

How to Foster the Development of Space Commerce Through Law and Economics

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The interdisciplinary approach of law and economics, i.e. the economic analysis of law, can foster space commerce by helping reduce the risks of engaging in space-related activities, form a competitive market reaching a Nash equilibrium, and act as a sector catalyst, benefiting the economy while at the same time accelerating the adoption of an efficient next generation of legal rules for conduct in space. Based on the principles of a costs, benefits and risks analysis, the normative Coase and Hobbes theorems, the Nash equilibrium, the bandwagon effect, and the concepts of game theory, a Space Bargaining Code that would lower the transaction costs and risks of operating in the space commerce industry would enable the private sector to reach efficient outcomes even when the initial allocation of the rights is not efficient, prevent monopolistic scenarios, and co-create efficient and widely accepted new rules that at this stage, when the law has yet to catch up with all the technological progress, are highly needed.

1 Introduction

While space commerce is already a major industry generating \$175 billion in annual revenue, it is expected to grow to at least a trillion dollars per year by 2020, expanding well beyond satellite communication led by governments to “a stage in which entrepreneurs and large companies are taking leadership by finding ways to create and deliver value to many different kinds of customers across a wide spectrum of products and services, from pharmaceuticals and manufacturing to tourism and energy”¹. The technology currently being several steps ahead of the law can provide a false sense of freedom to companies

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1 Langdon Morris and Kenneth J. Cox, *Introduction* in Space commerce: The inside story by the people who are making it happen. McCandless II, Bruce, et. al. Ed. Langdon Morris and Kenneth J. Cox. United States: Aerospace Technology Working Group in partnership with The International Space University and The International Institute of Space Commerce, 2010, pp. 3-4.

engaging in space activities; the reality is that the absence of clearly defined legal rules addressing the newest developments in technology and space business creates uncertainty in the marketplace, and skyrockets the already high risks of space ventures.

The private sector has assumed a crucial role in shaping the future of our civilization in outer space, and yet so much depends on “how national and international law develops over time in response to the pressures of corporate expansion”². One of the reasons the adopted treaties, principles, resolutions, and declarations have left several issues unresolved is their anticipatory nature; they were negotiated and signed when “the economic benefits stemming from space exploration and technology were not as readily apparent as they are today”³. That is precisely why “continuous law-making is essential to ensure a viable and coherent system of law”⁴ that is believed to eventually culminate in a comprehensive space convention. At this stage, such a codification of space law in a single act governing all space activities is considered to be premature, arguing instead that “the tested method of step-by-step resolution of emerging issues through non-binding instruments which are confirmed, at a later stage, by limited agreements dealing with particular matters is an essential prerequisite for successful law-making.”⁵

Outer space law has the power to “ensure safety, equity and market efficiency”⁶, and thus accelerate the growth of space commerce and its multiple benefits. Not only will “space activities [...] play an increasingly important role in meeting major challenges related to climate change, food security, disaster management and global health issues”⁷, they will launch humankind in a brand new era of innovation, expansion, hope, and alignment with the shifting world consciousness.

It is evident, however, that new approaches might be needed, as the ones that were successful in the 60ies and 70ies of the 20th century, don't seem to be working any more. The first four space law conventions were realized within a rather short period of time, and soon after adhered to by a large number of countries; then, with the Moon Agreement, the tide has turned. Any subsequent

2 Hearsey, Christopher M., A Review of Challenges to Corporate Expansion into Outer Space (September 9, 2008). Available at SSRN: <<http://ssrn.com/abstract=1699020>> (Last visited: September 11, 2012).

3 Danilenko, Gennady M., Outer Space and the Multilateral treaty-Making Process, <www.law.berkeley.edu/journals/btly/articles/vol4/Danilenko/HTML/text.html> (Last visited: January 17, 2012).

4 Ibid.

5 Ibid.

6 Hearsey, Christopher M., A Review of Challenges to Corporate Expansion into Outer Space (September 9, 2008). Available at SSRN: <<http://ssrn.com/abstract=1699020>> (Last visited: September 11, 2012).

7 Niklas Hedman and Werner Balogh, *The United Nations and outer space: Celebrating 50 years of space achievements* in Yearbook on Space Policy 2007/2008, Yearbook on Space Policy, 2009, Volume 2, pp. 237-252.

“efforts undertaken [...] to establish an international legal format for space activities with anticipated commercial aspects [...] have also proved to be cumbersome and prone to conflict”⁸. It can certainly be challenging to establish foundational legal elements for the cosmic realm, and yet space law is expected to provide predictability and a reliable, risk-reducing structure for space activities, with corporations undoubtedly playing “a defining role in national and international legislation”⁹.

The new approach that this paper explores is a Space Bargaining Code based on principles of law and economics. By seeking to highlight a few key considerations such as certainty of the legal impact of any space action or activity; efficiency of the adopted legal solutions, and their wide acceptance in the space commerce community, as explained and illustrated by a costs, benefits and risks analysis, the normative Coase and Hobbes theorems, the Nash equilibrium, the bandwagon effect, and certain concepts of game theory, this paper emphasizes once again the major significance of introducing real life and economic insights into the legal discourse.

