A COMMERCIAL SPACE SECURITY DILEMMA?

The Dynamics of Commercial Competition in Space

Wendy N. Whitman Cobb

The United States and other nations are relying more heavily on commercial space companies than ever before. While some see this as beneficial, a heightened focus on economic security and the growing power of commercial space companies may portend the onset of a commercial space security dilemma centered not on space capabilities but on the companies driving innovation. In this security dilemma, countries, specifically the United States and China, are incentivized to build and protect their commercial space markets to increase their military and economic power, replicating the dynamics of an arms race. The emerging commercial space security dilemma has implications for space and for great power competition.

The growing importance of the commercial space industry has been demonstrated repeatedly in recent years. As tension in the space domain heightens, the United States in particular is turning to commercial space companies for everything from launch services to communications.

Since the beginning of the first Space Age in the 1960s, the US government has contracted with major companies to build and sometimes even operate satellites and space-based systems, retaining control over the substance of the satellites themselves as well as their operations. Today in the third Space Age, however, the paradigm has shifted to one where the US government as well as other spacefaring governments are now contracting for services from companies who retain full control over the satellites, the systems, and their operations. In return, as the United States has seen, there are significant benefits: lowered costs, new space-based capabilities, increased redundancy and resiliency of space systems—especially with systems such as communication and remote imaging that are central to national security—and greater access to space. The United States is not alone in recognizing the growing importance of commercial space. Russia has been wary and critical of the rise of SpaceX, which has put a dent in Russia's own commercial launch industry in addition to eliminating the NASA paycheck

Dr. Wendy Whitman Cobb, professor of strategy and security studies at the School of Advanced Air and Space Studies, Air University, is the author of Privatizing Peace: How Commerce Can Reduce Conflict in Space *(2020).*

Moscow received for taking American astronauts to and from the International Space Station.[1]

In 2014, recognizing the rising impact of commercial space companies, the Chinese government adopted a policy of encouraging the growth of a domestic commercial space industry, ostensibly to take advantage of the same things the United States has found helpful, such as cost reduction and innovation.[2] While this might indicate the increasing legitimacy of commercial space around the world, it also signals a potentially more dangerous phenomenon: a security dilemma—or spiral model—where the actions taken by a state for its own security lead other states to respond in ways that begin a repeating cycle of escalatory reactions.

Describing current commercial space activity as an arms-race spiral may seem counterintuitive, especially because some have argued that turning to commercial space capabilities may actually help alleviate a security dilemma in the space domain.[3] Yet three factors mitigate the potentially peaceful influence that commercialization may offer: the unique dual-use nature of space technology, the rising importance of economic security, and the dominance of governments in commercial space markets.

These factors suggest a veritable arms race is developing between the United States and China in terms of the commercial space industry. As commercial space companies provide more national security services, they themselves simply become a thin veneer for the military and its use of force. As such, both countries are incentivized to step up investment in and protection of their domestic commercial space markets to increase their military and economic power, spurring the other to do more of the same. Thus, a race for the greatest quantity and quality of commercial space resources ensues.

This article explores this idea, discussing the concept of the security dilemma and its variations and outlining how the unique nature of the space domain contributes to the security dilemma in general and the commercial space security dilemma (CSSD) specifically. Like security dilemmas generally, all countries could find themselves in a CSSD; however, this article focuses primarily on the developing dynamic between the United States and China. Evidence indicates the commercial space industry has already affected the security balance between the United States and China, and both have responded with certain actions, including moves to protect domestic industries. As a result, several consequences flow from this commercial space security dilemma, including shifts in where competition between states is occurring, changes in what it means to be a space power, impacts on deterrence, and potential caution on the part of commercial space companies who might find themselves the target of adversarial

1. Marina Koren, "The NASA Decision Russia Didn't Like," *Atlantic*, February 28, 2019, https://www.theatlantic.com/.

2. Irina Liu et al., *Evaluation of China's Commercial Space Sector*, Institute for Defense Analysis (IDA) Document D-10873 (Washington, DC: IDA Science and Technology Policy Institute, September 2019), https://www.ida.org/.

