of the analysis presented throughout the report, it can be argued that monopolies in space can take multiple forms and that the stakes vary in each case, although they are constantly high, to the point of jeopardizing entire missions or lives owing to the lack of current regulation in that sense.

For the purposes of discussion, the question as to whether there really is a need for an antitrust regime in space after all arises. Isn't space law enough to prevent monopolistic abuse? Private actors have already voiced their support of the current international space law framework [96], but they are heavily pushing national space legislation in different directions [97].

The outcome is legal fragmentation and a perception that NewSpace is becoming yet another “Wild West” or an auspicious race up for grabs, driven by a first come, first served ambition. The result is a general concern over rising space monopolies and the legal questioning that comes into play, in each given scenario. This is indeed uncharted territory and this report has addressed the problem of the lack of adequate legal equipment and instruments to face space monopolies, both nationally and internationally. Multilateralism, or even “minilateralism”, could

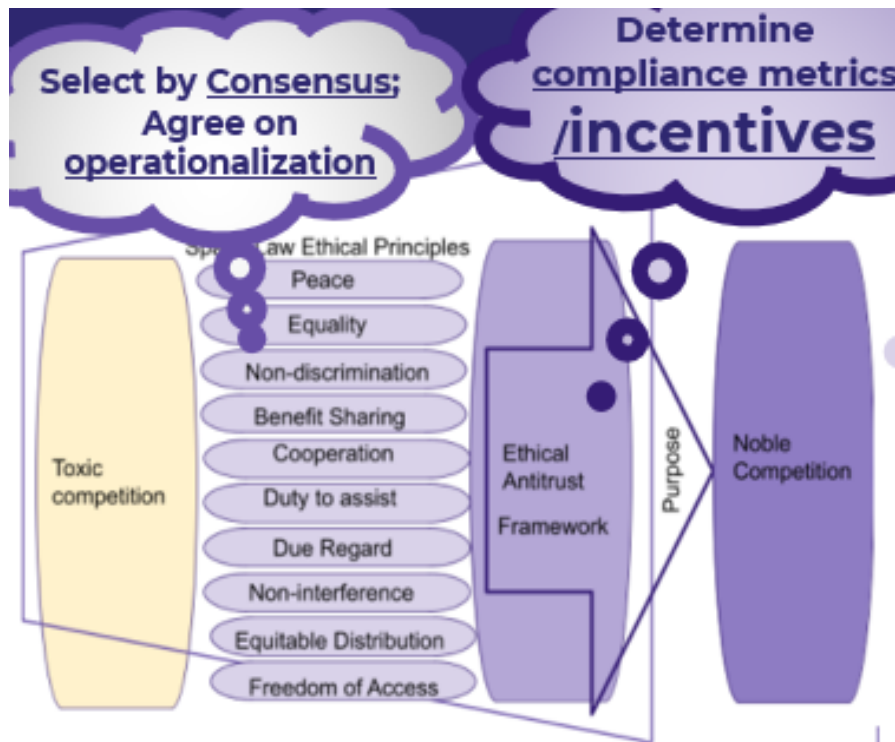


prove as a starting nucleus to initiate a new space antitrust framework, with a higher common purpose.

To achieve this, the concept behind “noble competition” can serve most stakeholders by ensuring the perennialism of space law ethics while encouraging commerce and healthy competition. With regards to the question as to whether an additional space antitrust framework is needed, the answer of this report is affirmative. Otherwise, sticking to a discourse exclusively based on a spirit of “collaboration” might decentivize the private sector, which the public sector increasingly relies on. For this reason, competition must be sustained, but shaped accordingly and this report has made several recommendations in this respect.

Figure 6, *infra*, resumes the proposed role of the higher ethical principles of space law into shaping a purposeful space antitrust to serve the collective interest of society at large and the sustainable development of the space ecosystem, in the spirit of cooperation while protecting economic liberty.

