How is Privatisation Changing the Space Industry?

By Oliver Walters (5th September 2019)

Abstract

Over the years, there has been an increase in the popularity and importance of industries relating to space and space technologies. With new endeavours like NASA's announcement of their plans to colonise the moon by 2024 and private entities like SpaceX planning to get to Mars by 2027, it is clear that the stage is set for a boom in the space industry. This research report aims to make a judgment on how to politically and economically deal with this potential boom to ensure that it can maintain its growth for the next few decades. This will be done by looking at the history of both the public and private 'sides' of the industry, making a comparison between them and finally concluding with a look into the future and the issues that may arise. Through research, this paper will argue that 'both sides' can coexist by competing with each other on a level playing field.

How is Privatisation Changing the Space Industry?

Introduction

Even though it has only been half a century since NASA first landed a man on the moon, the renewed and revitalised space industry, as a whole, is back with plans to reach both Mars and the Moon. However, with all of this quick progress being made and seen in the news, it becomes difficult to stop and think about the consequences of this aforementioned progress that may arise in the future. It is important to look into this, especially considering the space industry's current economic growth as the decade comes to a close.[1] This growth has inevitably led to the growing source of competition and interest that has brewed between public organisations and private companies. Although it is not much of an issue yet, it is still crucial to understand that there is a big divide between the actions, standards and goals of these 'two sides'.

The speed and novelty of private expansion into space is often celebrated, for instance, in news articles that compare companies for their ability to develop intuitive technologies to benefit exploration and science.[2] However, this novelty also causes concern and raises questions about the balance between regulation and innovation. This ties into a greater discussion about the relationship between state and market. free-market economic perspectives are usually the centre point for this discussion, hence seen, as an example, from the previously stated news article.

[1] Matthew Weinzier, "Space, the Final Economic Frontier" *Journal of Economic Perspectives* 32, no. 2 (Spring 2018): 179, https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.32.2.173.
[2] Seth Archer, "Here are 20 companies that are best exposed to the growing space economy", *Business insider*, August 13, 2017. https://www.businessinsider.com/space-companies-morgan-stanley-best-exposed-to-the-growing-space-economy-2017-10/?r=AU&IR=T

Free market ideologies usually push for major concepts and ideas that aid in their beliefs about economics and the relationship between state and market. Privatisation is the process where private companies provide goods or services in industries previously run by public entities - Examples of this involve the contracting of private companies to develop and launch rockets carrying payloads into space, which was originally a government-only program. Deregulation is the economic strategy where companies are not required to follow previously initiated laws that keep them under a level of government control. For example, the *Commercial Space Launch Act of 1984*, allowed the development of spaceflight technology that didn't have to meet strict NASA standards and regulations.[3] Entrepreneurship is the process by which private companies develop new technologies in order to solve problems either being encouraged by competition or ambition.

Although his paper will focus primarily on the United States of America, the arguments and information provided can be applied to other leading and emerging space economies like Australia, India and China. In terms of the conclusion of this paper, there should be little need for regulation within the near future due to a free market style of governance combined with a symbiotic relationship between the more government-oriented public side of the industry and the commercial & private side of the industry being the most suited for the industry.

[3] Commercial Space Launch Act of 1984, H.R. 3942, 38th Cong. (1984).

The history of Space exploration in the United States

The public space industry, and the organisations incorporated inside it, was originally set up after the Second World War as scientists worked on ballistic missile projects (like the Manhattan project to develop the Atomic bomb) turned their focus from launching rockets at each other to launching them into space. Due to tensions in the Cold War and the already intensifying battle of ideologies between the Soviet Union and the United States, the Soviets tried to prove that they were technologically superior by launching the satellite Sputnik into space in 1951. This enticed the US into creating a 'space committee' branch of the National Advisory Committee for Aeronautics. However, it was not until Yuri Gargarian's mission into space in 1957 before the public entity NASA was created in 1958 as a reactionary measure, to this feat of Soviet technological prowess. This was a catalyst to a new space age. NASA received heavy funding from the Kennedy Administration in the early 1960s following the President's famous speech, promising to get to the moon "by the end of this decade".[4] And the space race soon died down after a successful moon landing in 1969.