3. Brad Townsend, *Security and Stability in the New Space Age: The Orbital Security Dilemma* (New York: Routledge, 2020); and Wendy N. Whitman Cobb, *Privatizing Peace: How Commerce Can Reduce Conflict in Space* (New York: Routledge, 2020).

countries. These findings contribute to a further understanding of the dynamics of commercial space and to a more rigorous study of space from the perspective of international relations, particularly the literature on arms races and security dilemmas.[4]

Security Dilemmas, Dual Use, and the Space Market

Variations on the Security Dilemma

The notion of a security dilemma was introduced and developed by scholars beginning in the 1950s.[5] The idea is intuitive: in an anarchic world where it is impossible—or nearly so—to divine the intent of nation-state actors, when state A increases its arms, state B cannot know whether that is to satisfy state A's own defensive needs or to prepare for an eventual attack. As such, it is only rational for state B to also increase its own capabilities which may then influence state A to continue its own buildup.

This feedback loop continues until both countries are heavily armed and unsure of the other's intentions. Several different variations have since emerged, and while the commercial space security dilemma is conceptually distinct, it most closely resembles the economic security dilemma, technology security dilemma, private military services security dilemma, and securitization, or dual-use dilemma.

In an economic security dilemma, countries—in this case the United States and China—react to perceived economic aggression to bolster domestic economic security, which in turn is perceived as hostile behavior by the other actor.[6] In other words, the economic sphere simply replaces the military one of the classic security dilemma and is a further reflection of the increasing importance of economic power and security to great power competition today.[7]

Relatedly, a technology security dilemma has economic components but is more focused on the technology industry and developments in areas such as artificial intelligence and semiconductors.[8] Some see this security dilemma emerging between

4. Dimitrios Stroikos, "International Relations and Outer Space," *Oxford Research Encyclopedia of International Studies*, October 2022, https://doi.org/.

5. John Herz, "Idealist Internationalism and the Security Dilemma," *World Politics* 2, no. 2 (1950); Samuel P. Huntington, "Arms Races: Pre-Requisites and Results," in *Public Policy: A Yearbook of the Graduate School of Public Administration, Harvard University*, ed. Carl S. Friedrich and Seymour E. Harris (Cambridge, MA: Harvard, 1958); Colin Gray, "The Arms Race Phenomenon," *World Politics* 24, no. 1 (1971); and Robert Jervis, *Perception and Misperception in International Politics* (Princeton, NJ: Princeton University Press, 1976).

6. David J. Bulman, "The Economic Security Dilemma in US-China Relations," *Asian Perspective* 45, no. 1 (Winter 2021), https://doi.org/.

7. See, for example, Nehra Mishra, "The Trade: (Cyber) Security Dilemma and Its Impact on Global Cybersecurity Governance," *Journal of World Trade* 54, no. 4 (2020); and Andrej Krickovic, "When Interdependence Produces Conflict: EU-Russia Energy Relations as a Security Dilemma," *Contemporary Security Policy* 36, no. 1 (2015).

8. Darren J. Lim and Victor Ferguson, "Conscious Decoupling: The Technology Security Dilemma," in *China Story Yearbook*, ed. Jane Golley et al. (Canberra, Australia: ANU Press, 2019), https://press-files.anu.edu.au/.

the United States and China, wherein such pressures are leading to an explicit decoupling of economic relations and technological supply chains. A private military services security dilemma is characterized by countries increasingly using private military contractors to either supplement or replace their own security forces, opening the way for other countries to provide such services as a growing trend in regions such as Africa and Southeast Asia.[9]

Finally, the literature identifies the dual-use security dilemma, beginning with what might be considered a more classic security dilemma approach: if one actor has dual-use capabilities, it will force the other to develop them as well.[10] The theory has since evolved to examine the process of securitization or the process by which a state decides whether to identify another state's dual-use technology as potentially dangerous or accept that state's assertion of its peaceful purposes.

Of these security dilemmas, the commercial space security dilemma may be most like the use of private military contractors. Both private military service providers and commercial space companies offer services that are essentially supplements, if not replacements, for state-controlled military forces. There are distinctions, however, that can result in a security dilemma of a different type.

For one, the barrier to entry for private military contractors is arguably much lower than for commercial space companies, meaning there is more competition in the market. Second, states are not the only—or the most significant—customer for private military services, as they are for commercial space companies.[11] Finally, these contracting organizations have not usually played a role in great power competition, instead becoming important in regional conflicts or in situations where state power is not nearly as assured.

To be sure, private military contractors such as Blackwater (now Academi) were important during American actions in Iraq and Afghanistan, and more recently, the Wagner Group has been active in Ukraine. Despite the involvement of major powers, however, these military conflicts could still be classified as regional and not competition and/or conflict between two major powers. This difference implies there will be different dynamics and consequences involved with a commercial space security dilemma than for the security dilemma arising from the use of private military contractors.