Figure 6. Noble Space Antitrust with an Agenda





## 8. Conclusion

In retrospect, this report has proven to be a very interesting intellectual exercise in terms of formulating hypotheses, testing scenarios and legal thinking, while making novel recommendations. So far, as of this writing, the ideas presented in this report have generated interest and positive feedback, notably among the community of space scholars (jurists, ethicists, economists, etc.). However, the next step is to approach the private sector and the community of practitioners who are deeply interested in concrete measures and technical incentives and less in theoretical research and altruistic motives. For this reason, this report includes an extensive section dedicated to implementation, however it still remains limited at this stage. Further work on the field is required under the form of workshops involving the entire range of stakeholders who have a say in the development of the space economy, at the international level. This is a promising direction, despite the sensitiveness of the space sector, as spacefaring nations have an overwhelming desire to cooperate despite all the recently observed competitiveness.

Furthermore, despite targeting potential space monopolies, space entrepreneurialism is first and foremost rooted into the assumption of a genuine *bona fide* ambition to achieve distinct, collective and higher purposes such as to enhance today's society through new technological capabilities, beyond tellurian frontiers. This report argues that antitrust is a path to enabling this, albeit competition is not an end *per se*. It is an enabler, a compass that needs direction, destination and a goal. The horizon looks promising in that sense given the recent US Executive Order on Promoting Competition in the American Economy, of July 9th, 2021, which affirms a strong stance from the US Administration to prevent "excessive market concentration" which "threatens basic economic liberties, democratic accountability" and to "enforce the antitrust laws to combat the excessive concentration of industry, the abuses of market power, and the harmful effects of monopoly and monopsony" through an ambitious and extensively detailed "whole-of-government approach".





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A final sign of gratitude to the Open Lunar Foundation, borrowing the words of James Joyce Ulysses, who best describes the Moon, a lunar experience and inspiration:

*Her antiquity in preceding and surviving succeeding tellurian generations: her nocturnal predominance: her satellitic dependance: her luminary reflection: her constancy under all her phases, rising and setting by her appointed times, waxing and waning: the forced invariability of her aspect: her indeterminate response to affirmative interrogation: her potency over effluent and refluxing waters: her power to enamour, to mortify, to invest with beauty, to render instance, to incite to and aid delinquency: the tranquil inscrutability of her visage: the terribility of her isolated dominant resplendent propinquity: her omens of tempest and of calm: the stimulation of her light, her motion and her presence: the admonition of her craters, her arid seas, her silence: her splendour, when visible: her attraction, when invisible.*

James Joyce, Ulysses<sup>6</sup>.

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<sup>6</sup> Joyce, J., "Ulysses", in Morton, O., "The Moon: A History for the Future", The Economist Books, 2020.