NASA continued to operate the Apollo program until "declining public interest and American involvement with other budget-draining activities (Vietnam, for example) led to pressure on NASA and the programme ended with Apollo 17".[5] Each successive administration cut funding to NASA with the initial cuts being made before the moon landings took place, going as early as the mid-1960s.[6] This was mainly caused by a decrease in public interest for going into space as mentioned before. As well, one example of this loss of interest was caused, in later years, by the Challenger disaster of 1986, where a member of the American public was killed in a rocket explosion. This event seriously tarnished NASA's reputation, as said by NASA, "American public opinion about the space program, as an aggregate of opinion surveys taken over three decades, has measured fairly consistently except for brief upward movements during the Apollo program and after the Challenger accident in January 1986".[7] Now, after this 'dark age', the space industry seemed to boom at an incredible pace when several companies like Virgin Galactic in 2004, Blue Origin in 2000, Bigelow in 1999 and SpaceX in 2002, began carrying out major business dealings and received high incomes in later years, "New Space firms has risen from less than $500 million per year from 2001 to 2008 to roughly $2.5 billion per year in 2015 and 2016".[8] A series of laws and amendments made in the 1990s and 2000s that deregulated and legalised the privatisation of all spaceflight activities helped these companies in

[4] Wikipedia, s.v. "Presidency of John F Kennedy", last modified June 2, 2019, https://en.wikipedia.org/wiki/Presidency_of_John_F._Kennedy
[5] Johnathan Allday, *Apollo in Perspective* (CRC Press, 2000), 19.
[6] Weinzier, "Space, the Final Economic Frontier", 174.
[7] Sylvia D. Fries, *Opinion polls and the US civil space program,* (United States, NASA, 1992) https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19940028560.pdf
[8] Weinzier, "Space, the Final Economic Frontier", 177.

gaining access to the public square. For example, the *The National Aeronautics and Space Administration Authorization Act of 1990*, which required NASA to buy launch services and the *Commercial Space Launch Amendments Act of 2004*, which removed NASA from all regulatory actions involving the industry.[9] [10] All of these deregulatory acts enabled and encouraged companies to jump into the new opportunities no longer in the hands of NASA. These deregulatory acts that aided the industry in it's infant years can explain why there is such a drive to enable free market solutions in the space industry.

The Present situation involving the private and public sectors of the space industry

According to a presentation given by Martin Gary at NASA,[11] There are several areas of this industry: Transport, Research, Tourism, Settlement, Resources and Servicing - All which operate in 3 key locations: Suborbital (Remaining in the atmosphere), Orbital and Deep Space (Going beyond the earth). And as shown in this presentation it also seems like the people inside this more modern NASA is looking to change its base of operations - from being the sole controller of US missions in deep space to a more sideline position where they focus on research, servicing and aiding companies with "limited government involvement" applied. With the growing success and popularity of the private industry so far, it is important for NASA to find their place in this new economy - and the best way to do that seems to be by working on level ground with the other companies, in a more coexistent relationship. This also shows with the growth of the satellite launching economy. Now that NASA has to purchase the satellite launching services that private companies have to offer, the economy has boomed as companies try and compete for that spot that serves NASA.[12]

It seems clear that the 'two sides' of this industry can coexist. As per the last paragraph, the public side of the space industry is already prepared to work in the more research based aspects of the industry, acting more as a scientific than regulatory body. NASA's new focus is based around encouraging competition within and providing for the private space industry. This shows with their new plan to start colonising the Moon by 2024.[13] This new moon mission encourages competition between the members of the industry as well as providing future opportunities to research how

[9] National Aeronautics and Space Administration Authorization Act, Fiscal Year 1991, S.2287, 101st Cong. (1990).
[10] Commercial Space Launch Amendments Act of 2004, H.R. 3752, 108th Cong. (2004).
[11] Martin Gary, "NewSpace: The Emerging Commercial Space Industry" (PowerPoint presentation, NASA Ames Research Center, February 24, 2017).
https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20140011156.pdf
[12] Weinzier, "Space, the Final Economic Frontier", 182.
[13] Alexandra Witze, "Can NASA really return people to the Moon by 2024?" *Nature* no. 571 (July 2019): 153-154.

humans can and will deal with life on extraterrestrial bodies. This more research centred public space industry makes sense to a more free market approach, something that will be heavily supported by the general public. This would be considered a free market as the government is only there to encourage and stimulate the economy when needed. This is different to the private space industry, however. Whereas the public side is much more focused on the research, the private side is very focused on innovation, created from a desire to out-compete each other. This is seen in the way companies aim to develop new or efficient technology. One example is Space-X's reusable launch system, which aims to be a reusable rocket system similar in concept to the space shuttle of the early 2000s.[14] This also provides how they can be symbiotic with the public side as the research done by the public side can aid the development of the private side like a cross-industry version of R&D.