Further, the CSSD is distinct from the dual-use dilemma, given that commercial space activities are acting as a thin veneer on state military action—something quite different from what occurs with more basic dual-use technologies—the process through which commercial space is deemed to be a threat may indeed be ongoing. As detailed below, China and Russia both see US commercial space activities as a threat,

9. Carolin Liss, "Southeast Asia's Maritime Security Dilemma: State or Market?," *Asia-Pacific Journal* 5, no. 6 (2007).

10. Amir Lupovici, "The Dual-Use Security Dilemma and the Social Construction of Insecurity," *Contemporary Security Policy* 42, no. 3 (2021).

11. Doug Brooks, "Messiahs or Mercenaries? The Future of International Private Military Services," *Managing Armed Conflicts in the 21st Century*, ed. Adekeye Adebajo and Chandra Lekha Sriram (London: Frank Cass, 2001).

with China in particular responding by enhancing its domestic commercial space industry to act as a bulwark.

In sum, while the many iterations of security dilemmas help to inform a commercial space security dilemma, none quite capture the emerging dynamics of the third Space Age. Add to that the distinct nature of space itself, and the result is an entirely new form of the security dilemma.

Dual Use and Space

Space has long been known, in the tagline of *Star Trek*, the historic entertainment franchise, as "the final frontier." Aside from highlighting the unknown nature of the space domain, this appellation also puts into focus the qualities of the space domain that contribute to much of the uncertainty involved in security dilemma theories. Uncertainty not just about a state's intentions but also about a state's message means that rational actors should move in ways to prevent attack by that state.[12]

Adding to the difficulty in assessing and understanding a state's intent, the space domain is physically distinct and distant from earthbound observers.[13] Space is a difficult place to operate in with its microgravity, increased radiation, and the speed at which objects are moving. With only a handful of individuals in space at any given moment, space operators must work from an array of sensors and data that, while giving a precise indication of what systems are doing and where at any given time, does a remarkably poor job of explaining why.

This uncertainty with regard to intent leads to difficulty in understanding whether a state is moving a satellite closer to an adversary's satellite for spying or jamming signals or simply to avoid a piece of dangerous space debris. Similarly, if a satellite stops working, it is difficult to ascertain immediately whether the problem is internal or due to a strike from a micrometeoroid or an attack, making attribution difficult. While this can be challenging to assess in the air, land, and sea domains as well, access and immediate assessment of the malfunctioning equipment or questionable activity in those domains are much easier than they are in space.

This uncertainty is only compounded by the ambiguity of space technology's dual-use nature. Other authors have noted the impact this has in space and in other technological domains. Yet with respect to commercial space companies, dual use can also mean whether a given commercial system is being used by a state

12. Herz, "Security Dilemma," 157; and Jervis, *Perception*, 59.

13. Elizabeth Mendenhall, "Treating Outer Space Like a Place: A Case for Rejecting Other Domain Analogies," *Astropolitics* 16, no. 2 (2018).

for military or aggressive purposes or whether, at any given time, it is only being used for civilian and commercial purposes.[14]

This is ambiguity in its truest sense in that a satellite's purpose is not only unclear but also multifold, sometimes at the same time. For example, while militaries use SpaceX's satellite internet constellation Starlink—at a minimum, the United States and Ukraine—there may be points in time when none are routing their communications through the megaconstellation. At other times, Starlink may be employed by a mixture of civilian, commercial, and military users. While some methods may exist to determine whether a military or state government is sending signals through particular satellites at a particular point in time—the presence of a satellite overhead, for example—some element of ambiguity in whether a commercial system is actively being used for aggressive purposes will persist even if a country or company outrightly declares otherwise.

This is an important point: ambiguity in a space asset's purpose can only increase a country's uncertainty about an adversary's actions and intentions. Given that uncertainty is a key element driving arms-race spiral dynamics, adding to that may only exacerbate a country's response to such actions. Whereas the purpose of space assets explicitly owned and operated by state entities is more certain, the possibility that state A may be using commercial assets for national security means that decisionmakers in state B may feel as if they need to prepare even more to compete against and possibly defeat a more capable adversary.

Commercial Space Market

The difference between the commercial space market and other economic markets also plays a role in understanding the CSSD. Though provisions for a commercial space market were put in place in the United States beginning in the 1980s, such a market has been slow to develop.[15] Technology costs, including space launch and satellite development, remained high, relegating space activity to the purview of great powers and major companies.