## References

- [1] Rhimbassen, M., An Introduction to Space Antitrust, Blogpost, Open Lunar Foundation, June 6th, 2021. Available online at: <https://www.openlunar.org/library/an-introduction-to-space-antitrust>. Accessed on July 7th, 2021. [Rhimbassen]
- [2] Pitt-Watson, D., Mann, H. The Purposeful Corporation and the Role of the Finance Industry. The British Academy., 2019. Available online at: <https://www.thebritishacademy.ac.uk/documents/2556/future-of-the-corporation-purpose-of-finance.pdf>. Accessed on July 7th, 2021. [Pitt-Watson]
- [3] *Ibid.*, at p. 1.
- [4] *Ibid.*
- [5] *Ibid.*, at p. 20.
- [6] *Ibid.*, at p. 31.
- [7] Fink, L. Purpose and Profit. Blogpost. Harvard Law School Forum on Corporate Governance, January 23, 2019. Available online at: <https://corpgov.law.harvard.edu/2019/01/23/purpose-profit/>. Accessed on July 7th, 2021.
- [8] Pitt-Watson, *supra*, note 2, at p. 32.
- [9] Schumpeter, J. Capitalism, Socialism and Democracy. 1942.
- [10] Stucke, M., Ezrachi, A. Competition Overdose: How Free Market Mythology Transformed Us from Citizen Kings to Market Servants. Harper Business, 2020. [Stucke]
- [11] Smith A. An Inquiry into the Nature & Causes of the Wealth of Nations, Vol 1., cited in Buchanan, M., Wealth Happens. Blogpost. Harvard Business Review, April 2002. Available online at: <https://hbr.org/2002/04/wealth-happens>. Accessed on July 7th, 2021.
- [12] Stucke, *supra*, note 10, at p. 255.
- [13] Bradford, A., et al. The Chicago School's Limited Influence on International Antitrust. Blogpost. University of Oxford, Faculty of Law, Jan 6th, 2020. Available online at: <https://www.law.ox.ac.uk/business-law-blog/blog/2020/01/chicago-schools-limited-influence-international-antitrust>. Accessed on July 7th, 2021.
- [14] Robertson, J. How the Big Bang changed the City of London for ever. BBC News, October 27th, 2016. Available online at: <https://www.bbc.com/news/business-37751599>. Accessed on July 7th, 2021. [Big Bang]
- [15] Chen, J. Commodity Futures Modernization Act (CFMA). Blogpost. Investopedia. December 10th, 2021. Available online at: <https://www.investopedia.com/terms/c/cfma.asp>. Accessed on July 7th, 2021.
- [16] Teachout, Z. Break 'em Up: Recovering Our Freedom from Big Ag, Big Tech, and Big Money politicize eachout, Z., "Break-em Up!". St Martin's Press, September 1st, 2020, at pp.. 218, 219, p. 237. [Teachout]
- [17] Pitt-Watson, *supra*, note 2, at pp. 32-35.



[18] Teachout, *supra*, note 16.

[19] Blount, P. J. Peaceful Purposes for the Benefit of All Mankind: The Ethical Foundations of Space Security, at p. 109. Chapter, in Steer, C. (ed). War and Peace in Outer Space: Law, Policy, and Ethics. OUP USA, March 25th, 2021.

[20] Von der Dunk, F. Shaking the Foundations of the Law: Some Legal Issues Posed by a Detection of Extra-Terrestrial Life, at p. 251. Chapter, in Schwartz, J. S. J., Milligan, T., (eds). The Ethics of Space Exploration. Springer, 2016.

[21] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies of 1967 (OST), UNOOSA. Available online at: <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introouterspacetreaty.html>. Accessed on July 7th, 2021. [OST]

[22] Rhimbassen, *supra*, note 1.

[23] OST, *supra*, note 21.

[24] 51/122. Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries, UNOOSA. Available Online at: <https://www.unoosa.org/oosa/en/ourwork/spacelaw/principles/space-benefits-declaration.html>. Accessed on July 7th, 2021.

[25] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies of 1979, at Article 4 provides that:

The exploration and use of the moon shall be the province of all mankind and shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development. Due regard shall be paid to interests of present and future generations as well as to the need to promote higher standards of living conditions of economic and social progress and development in accordance with the Charter of the United Nations.

Retrieved from McGill Institute of Air and Space Law Blog. Available online at: <https://www.mcgill.ca/iasl/centre/research/space-law/moon-treaty>. Accessed on July 7th 2021.

[26] Hanson, J. Precautionary Principle: Current Understandings in Law and Society. Encyclopedia of the Anthropocene, Volume 4, 2018, at pp. 361-366. Available online at: <https://www.sciencedirect.com/science/article/pii/B9780128096659104513>. Accessed on July 7th, 2021.

[27] Sheetz, M. Elon Musk blasts Jeff Bezos' Amazon, alleging effort to 'hamstring' SpaceX's Starlink satellite internet. CNBC, January 26th, 2021. Available online at: <https://www.cnbc.com/2021/01/26/elon-musk-blasts-jeff-bezos-amazon-competitor-to-spacexs-starlink.html>. Accessed on July 7th, 2021. [Sheetz]

[28] Constitution of the International Telecommunications Union, at Articles 9, 12 and 44 on equitable distribution and access. Available online at: <https://www.itu.int/council/pd/constitution.html>. Accessed on July 7th, 2021.