2 Why a Code

“For the time being, traditional methods of creation of law do not comply with the needs of the space activities and their actors. Soft law in space activities has filled the gap, exists and thrives: it is seen as essential and necessary for space international relations.”¹⁰ The concept of advancing space law through non-legally binding codes of conduct has been gaining momentum, especially with the EU’s Draft International Code of Conduct for Outer Space Activities whose purpose is to enhance the security, safety and sustainability of all outer space activities, endorse best practices, and reaffirm existing international space law¹¹. All United Nations member states are invited to participate and subscribe, with the objective of reaching an agreement on an acceptable code in the second half of 2013¹². Another code that has been discussed in the space law arena is David

8 van Traa-Engelman, H.L., *Commercial utilization of outer space: Law and Practice*. Martinus Nijhoff Publishers, Kluwer Academic Publishers, 1993, p. 14.

9 Hearsey, Christopher M., *A Review of Challenges to Corporate Expansion into Outer Space* (September 9, 2008). Available at SSRN: <<http://ssrn.com/abstract=1699020>> (Last visited: September 11, 2012).

10 Ferrazzani, Marco, *Soft Law in Space Activities*, Conference on Soft Law in Outer Space, Austria (Vienna): 2011.

11 Tiffany Chow, *Draft International Code Of Conduct For Space Activities Fact Sheet*. Secure World Foundation, June 2012, http://swfound.org/media/83247/ICOC_Fact-Sheet_June2012.pdf (Last visited: September 12, 2012), p.1.

12 Listner, Michael J., *Geopolitical Challenges to Implementing the Code of Conduct for Outer Space Activities*. <http://www.e-ir.info/2012/06/26/geopolitical-challenges-to-implementing-the-code-of-conduct-for-outer-space-activities/> (Last visited: September 12, 2012).

Livingston's code of ethics for conducting business in outer space¹³. Such a code is believed to facilitate the increase of the commercial activity in space, and would cover areas like "environmental stewardship in space, the promotion of honest dealings, making safety an important concern, ensuring a free-market economy and disclosure of conflicts of interest or political contributions"¹⁴. A code that would complement the aforementioned International Code of Conduct or any other interational code that the UN member states would negotiate, and take any code of ethics that companies would subscribe to to the next level, is the Space Bargaining Code; a code open for subscriptions to both the private and the public sector, that would reduce transaction costs and risks of doing business in the space sector, foster collaboration, cooperation, and progress-friendly competition, and generate faster and more sustainable growth.

3 Law and Economics behind the Space Bargaining Code

Given the "entrepreneurs and financiers hesitate when committing to a business plan based upon poorly substantiated market projections, while prospective customers are looking to proven performance and acceptable pricing before buying"¹⁵, enhancing reliability, clarity and certainty of the legal foundation of space commerce is essential for the future of this emerging and expanding industry. The discipline that can help us achieve these goals is law and economics, or the economic analysis of law.

That said, it is also true that whether a state or commercial entity will engage in space activities or not depends on the often prohibitive costs that space ventures entail. "International cooperation offers the opportunity to improve the efficacy of expenditures, which is a significant cost consideration"¹⁶, especially for the private sector that – far from the public choice economics – prioritizes utility maximization. The Space Bargaining Code would provide a structure for negotiations and deal-making that would allow access to space commerce

13 Livingston, David M., A Code of ethics and Standards for Lunar Development and Outer Space Commerce. Lunar Development Conference, Space Frontier Foundation, July 2001, <www.spacefuture.com/archive/a_code_of_ethics_and_standards_for_lunar_development_and_outer_space_commerce.shtml> (Last visited: September 12, 2012).

14 Livingston, David, A code of ethics for conducting business in outer space, Elsevier Science Ltd., 2003, Space Policy 19, p. 93.

15 McCandless II, Bruce, et. al. "Foreword." Space commerce: The inside story by the people who are making it happen. Ed. Langdon Morris and Kenneth J. Cox. United States: Aerospace Technology Working Group in partnership with The International Space University and The International Institute of Space Commerce, 2010, p. XIII.

16 James D. Rendleman and J. Walter Faulconer, Perspectives on Improving United States International Space Cooperation. 2010, <<http://strategicspacesolutions.com/Public-papers/IAC-10B38-E775.pdf>> (Last visited: September 12, 2012), p. 3.

to more actors and at lower investment points. In addition, “lowering transaction costs ‘lubricates’ bargaining”¹⁷, leading to lubricating private bargains by lowering the search, bargaining, and enforcement costs¹⁸.