Yet in the early twenty-first century, these dynamics began to change as a wave of new space companies entered the industry, focused on reducing cost by making rockets reusable and utilizing cheaper and smaller off-the-shelf technologies for the rockets and attendant satellites. At the same time, an opening for commercial companies emerged as the US government forced the partnership of Boeing and Lockheed Martin—companies once independently providing launch services—making the launch

14. Jonathan B. Tucker, ed., *Innovation, Dual Use and Security: Managing the Risks of Emerging Biological and Chemical Technologies* (Cambridge, MA: MIT Press, 2012); Thea Riebe and Christian Reuter, "Dual-Use Dilemmas for Cybersecurity, Peace, and Technology Assessment," in *Information Technology for Peace and Security*, ed. Christian Reuter (Wiesbaden, Germany: Springer, 2019); Joan Johnson-Freese, *Space Warfare in the 21st Century* (New York: Routledge, 2017); and Aleksander M. Lubojemski, "Satellites and the Security Dilemma," *Astropolitics* 17, no. 2 (2019).

15. See Whitman Cobb, *Privatizing Peace*.

industry a government-dictated monopoly.[16] The government also directed NASA to begin shifting its human spaceflight program away from the space shuttle. This combination of forces has helped lead to the commercial space boom in recent years.

Despite the growing importance and value of commercial space, however, the fact remains that in the United States, the government remains the single most important customer supporting much of the market for commercial space activities.[17] While the US government was initially wary of untested commercial space companies, in the past decade, it has become an enthusiastic supporter of the industry and has increased its use of commercial capabilities significantly. Even in areas where government-owned and -operated systems once dominated, as in the field of remote sensing, contracts are becoming more common, making the US government a powerful and influential customer. The result is that companies currently in existence are often compelled to compete for government contracts and new companies must try to win such contracts to have any hope of economic success.

The Commercial Space Security Dilemma

The commercial market offers the government the opportunity not only to work with successful companies but also to take advantage of rapid innovations to create and deploy new and increasingly useful capabilities. As such, some military strategists have proposed that shifting some government-owned and -operated activities to commercial services would not only lower costs and increase government capabilities but also help to reduce a growing security dilemma in space, as this might signal a benign rather than hostile intent on the part of the United States.[18] This perception is further advanced by the idea that as the state is the only legitimate wielder of power and military might, commercial systems could not legally be used in an aggressive manner.[19]

While moving military activities to commercial providers might appear to send a peaceful signal to adversaries and reduce the uncertainty in government use of space, the commercial space security dilemma argues otherwise—it does not matter who is doing the activity if the ultimate benefactor is a government. In other words, if the United States acquires a potentially aggressive capability via a commercial provider, it will still use that capability in much the same way it would if it owned it directly. Thus, an adversary government may still rationally assume the capability is a threat and react accordingly.

This tendency is heightened when the government is the only or most significant customer in a commercial market. Far from ameliorating the security dilemma in space, such a reaction only moves the actors in a different direction, which distinguishes a commercial space security dilemma from the traditional security dilemma.

16. William E. Kovacic, "Competition Policy Retrospective: The Formation of the United Launch Alliance and the Ascent of SpaceX," *George Mason Law Review* 27, no. 3 (2020).

17. Svetla Ben-Itzhak, "Companies Are Commercializing Outer Space. Do Government Programs Still Matter?," *Washington Post*, January 11, 2022, https://www.washingtonpost.com/.

18. Townsend, *Security and Stability*.

19. Townsend.

Seeking the benefits of a commercial space sector—innovation, lowered costs, and increased capabilities—the country supports sector development through laws, regulations, contracts, and markets. As this market develops, it can impact the security balance between two states, potentially threatening an adversary state. The unique nature of space further heightens the uncertainty: a potential adversary may be unable to assess whether a given commercial satellite is being used for peaceful or aggressive purposes by a state entity at any given time.

This uncertainty causes the other state to increase its own space capabilities, including the stimulation of its own commercial space industry to take advantage of the above mentioned benefits. The original state in turn sees these developments as a threat to both its economic and security position, causing further investment in and emphasis on commercial space.