[29] Galeriu, I. D. "UPDATE: Paper satellites" and the free use of outer space. Blogpost. Hauser Global Law School Program, New York University School of Law. April 2018. Available online at: [https://www.nyulawglobal.org/globalex/Paper\\_satellites\\_free\\_use\\_outer\\_space1.html](https://www.nyulawglobal.org/globalex/Paper_satellites_free_use_outer_space1.html). Accessed on July 7th, 2021.



[30] The duty to assist is enshrined within the Article V of the OST, *supra*, note, 21, and further elaborated throughout the subsequent 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (ARRA). UNOOSA. Available online at: <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introrescueagreement.html>. Accessed on July 7th, 2021. [ARRA]

[31] Convention on International Liability for Damage Caused by Space Objects, UNOOSA. Available online at: <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introliability-convention.html>. Accessed on July 7th, 2021.

[32] ARRA, *supra*, note 30.

[33] Von der Dunk, F. G. The Regulation of Space Tourism. Chapter, at pp. 177–199, in Cohen, E., Spector, S. (eds). *Space Tourism: The Elusive Dream*. Tourism Social Science Series, Volume 25, Emerald Publishing, Bingley, UK, 2019. Available online at DigitalCommons@University of Nebraska - Lincoln: <https://digitalcommons.unl.edu/spacelaw/114/>. Accessed on July 7th, 2021.

[34] OST, ARRA, *supra*, note 32.

[35] OST, *supra*, note 21, at Article VIII.

[36] Cockell, C. Liberty and Limits to the Extraterrestrial State. *JBIS*, Vol. 62, at pp. 139-157, 2009.

[37] ARRA, *supra*, note 32, at Article 6.

[38] Fasan, E. Law and peace for the celestial bodies. *Proceedings of the 5th Colloquium on the Law of Outer Space*, 1962, at p. 9;

Fasan, E. Legal problems for celestial bodies and their solution by the IISL. *Proceedings of the 9th Colloquium on the Law of Outer Space*, 1966, at p. 54. [Fasan]

[39] Jakhu, R. and Pelton, J. (eds). *Global Space Governance: An International Study*, Space and Society Series, Springer, 2017.

[40] Pop, V. *Who Owns the Moon: Extraterrestrial Aspects of Land and Mineral Resources Ownership*, Springer, 2009.

[41] Fasan, *supra*, note 38.

[42] Pagano, U. 9 Pagano, The Crisis of Intellectual Monopoly Capitalism. *Cambridge Journal of Economics*, April 2012., 38(6), at p. 1419. Available online at: [https://www.researchgate.net/publication/254455727\\_The\\_Crisis\\_of\\_Intellectual\\_Monopoly\\_Capitalism](https://www.researchgate.net/publication/254455727_The_Crisis_of_Intellectual_Monopoly_Capitalism). Accessed on July 7th, 2021. Cited in Pistor, K., *The Code of Capital: How the Law Creates Wealth and Inequality*, Princeton University Press, 2019, at p. 117. [Pistor]

[43] Wallach, L. The Folly of Vaccine Monopolies. April 28th, 2021. Blogpost. Friedrich Ebert Stiftung. Available online at: <https://ny.fes.de/article/the-folly-of-vaccine-monopolies>. Accessed on July 7th, 2021. [Wallach]

[44] Waiver of the WTO's Intellectual Property Rules: Existing TRIPS "Flexibilities" Unworkable for Necessary Scale Up of COVID-19 Medicines Production. Public Citizen. Available online at: <https://www.citizen.org/article/waiver-of-the-wtos-intellectual-property-rules-existing-trips-flexibilities-unworkable-for-scale-up-of-covid-19-medicines-production/>. Accessed on July 7th, 2021;



Santos, R. 'IP Monopoly Capitalism' – A 'Virus' To Society During COVID-19. Blogpost. Health Policy Watch. May 19th, 2021. Available online at: <https://healthpolicy-watch.news/ip-monopoly-capitalism-virus-society-covid/>. Accessed on July 7th, 2021.

[45] Wallach, *supra*, note 43.