Looking into the future and the international stage

Despite all this positive development, There is a point where the industry will need some form of regulation or reform to tackle issues involving mining, land and the environment. This problem is expressed in how companies are currently treating Earth's upper atmosphere. So far, scientists have warned that launching satellites into the atmosphere can create huge fields of debris if things like paint or metal parts shed off the main body, "The bad news is that a very tiny piece of debris can cause major disasters. The worse news is that outer space is full of debris".[15] Like said, this problem is amplified with the evermore increasing amount of space Debris in the upper atmosphere.[16] Another issue is the development of land in space. Since 1967, the rules have been set by the UN Outer Space Treaty, stating that outer space cannot be claimed and it is for all countries to use.[17] However, this treaty will quickly become irrelevant as companies begin stepping into the frame. And this is why it is important to develop some kind of regulation for this industry. And with limited space on the atmosphere, the need for a system of real-estate becomes much more important. As suggested in the 'Understanding the Space Economy' interview, "You could have private investors send up a satellite to occupy space and then just rent it out because that's like valuable real estate that's only going to get more valuable with time".[18] Which only adds to the point that there needs to be some kind of

---

[14] Malcolm Macdonald, Viorel Badescu, *The International Handbook of Space Technology* (New York: Springer, 2014), vii.
[15] Reuben Westmaas, "Check Out the Damage That Space Junk the Size of a Pencil Eraser Can Do"Curiosity, March 13, 2018. https://curiosity.com/topics/check-out-the-damage-that-space-junk-the-size-of-a-pencil-eraser-can-do-curiosity/
[16] Weinzier, "Space, the Final Economic Frontier", 186.
[17] UN General Assembly, Resolution 1962, Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, S/RES/1962, ¶ 17 (December 13, 1963), http://www.unoosa.org/oosa/en/ourwork/spacelaw/principles/legal-principles.html
[18] Sinead O'Sullivan, "Understanding the Space Economy", interview by Curt Nickisch, *Ideacast*, Harvard Business Review, May 28, 2019. https://hbr.org/ideacast/2019/05/understanding-the-space-economy

regulatory system when it comes to land use to make sure that the future that humanity's land disputes are kept on earth. This does not affect the application of free market solutions in the space industry however, as it is still possible to keep companies in check without regulation - it just requires that NASA and other government bodies have a big role in the space industry and this can be done in a symbiotic relationship as well.

This free market ideology can also apply outside of the already twenty-year-old US space economy. There has only been recent international progress in the development of both public space initiatives and private enterprises. For example, the Indian Space Research Organisation (ISRO) and the many new private enterprises developing in India have worked together to an incredible degree of success with a report from the International Astronautical Federation, on the status of private and public spaceflight India, in 2016 stating, "The Indian Space program has excelled in many dimensions and has also contributed to international dimensions through its commercial and cooperative endeavours".[19] The development of 'both sides' at the same time poses a situation that is different from the US. This creates the need for a more symbiotic relationship as to encourage the new market to accelerate so that it can compete on a global stage. And as shown in the case of India, that allows for a successful space program. However, a possible rebuttal of the previously stated argument could be that the development of such practices may not be necessary and that it might be much better to have a public-centred industry much like China, whom is already challenging the United States on their capabilities in spaceflight, "[China's] goal of challenging the US for space control are [*sic*] a potentially serious threat".[20] However, the nature of the Chinese economic model being much more focused on the Authoritarian, Command control aspects can provide an explanation for why their system works well - because they already have existed under that form of governance for long enough. Since most of the world has a much more politically liberal approach to government, it is much better to use the strengths of the market/mixed economy to take on countries that hang on to a publicised approach to endeavours in space. Hence showing how the current practices that are being acted out in the many new space economies clearly points to how the free market model and a symbiotic relationship can really work with.

[19] Mukund K. Rao et al., "Indian Space: Toward a "National Ecosystem" for Future Space Activities", *New Space* 4, no. 4 (December 2016): http://doi.org/10.1089/space.2016.0008
[20] Erik Seedhouse, *The New Space Race: China vs. USA*, (New York: Springer, 2010), 105.

Conclusion

In conclusion, it seems fair to say that a free market style space industry is great for development and innovation. However, it is useful to keep the public space industry there as a standard to compare against and a source of scientific research. It is important to maintain lower, but still existent regulations to the space industry as it protects us from issues pertaining to the atmosphere and land use. As a response to the penultimate question of this paper, privatisation is changing the space industry by developing new and innovative technologies that push the boundaries of human endeavours in space.

Bibliography

Primary Sources

Commercial Space Launch Act of 1984, H.R. 3942, 38th Cong. (1984).

Commercial Space Launch Amendments Act of 2004, H.R. 3752, 108th Cong. (2004).

Fries, Sylvia D. *Opinion polls and the US civil space program,* (United States, NASA, 1992) https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19940028560.pdf

Gary, Martin. "NewSpace: The Emerging Commercial Space Industry". PowerPoint presentation, NASA Ames Research Center, February 24, 2017. https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20140011156.pdf

National Aeronautics and Space Administration Authorization Act, Fiscal Year 1991, S.2287, 101st Cong. (1990).