The CSSD also changes what it means to be a space power. To this point in space history, the ability to have and exert spacepower has been reserved only for those states that could afford to be part of what one international relations scholar terms the space club.[20] The growth of commercial space in general has meant that those capabilities are no longer reserved for great powers but instead can accrue to any state willing to pay the reduced cost—for example, Ukraine. The result is that "states that can harness the capabilities of their space entrepreneurial community, including both start-ups and modernized contractors, will be in a position to increase their structural power."[21]

If having space capabilities allows states to join an elite club whose membership signals both power and prestige, then the wider availability of such capabilities means an increase in states with club membership, thus reducing the level of prestige that membership brings.[22] As a result, the competition moves to a more select level: those states that can support and foster an increasingly influential commercial space industry.

In other words, in a world where commercial space is powerful but also accessible as a global commodity, any state can become a space power but not every state can be a commercial space power. Commercial spacepower enables states a degree of control over the actions of those commercial space companies. The hegemonic commercial space sector, led by a very small number of companies operating out of an even smaller number of nations, further encourages the spiral dynamic as states such as the United States and China contend for an even higher level of international power.

The United States and China

Where the economic realm was once seen as protected from warfare, globalization and the era of deep interconnectedness has meant that today, competition between states has

20. Deganit Paikowsky, *The Power of the Space Club* (Cambridge, UK: Cambridge University Press, 2017).

21. Santiago Remanteria, "Power Dynamics in the Age of Space Commercialization," *Space Policy* 60 (2022): 10.

22. Paikowsky, *Power of the Space Club*.

multiple dimensions, including commercial space.[23] Though it is perhaps easiest to see the impact of commercial space in the ongoing conflict in Ukraine, there is already substantial evidence of the CSSD emerging between the United States and China.

First, remote sensing images from commercial satellites have been used to identify and track suspicious activities by China, including the construction of nuclear silos and Uyghur concentration camps.[24] These images, provided by companies such as Maxar Technologies and Planet Labs, not only highlight China's violations of international law and threatening behavior, but also allow the United States to call out such behavior without divulging its own sources and methods. Similarly, in the Ukraine conflict, Western officials have been able to use commercial imagery to preempt Russia's denials without giving away the extent of state capabilities.[25] Such public analysis of open-source imagery gives US officials yet another opportunity to further their case—in these instances in the form of private, nongovernmental imagery analyses—to domestic and international audiences about the threat posed by China.

But how does this capability change the security calculus between China and the United States? China might once have expected such evidence to remain classified because US officials would not want to give away the quality of their own space capabilities, but it is increasingly likely that state behaviors will come to light via commercial satellites. And efforts to better hide its activities in response would impose an additional cost on China due to the commercial capability.

SpaceX's Starlink has also threatened to upset relations between the United States and China. While Starlink does not currently provide service to China, the possibility that it could be used in a time of conflict to US advantage has not escaped Chinese officials. To this end, SpaceX founder and chief executive officer Elon Musk has recently claimed the Chinese government has sought assurances that Starlink would not be used or sold in China, particularly in light of its impact in the Ukraine conflict.[26]

In the spring of 2022, Chinese scientists warned that Starlink posed a grave threat to Chinese national security because the system could be used for a wide variety of functions: missile (including hypersonics) tracking, transmission speed boosting for drones and fighter planes, or even as kinetic weapons if they were to ram into another satellite.[27] While there is little evidence that Starlink could provide a missile-tracking

23. Nicholas Mulder, *The Economic Weapon: The Rise of Sanctions as a Tool of Modern War* (New Haven, CT: Yale University Press, 2022).

24. Matt Korda and Hans Kristensen, "A Closer Look at China's Missile Silo Construction," Federation of American Scientists, November 2, 2021, https://fas.org/; and Doug Irving, "China's Disappeared Uyghurs: What Satellite Images Reveal," *Rand Review* (blog), April 2021, https://www.rand.org/.

25. Theresa Hitchens, "How US Intel Worked with Commercial Satellite Firms to Reveal Ukraine Info," Breaking Defense, April 7, 2022, https://breakingdefense.com/.

26. Roula Khalaf, "Elon Musk: 'Aren't You Entertained?,' " *Financial Times*, October 7, 2022, https://www.ft.com/.

27. Ben Turner, "Chinese Scientists Call for Plan to Destroy Elon Musk's Starlink Satellites," Live Science, May 27, 2022, https://www.livescience.com/.

function, researchers nonetheless argued that the Chinese government needed to find ways immediately to counter the potential threat.