[46] Prabhala A., et al. We can't let the WTO get in the way of a 'people's vaccine. The Guardian. October 15th, 2020. Available online at: <https://www.google.com/url?q=https://www.theguardian.com/commentisfree/2020/oct/15/peoples-vaccine-coronavirus-covid-wto&sa=D&source=editors&ust=1624832316997000&usq=AOVaw1AaFSvZW4m8C1YvCGiVSF9>. Accessed on July 7th, 2021;

Sheikh, K., Thomas, K. Researchers Are Racing to Make a Coronavirus Vaccine. Will It Help? The New York Times, Published on January 28th, 2020, Updated on June 10th, 2020. Available online at: <https://www.google.com/url?q=https://www.nytimes.com/2020/01/28/health/coronavirus-vaccine.html&sa=D&source=editors&ust=1624832338837000&usq=AOvVaw3XWYkPleMA-UZkLrHbhtby>. Accessed on July 7th, 2021.

[47] WTO Doha Declaration on the TRIPS Agreement and Public Health of 2001. Available online at: [https://www.wto.org/english/thewto\\_e/minist\\_e/min01\\_e/mindecl\\_trips\\_e.htm](https://www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_trips_e.htm). Accessed on July 7th, 2021.

[48] *Ibid.* The Doha Declaration provides that:

“1. We recognize the gravity of the public health problems afflicting many developing and least-developed countries, especially those resulting from HIV/AIDS, tuberculosis, malaria and other epidemics.

2. We stress the need for the WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) to be part of the wider national and international action to address these problems.

3. We recognize that intellectual property protection is important for the development of new medicines. We also recognize the concerns about its effects on prices.

4. We agree that the TRIPS Agreement does not and should not prevent members from taking measures to protect public health. Accordingly, while reiterating our commitment to the TRIPS Agreement, we affirm that the Agreement can and should be interpreted and implemented in a manner supportive of WTO members' right to protect public health and, in particular, to promote access to medicines for all.

In this connection, we reaffirm the right of WTO members to use, to the full, the provisions in the TRIPS Agreement, which provide flexibility for this purpose.”

[49] Cao, S. Should Jeff Bezos and Elon Musk Pay for NASA's 2024 Moon Mission? Observer. May 27th, 2021. Available online at: <https://observer.com/2021/05/bernie-sanders-seek-block-funding-blue-origin-nasa-moon-project/>. Accessed on July 7th, 2021.



[50] Wells, T. Exploring the Space for Antitrust Law in the Race for Space Exploration, 15 WASH. U. GLOBAL STUD. L. REV. 381, 2016. Available online at: [https://openscholarship.wustl.edu/law\\_globalstudies/vol15/iss2/9](https://openscholarship.wustl.edu/law_globalstudies/vol15/iss2/9). Accessed on January 20<sup>th</sup>, 2021;

Kovacic W. E. COMPETITION POLICY RE TION POLICY PROSPECTIVE: THE FORM TIVE: THE FORMATION OF TION OF THE UNI THE UNITED LAUNCH ALLI UNCH ALLIANCE AND THE ASCENDANCE AND THE ASCENT OF SP T OF SPACEX. George Washington University Law School Scholarly Commons. 2020. Available online at: [https://scholarship.law.gwu.edu/cgi/viewcontent.cgi?article=2757&context=faculty\\_publications](https://scholarship.law.gwu.edu/cgi/viewcontent.cgi?article=2757&context=faculty_publications). Accessed on July 7<sup>th</sup>, 2021.

[51] Shalal, A. European officials reject SpaceX complaints over launch subsidies. Reuters, February 26h, 2019. Available online at: <https://www.reuters.com/article/us-europe-space-usa-spacex-idUSKCN10F2AF>. Accessed omm July 7<sup>th</sup>, 2021.

[52] T. Bishop. Blue Origin's rocket-landing patent canceled in victory for SpaceX. GeekWire, September 1st, 2015. Available online at: <https://www.geekwire.com/2015/blue-origins-rocket-landing-patent-canceled-in-victory-for-spacex/>. Accessed on October 2nd, 2020.