Finding business partners, getting complete and accurate information before partnering up with another entity, forming a clear results-oriented bargaining strategy, and much more would be facilitated through the Space Bargaining Code. Not only would the code contain ethical norms and guidelines; it would also introduce a framework within which space commerce could thrive, with cooperation serving as a catalyst of growth. Space leaders would be encouraged to create conditions for reciprocity, transparency, integrity, and respect, and seek partnerships and synergies wherever and whenever possible, including any public-private sector combinations. After all, “cooperation enables states to leverage resources and reduce risk; achieve efficiencies; improve global diplomatic and other engagement; and enhance diplomatic prestige, political sustainability and workforce stability”¹⁹.

The Normative Coase theorem suggests to “structure the law so as to remove the impediments to private agreements”²⁰. Since there are several unaddressed issues in outer space law at this moment that prevent space commerce to be as efficient and profitable as it could be, the Space Bargaining Code is the closest to the implementation of the Normative Coase theorem that we realistically could attain at this point, when the international arena doesn’t seem to be ready to agree on, and commit to a new groundbreaking space convention. Still, sooner rather than later we want to be able to uplevel the body of outer space law, in consideration of the Normative Hobbes theorem that says “structure the law so as to minimize the harm caused by failures in private agreements”²¹.

The good news, however, is that a solution like the Space Bargaining Code can minimize these failures in private agreements. One of the reasons for that can be explained by the ‘bandwagon effect’, “a positive network externality in which a consumer wishes to possess a good in part because others do.”²² The more space actors that would subscribe to the code, the more new subscribers the code would attract. There is added value in the fact that a large number or percentage of the market is involved in an initiative, so the more entities would subscribe to the Space Bargaining Code, the more interest and new subscriptions would follow. Especially businesses would simply not want to miss out on

17 Robert Cooter and Thomas Ulen. *Law and Economics* (Fourth Edition). United States: Pearson Addison Wesley, 2004, p. 97.

18 *Ibid.*, pp. 91-94.

19 James D. Rendleman and J. Walter Faulconer, *Perspectives on Improving United States International Space Cooperation*. 2010, <<http://strategicspacesolutions.com/Public-papers/IAC-10B38-E775.pdf>> (Last visited: September 12, 2012), p. 15.

20 Robert Cooter and Thomas Ulen. *Law and Economics* (Fourth Edition). United States: Pearson Addison Wesley, 2004, p. 97.

21 *Ibid.*

22 Robert S. Pindyck and Daniel L. Rubinfeld, *Microeconomics* (Sixth Edition). United States: Pearson Education International, 2005.

all the opportunities that unlike them, their competitors and potential business partners would already be enjoying.

Partly due to the bandwagon effect, the market for space activities fostered by this code would collaborate more, but it would also become more competitive, preventing any monopolistic scenario from arising, which would ultimately create the conditions for expansion, and delivering even more value to the customers and humankind as a whole. A Nash equilibrium would emerge, where “no individual player can do any better by changing his or her behavior so long as the other players do not change theirs”²³ (despite the shortcomings of this notion, it is nevertheless fundamental in game theory that helps us understand the dynamics and logic of cooperation, conflict and competition). In this situation, each entity does the best given the competitors’ actions, but because no player has an incentive to deviate from its Nash strategy, the strategies are stable²⁴. “The hope is that most commercial competition will result – through the working of market forces – in an ever bigger pie”²⁵, with both/all sides winning.

4 Summary

“Justice, reason, and law are nowhere more needed than in the boundless, anarchic, and self-help environment of the final frontier”²⁶; so let’s use what law and economics has to offer as an efficiency seeking discipline, and encourage space commerce to benefit from it in terms of expansion, profitability, and impact, while at the same time co-creating the new and improved generation of outer space law.

A solution like the Space Bargaining Code would generate a ripple effect of positive outcomes, from lowering transaction costs and risks of operating in the space commerce industry to more competition and collaboration, faster growth, a more efficient use of resources, and more; at this stage, when the law has yet to catch up with all the technological progress, this could be a highly productive and overall beneficial stepping stone to the next legally binding (set of) document(s).

23 Robert Cooter and Thomas Ulen. *Law and Economics* (Fourth Edition). United States: Pearson Addison Wesley, 2004, p. 41.

24 Robert S. Pindyck and Daniel L. Rubinfeld, *Microeconomics* (Sixth Edition). United States: Pearson Education International, 2005, pp. 442, 478.

25 Galloway, Jonathan F.; *Game theory and policy of outer space*. Elsevier Science Ltd., 2004, *Space Policy* 20, p. 89.

26 Hays, Peter L, *Chapter 28: Space Law and the Advancement of Spacepower* in *Toward a Theory of Spacepower: Selected Essays*. Ed. Charles D. Lutes and Peter L. Hays, with Vincent A. Manzo, Lisa M. Yambrick, and M. Elaine Bunn, United States: Institute for National Strategic Studies, National Defence University, <www.ndu.edu/press/lib/pdf/spacepower/space-Ch28.pdf> (Last visited: September 11, 2012).