Another potential impact of Starlink is the wider availability of uncensored information in China, which has instituted strict firewalls to limit its citizenry's access to global information. Satellite services such as Starlink cannot legally operate in countries such as China or Iran without a license. Yet on September 23, 2022, in reaction to crackdowns by the Iranian government, Secretary of State Antony Blinken announced measures to "advance Internet freedom and the free flow of information for the Iranian people," which included the activation of Starlink in Iran.[28] As much as Starlink's megaconstellation that offers resiliency and redundancy has helped a country such as Ukraine when communications have been interrupted, countries such as China and Iran must surely see a similar free flow of information, resulting from the same capabilities, as dangerous to the stability of their society in general.

The national security impact of Starlink begs another question: if satellite communications were one of the very first space capabilities to be commercialized (the founding of COMSAT goes back to the Kennedy administration), why are we just now seeing commercial satellite communications have this significant of an effect?

To be sure, states have historically jammed commercial satellite communications; in just the past few years, satellite systems have been jammed by state actors such as Iran and hacked by states such as Russia.[29] Yet Starlink and other emerging systems are different in that they are megaconstellations, large satellite networks with thousands of smaller satellites in low Earth orbit, creating a highly redundant and resilient system. To truly disrupt communications, there must be a way of disrupting thousands of satellites, thereby drastically increasing the cost of such an attack. This system is strengthened by the fact that companies such as SpaceX can quickly and cheaply reconstitute the system by launching new satellites if the system were physically attacked.

Further, despite the ability of states and potentially others to jam and disrupt megaconstellations, SpaceX has proven particularly adept at working around such operations.[30] While there would likely be some possibly major problems in terms of dealing with debris from such an attack, taking out a portion of Starlink satellites would not end the battle.

At the moment, this puts China at a disadvantage not only because of increased costs but also because it does not have a similar system on which to rely. In further support of the CSSD, China is developing plans for its own megaconstellation, Guowang, operated

28. Antony Blinken (@SecBlinken), "We took action today to advance Internet freedom . . .," Twitter, September 23, 2022, 10:04 a.m., https://twitter.com/.

29. Brett Tingley, "Eutelsat Accuses Iran of Jamming 2 Persian-Language Broadcast Satellites," Space.com, October 7, 2022, https://www.space.com/; and Patrick Howell O'Neill, "Russia Hacked an American Satellite Company One Hour before the Ukraine Invasion," *MIT Technology Review*, May 10, 2022, https://www.technologyreview.com/.

30. Michael Kan, "Pentagon Impressed by Starlink's Fast Signal-Jamming Workaround in Ukraine," PCMag.com, April 21, 2022, https://www.pcmag.com/.

by a state-owned enterprise (SOE) called SatNet.[31] There is some skepticism in China about the need for such a system, given the widespread use of 4G and 5G cellular networks across the country, including rural regions. Nevertheless, it has received strong support from the Chinese Communist Party (CCP).[32] Given the potential for megaconstellations to "reshape global networks," according to one report, the party has thrown its support behind its development not only to further its economic goals at home and abroad but also to have a hand in setting global norms and standards.[33]

The increased interest in a homegrown commercial megaconstellation is consistent with China's growing encouragement of commercial space. In 2014, seeing the impact of commercial space companies in the West, the CCP adopted a new policy supporting such business activity in its own backyard. On its own, this decision suggests the Chinese government sees the value of commercial space and the need to take advantage of it. Notwithstanding the lack of transparency and data, the number of space companies in China has increased, with one analysis placing the number at 78 in 2019.[34] And although limited, the data clearly affirms that many of these companies maintain close ties with the state. If they are not SOEs themselves, then they have been founded by former government employees or depend to a significant extent on government funding.

Such ties with the government should not be a surprise. Yet why would the CCP want to encourage such activity when the government intends to keep such a close hold of it? Even beyond the continued difficulty in understanding China's intentions in commercial space, analysts have identified strikingly familiar motivations: economic development, national pride and geopolitical standing, the potential for spin-offs, and technological breakthroughs.[35] While these motivations mirror those of the United States, the very fact Chinese leaders feel the need to create and encourage such a market is itself evidence that they see commercial space as an area of competition. To not promote the commercial space industry would thus put the country at a significant disadvantage.

Even in the United States, while some limitations are placed on commercial space companies—such as the quality of imagery available for purchase—policymakers increasingly recognize the need to continue supporting commercial space developments in continuing competition with China. Indeed, amid calls from elected officials to continue to compete with China in low Earth orbit, NASA is supporting the construction of a commercial space station to replace the International Space Station

31. Makena Young and Akhil Thadani, *Low Orbit, High Stakes: All-in on the LEO Broadband Competition* (Washington, DC: Center for Strategic and International Studies [CSIS], December 2022), https://csis-website-prod.s3.amazonaws.com/.