[53] Sheetz, *supra*, note 27.

[54] Wall, M. Protests, trolling and more: Drama swirls around NASA's next moon lander for astronauts. Space.com, May 28th, 2021. Available online at: <https://www.space.com/nasa-artemis-moon-lander-spacex-blue-origin-protests>. Accessed on July 7<sup>th</sup>, 2021.

[55] Article VI of the OST provides that:

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

[56] Sherman Antitrust Act, 15 U.S.C. §§ 1-7; Clayton Antitrust Act, 15 U.S.C. §§ 12-27, 29 U.S.C. §§ 52-53.

[57] Consolidated version of the TFEU, 26th of October, 2012. Available online at: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:12012E/TXT:en:PDF>. Accessed on May 21st, 2021.

[58] Lagos Koller, H. THE GROUP OF GOVERNMENTAL EXPERTS (GGE) REPORT ON TRANSPARENCY AND CONFIDENCE BUILDING MEASURES IN OUTER SPACE ACTIVITIES. UNOOSA, 2016. Available online at: [https://www.unoosa.org/pdf/SLW2016/Panel2/3\\_Lagos\\_Koller\\_GGE\\_outer\\_space\\_final.pdf](https://www.unoosa.org/pdf/SLW2016/Panel2/3_Lagos_Koller_GGE_outer_space_final.pdf). Accessed on July 7<sup>th</sup>, 2021.



[59] Hitchens, T. TCBMs in Space: A Role for Middle Powers. Fifth International Manfred Lachs Conference on Global Space Governance, May 5th-6th, 2017. Available online at: [https://www.mcgill.ca/iasl/files/iasl/7\\_hitchens\\_manfredlachsmay5-62017.pptx](https://www.mcgill.ca/iasl/files/iasl/7_hitchens_manfredlachsmay5-62017.pptx). Accessed on July 7th, 2021.

[60] Rhimbassen, *supra*, note 1.

[61] The 1969 Vienna Convention on the Law of Treaties. Available online at: [https://legal.un.org/ilc/texts/instruments/english/conventions/1\\_1\\_1969.pdf](https://legal.un.org/ilc/texts/instruments/english/conventions/1_1_1969.pdf). Accessed on July 7th, 2021.

[62] Fox, E. M., Antitrust Regulation Across National Borders: The United States of Boeing Versus the European Union of Airbus, Brookings.edu, Tuesday, December 1, 1998. Available online at: <https://www.brookings.edu/articles/antitrust-regulation-across-national-borders-the-united-states-of-boeing-versus-the-european-union-of-airbus>. Accessed on January 21st, 2021;

Karpel, A. A, The European Commission's Decision on the Boeing-McDonnell Douglas Merger and the Need For Greater US-EU Cooperation in the Merger Field, Digital Commons WCL, 1998. Available online at: <https://digitalcommons.wcl.american.edu/cgi/viewcontent.cgi?article=1358&context=aulr>. Accessed on February 8<sup>th</sup>, 2021;

Grant, J., Neven, D., J., The attempted merger between General Electric and Honeywell: A case study of transatlantic conflict, Graduate Institute of International Studies, Geneva, March 2005. Available online at <https://ec.europa.eu/dgs/competition/economist/honeywell.pdf>. Accessed on May 21<sup>st</sup>, 2021.

[63] For more, see the ICN website at: <https://www.internationalcompetitionnetwork.org/>.

[64] UNCTAD RPB Code: "THE UNITED NATIONS SET OF PRINCIPLES AND RULES ON COMPETITION", The Set of Multilaterally Agreed Equitable Principles and Rules for the Control of Restrictive Business Practices, UN, 2020. Available online at: <https://unctad.org/system/files/official-document/tdrbpconf10r2.en.pdf>. Accessed on January 20<sup>th</sup>, 2021.

[65] Recommendations and Best Practices on Competition Law and Policy, OECD. Available online at: <https://www.oecd.org/competition/recommendations.htm>. Accessed on July 7th, 2021.