UN General Assembly, Resolution 1962, Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, S/RES/1962, ¶ 17 (December 13, 1963), http://www.unoosa.org/oosa/en/ourwork/spacelaw/principles/legal-principles.html

Secondary Sources

Allday, Johnathan. *Apollo in Perspective* (CRC Press, 2000).

Archer, Seth. "Here are 20 companies that are best exposed to the growing space economy". *Business insider*, August 13, 2017. https://www.businessinsider.com/space-companies-morgan-stanley-best-exposed-to-the-growing-space-economy-2017-10/?r=AU&IR=T

Macdonald, Malcolm, and Badescu, Viorel. *The International Handbook of Space Technology*. New York: Springer, 2014, vii.

O'Sullivan, Sinead. "Understanding the Space Economy", By Curt Nickisch. *Ideacast*, Harvard Business Review, May 28, 2019. https://hbr.org/ideacast/2019/05/understanding-the-space-economy

Rao, Mukund K., Murthi, K. R. Sridhara, and Raj, Baldev. "Indian Space: Toward a "National Ecosystem" for Future Space Activities". *New Space* 4, no. 4 (December 2016): http://doi.org/10.1089/space.2016.0008

Seedhouse, Erik. *The New Space Race: China vs. USA*. New York: Springer, 2010.

Weinzier, Matthew. "Space, the Final Economic Frontier". *Journal of Economic Perspectives* 32, no. 2 (Spring 2018): 173-192, https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.32.2.173.

Westmaas, Reuben. “Check Out the Damage That Space Junk the Size of a Pencil Eraser Can Do”. *Curiosity*, March 13, 2018. https://curiosity.com/topics/check-out-the-damage-that-space-junk-the-size-of-a-pencil-eraser-can-do-curiosity/

Wikipedia, s.v. “Presidency of John F Kennedy”. last modified June 2, 2019, https://en.wikipedia.org/wiki/Presidency_of_John_F._Kennedy

Wikipedia. 28/3/2019. “Private Spaceflight.” Accessed 13/6/19 https://en.wikipedia.org/wiki/Private_spaceflight

Wikipedia. 8/4/2018. “Space Industry.” Accessed 11/2/19. https://en.wikipedia.org/wiki/Space_industry

Witze, Alexandra. “Can NASA really return people to the Moon by 2024?” *Nature* no. 571 (July 2019): 153-154.

Images

Dent, Harry. “Space Exploration and Travel: Is It Crazy… or Inevitable?”, *InvestorPlace,* July 8, 2017. https://investorplace.com/2017/08/space-exploration-travel-crazy-or-inevitable-ggsyn/

Stampler, Laura. “These Soviet Space-Race Propaganda Posters Retain Their Delusional Intensity 50 Years Later”, *Business Insider*, April 26, 2012. https://www.businessinsider.com.au/here-are-the-soviets-extremely-intense-space-race-propaganda-posters-from-1958-1963-2012-4

Reflection

Review of the entire research process

In reflection of the entire process of research, including all assessments. I think my main issue was clarity and conciseness - making sure the words I used and how I used them were getting a point or concept across. In the Viva Voce, it was imperative to work on my presentation skills in order to deliver my points in a quicker manner in order to not surpass time. The written report had the same issues, especially considering the word/sentence length in a three page document. When I was writing the draft report last term, I also mentioned in my previous reflection that brevity was something I wanted to look out for instead of "waffling on". And now with this assessment, it is the same, attempting to condense the information in a clear and clean format is the biggest focus for this part of the task. In reflection, I think I managed to handle that well, getting better as time went on. I probably should've tried to spend more time proofreading my work in the first two terms, both my report and draft paper contained several lexical and grammatical errors. I also found it difficult to find the right sources that provided statistical information as seen from the feedback from the term 2 draft.

The goal of this stage of the research report was to refine and edit the previous work done in term 2. The main tactics I employed and the things I needed to edit were:

- Reviewing feedback from the previous draft
- Proofreading and reviewing the assessment with Dr. Chilton/Myself
- Updating the Bibliography in accordance with the Chicago Manual of Style
- Adding more scholarly sources and citations to back up specific statements made
- Conducting research on Google Scholar and Jstor etc. to add those sources

Reflection on the learning experience of Research Studies

In reflection of the research studies as a whole, I think I learnt a lot about the process of research. Throughout the year, I learnt pretty crucial things such as the nature of truth, history of libraries and knowledge and creating research reports/papers. The knowledge I learnt in this course will help me in my later endeavours during year 12, university and beyond - not to mention the skills I acquired and the fun, memorable experience I had taking the course.[21]

[21] Process Log - https://docs.google.com/document/d/1ZZsBzrn7C8Ym_OWBCacXeGmR4Btj-UIbnKRcoyqVRcc/edit?usp=sharing