32. Frank Chen, "China Launching State Rival to Elon Musk's SpaceX," *Asia Times*, November 17, 2020, https://asiatimes.com/.

33. Young and Thadani, *Low Orbit, High Stakes*.

34. Liu et al., *Space Sector*.

35. Liu et al., *Space Sector*; and Secure World Foundation, in partnership with the Caelus Foundation, *The Sino-US Space Commercialization Dialogues 2019–2021* (Broomfield, CO: Secure World Foundation, August 2022), https://swfound.org/.

when the program ends.[36] The impact of commercial space assets in Ukraine has further encouraged members of Congress to support additional development.[37]

US Space Force leaders repeatedly comment on the strength and potential of the commercial space industry in public, and the organization has moved to make it easier to leverage such opportunities.[38] Along with increased military interest in commercial space, the National Reconnaissance Office has increased the number of contracts available to commercial imagery services to supplement government-owned systems.[39]

More broadly, like China, the United States has also elevated issues of economic security to national security, reinforcing the importance of commercial space in the broader economic context. In addition to moves during the Trump administration to protect American industries and limit the influence of Chinese companies like Huawei and ByteDance—the Beijing-based owners of TikTok—in 2022, the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act was signed into law to encourage domestic production of semiconductors, protect supply chains, and increase investment in science and technology to specifically compete with China.[40]

It is clear the United States and China both recognize the value in economic security generally but the commercial space industry specifically and have acted in ways to encourage its growth and fully utilize its flourishing capabilities. At the same time, commercial space impacts the security environment and balance between the two countries, leading to the tit-for-tat maneuvering of the security dilemma. Given this familiar spiraling pattern, theories about the traditional security dilemma may provide some insight on what to expect moving forward. At the same time, however, the differences between a commercial space security dilemma and traditional security dilemma suggest there might be some unique implications as this dynamic plays out in the space domain.

Implications

Potential Benefits

Given that a commercial space security dilemma is emerging between the United States and China, one might argue it represents a better dilemma to have than a traditional arms race. The costs of supporting and developing a commercial space industry

36. National Aeronautics and Space Administration (NASA), "NASA Selects Companies to Develop Commercial Destinations in Space," press release, NASA, December 2, 2021, https://www.nasa.gov/.

37. Theresa Hitchens, "Space Force Should Heed Ukraine Lessons as It Revamps Structure: CSO Nominee Saltzman," Breaking Defense, September 13, 2022, https://breakingdefense.com/.

38. Sandra Erwin, "Private Industry Aims to Fill Demand for Space Threat Intelligence," *SpaceNews*, September 18, 2022, https://spacenews.com/; and Erwin, "Space Force Looking to Ease Barriers to Entry Commercial Companies," *SpaceNews*, April 4, 2022, https://spacenews.com/.

39. Theresa Hitchens, "NRO Keeps 3 Vendors for Commercial Imagery with New 10-Year Contracts," Breaking Defense, May 25, 2022, https://breakingdefense.com/.

40. Kevin Breuninger, "Biden Signs China Competition Bill to Boost US Chipmakers," CNBC, August 9, 2022, https://www.cnbc.com/.

are the time and effort invested in writing appropriate legislation and regulations and enforcing them, rather than in building physical weapons that pose existential threats. While qualitative arms races might spur some technological developments, a commercial space security dilemma adds an additional dimension of economic and technological competition that may in fact result in more far-reaching benefits.

Additionally, space capabilities such as Starlink provide growing economic and socioeconomic value to the world. These additional connections between people and states may even contribute to a decreased willingness to engage in conflict in space given the value especially to the global economy.[41] In the long run, focusing on space assets with economic value may be far cheaper than building and maintaining weapons that may never be used. Arguably, if a security dilemma is to be had, a commercial space race may be the preferable alternative to a traditional arms race.

So Much Winning

While both the United States and China recognize the value in fostering a commercial space industry, the United States may be better placed to win a battle between the markets. The United States' democratic and capitalist-based system has enacted legislation and regulations that support the rapid advancement of commercial space.[42] To date, China lacks such a framework, making it far more difficult for companies to know what they are allowed to do, how to go about doing it, and who is in charge. Further, Chinese SOEs (and even non-SOEs) must act in accordance with CCP desires, potentially limiting the possibility for true technological innovation. The relatively favorable economic and political systems will continue to give the United States an advantage.