[66] OECD Glossary of Statistical Terms. Available online at: <https://stats.oecd.org/glossary/detail.asp?ID=3145>. Accessed on January 20th, 2021.

[67] MODEL LA MODEL LAW ON COMPETITION ON COMPETITION, UNCTAD Series on Issues in Competition Law and Policy, Substantive Possible Elements for a competition law, commentaries and alternative approaches in existing legislations. Available online at: <https://digitallibrary.un.org/record/502814?ln=fr>. Accessed on January 20th, 2021.

[68] Rhimbassen, *supra*, note 1.

[69] For more, see the GAO website at: <https://www.gao.gov/>.

[70] Hardwood, W. Jeff Bezos' Blue Origin challenges NASA contract awarded to SpaceX for Artemis moon lander. CBS News. April 27th, 2021. Available online at: <https://www.cbsnews.com/news/blue-origin-challenges-nasa-contract-spacex-artemis-lunar-lander/>. Accessed on July 7th, 2021.



[71] Foust, J. Senate passes NASA authorization act. Space News. June 9th, 2021. Available online at: <https://spacenews.com/senate-passes-nasa-authorization-act-2/>. Accessed on July 7th, 2021.

[72] Hamilton, I. A. Bernie Sanders is trying to block Jeff Bezos' Blue Origin from getting \$10 billion NASA funding for a moon-landing mission. Business Insider France, May 25th, 2021. Available online at: <https://www.businessinsider.fr/us/bernie-sanders-jeff-bezos-blue-origin-nasa-funding-amendment-moon-2021-5>. Accessed on July 7th, 2021.

[73] Rubin, G. T. Funding for Bezos Space Company Fails to Launch in House. Wall Street Journal, June 18th, 2021. Available online at: <https://www.wsj.com/articles/funding-for-bezos-space-company-fails-to-launch-in-house-11624008601>. Accessed on July 7th, 2021.

[74] Raju, N. Transparency and Confidence-Building Measures for Lunar Security. Blogost. Open Lunar Foundation, May 2021. Available online at: <https://www.openlunar.org/library/transparency-and-confidence-building-measures-for-lunar-security>. Accessed on July 7th, 2021.

[75] The NASA 2020 Artemis Accords. Available online at: <https://www.nasa.gov/specials/artemis-accords/index.html>. Accessed on July 7th, 2021. [Artemis Accords]

[76] For more on the The Hague International Space Resources Governance Working Group, see the IAASL Leiden University website at: <https://www.universiteitleiden.nl/en/law/institute-of-public-law/institute-of-air-space-law/the-hague-space-resources-governance-working-group>. Accessed on July 7th, 2021. [HISRGWG]

[77] For more on the Space Sustainability Rating (SSR), see the MIT Media Lab website at: <https://www.media.mit.edu/projects/ssr-space-sustainability-rating/overview/>.

[78] The 2020 Vancouver Recommendations on Space Mining, by the Outer Space Institute (OSI) of the University of British Columbia, Canada, are available online at: [http://www.outerspaceinstitute.ca/docs/Vancouver\\_Recommendations\\_on\\_Space\\_Mining.pdf](http://www.outerspaceinstitute.ca/docs/Vancouver_Recommendations_on_Space_Mining.pdf). Accessed on July 7th, 2021. [OSI]

[79] The notion of benefit sharing is understood differently by the Building Blocks for the Development of an International Framework on Space Resource Activities, drafted by the HISRGWG, *supra*, note 76, in 2019, (available online at: <https://www.universiteitleiden.nl/binaries/content/assets/rechtsgeleerdheid/instituut-voor-publiekrecht/lucht--en-ruimterecht/space-resources/bb-thissrwg--cover.pdf>) and the OSI, *supra*, note 78. On the one hand, the HISRGWG sustains that benefit sharing does not entail the sharing of monetary benefits, while, on the other hand, the OSI sustains, on the contrary, that it does, at Article 20 of the Vancouver Recommendations, which reads as follows:

“Encourage the establishment of a mandatory benefits sharing mechanism that includes, but is not limited to, sharing of monetary benefits, for example through an international fund”.

[80] Draft report, XIII. General exchange of views on potential legal models for activities in exploration, exploitation and utilization of space resources. UN General Assembly, June 10th, 2021. Available online at: [http://unoosa.org/res/oosadoc/data/documents/2021/aac\\_105c\\_21/aac\\_105c\\_21\\_314add\\_8\\_0.html/AC105\\_C2\\_L314Add08E.pdf](http://unoosa.org/res/oosadoc/data/documents/2021/aac_105c_21/aac_105c_21_314add_8_0.html/AC105_C2_L314Add08E.pdf). Accessed on July 8th, 2021.





[81] For more on the Global Expert Group on Sustainable Lunar Activities (GEGSLA), see the Moon Village Association (MVA) website at: <https://moonvillageassociation.org/global-expert-group-on-sustainable-lunar-activities-gegsla/>. Accessed on July 8th, 2021.

[82] Pistor, *supra*, note 42, at pp. 189-190.

[83] Lucas-Rhimbassen, M. On the Dangers of Enclosing the Intangible: Applying Pistor's "Code of Capital" Critique to "Space 3.0" and DLT from an Anti-monopoly Perspective. Chapter, in Froehlich, A. (ed). Outer Space and Cyber Space: Similarities, Interrelations and Legal Perspectives. ESPI Springer, August 2021.

[84] De Filippi, P., "Blockchain et cryptomonnaies", Que Sais-Je, 2018, at p. 111.

[85] Pistor, *supra*, note 42.

[86] Artemis Accords, *supra*, note 75.

[87] Pesca, M. Why Zephyr Teachout Wants to Break Up Big Tech. Interview Article. Slate, July 30th, 2020. Available online at: <https://slate.com/technology/2020/07/zephyr-teachout-book-antitrust-monopolies-big-tech-facebook-amazon-google.html>. Accessed on July 8th, 2021.

[88] Wu, T. The Curse of Bigness: Antitrust in the New Gilded Age. Columbia Global Reports, 2018, at p. 127.

[89] Teachout, *supra*, note 16, at p. 250.

[90] Fox., E. M., Crane, D., A., Global Issues in Antitrust and Competition Law, 2<sup>nd</sup> Ed., West Academic Publishing, 2017.

[91] Freyman, N., Brew, M. G7 nations announce their support for a global corporate minimum tax rate of 15%. Business Insider France. June 7th, 2021. Available online at: <https://www.businessinsider.fr/us/g7-nations-announce-support-corporate-minimum-tax-15-percent-2021-6>. Accessed on July 8th, 2021.

[92] Dumoulin, S. Une niche fiscale dans l'espace pour Eutelsat. Les Echos. November 18th, 2018. Available online at: <https://www.lesechos.fr/tech-medias/hightech/une-niche-fiscale-dans-l'espace-pour-eutelsat-151039>. Accessed on July 8th, 2021.

[93] OST, ARRA, *supra*, note 30.

[94] rpreted as a call for regulation. However, here lies a caveat. In several instances, active regulation can in reality hide a deregulation apparatus [

[95] Big Bang, *supra*, note 14..

[96] Reopening the American Frontier: Exploring How the Outer Space Treaty Will Impact American Commerce and Settlement in Space, US Senate Committee on Commerce, Science and Transportation Hearings, May 23rd, 2017. Available online at: <https://www.commerce.senate.gov/2017/5/reopening-the-american-frontier-exploring-how-the-outer-space-treaty-will-impact-american-commerce-and-settlement-in-space>. Accessed on September 20th.



[97] Israel, B. R., Space Governance 3.0", 48 Ga. J. Int'l & Comp. L., 2020. Available online at: <https://digitalcommons.law.uga.edu/gjicl/vol48/iss3/7>, (Israel, 2020), p. 722.

[98] Executive Order on Promoting Competition in the American Economy of July 9th, 2021. White House. Available online at: <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/07/09/executive-order-on-promoting-competition-in-the-american-economy/>. Accessed on July 12th, 2021.