Loss of Industry Partners

Despite the importance of government contracts to commercial space companies, the potential for conflict might make them less likely to offer services to the government. If companies believe their space systems may be subject to a variety of attacks, they may withdraw from that segment of the market altogether or increase prices to negate any cost savings. Given the United States' growing dependence on commercial space services, there is evidence officials are concerned about such a thing happening with leaders now considering ways to indemnify space companies in the case of conflict.[43]

41. Whitman Cobb, *Privatizing Peace*.

42. Wendy N. Whitman Cobb, "Commercialization and Space: Democracies Can Fly in Space," *Astropolitics* 19, no. 1–2 (2022).

43. Michael Marrow, "DOD Considering Indemnification for Commercial Space Vendors, Officials Say," Inside Defense, September 15, 2022, https://insidedefense.com/.

Deterrence

Finally, as Russia and China become increasingly adversarial, how commercial space fits into emerging concepts of deterrence, integrated or otherwise, must be considered. Proliferated constellations operated by private providers augment the resilience and redundancy of US satellite systems, theoretically increasing the costs of any attack and ideally discouraging potential adversaries from attacking. Yet because the primary feature of the commercial space industry is that many actors, individuals or states, have access to it, is it possible to use commercial space systems as a deterrent? While it would be hard to see China buying widespread access to something like Starlink, it is not impossible: in 2019, China bought time on US-made satellites via private equity groups.[44]

On a strategic level, it may be worth considering whether allowing China and other potential adversaries to buy American-based space services may be an advantage of sorts. Making China or Russia dependent on an American provider not only would provide some leverage and potentially control, but also perhaps more importantly would deter them from attacking such systems given their use of it. At the same time, as SpaceX's limiting of Starlink in Ukraine demonstrates, commercial companies may be more vulnerable to adversary coercion, thereby limiting the availability of commercial services in times of conflict. Therefore, analyses of and plans for deterrence and coercion must be extended to include these commercial actors as well.

Recommendations

There is clearly a global desire to continue providing space-based services, particularly since the global economy is largely dependent on them. Thus, any means of breaking the spiral will not be able to necessarily limit the presence, growth, or capabilities of space companies.

Because governments currently dominate the space market, the first measure might be to encourage the growth of space markets and the presence of customers other than government. This would give companies the ability to decline government contracts while still innovating, providing economic benefits, and making a product. At the same time, growing the market and encouraging greater interdependence between countries, companies, people, and space can further increase the costs of conflict in space, thereby discouraging states from engaging in such conflict.

Alternatively, states may look for ways to fully integrate commercial companies into the global system and give them an official seat at the table, so to speak. Although some companies and industries participate on the world stage as official observers, under the Outer Space Treaty, commercial companies are still responsible to the state in which they operate from. If companies were given legal standing in international organizations and legal regimes, however, several beneficial consequences for the CSSD may follow.

---

44. Brian Spegele and Kate O'Keeffe, "China Exploits Fleet of US Satellites to Strengthen Police and Military Power," *Wall Street Journal*, April 23, 2019, https://www.wsj.com/.

For one, commercial companies may work with like-minded states to negotiate rules of behavior for outer space, especially at a time when efforts in space diplomacy have turned from establishing binding instruments such as treaties and potential limits to technology to setting more flexible behavioral rules of the road and behavioral norms. While collaboration on rules of the road would be good on its own, the fact that commercial companies are now dominating operations in space means they would also be able to enforce them.

For example, bans on certain types of weapons—given that a sufficient definition of such weapons is agreed on—may be enforceable because companies would reject launch contracts from governments to put them in orbit. Weapons bans could be avoided were states to develop a nationally owned and operated space launch capability; however, such a capability would take several years and a significant investment of money, meaning states would remain reliant on commercial companies in the meantime. Similarly, commercial companies like SpaceX are actively establishing such rules when they choose to move—or not move—satellites. While companies may not be incentivized to turn down launch contracts today for reasons already discussed, giving them an independent power base and legal standing might provide the motivation.

Conclusion

These implications and recommendations reinforce the notion that the commercial space security dilemma is an arms race of a nature different from the classic security dilemma. Rather than a race that primarily involves military activity and government actors, it is one that prominently features nonstate actors with their own motivations and ambitions, operating in a domain with its own unique challenges. Further, it is a dilemma that necessarily entails economic activity, which in a globalized world has become increasingly important to national security.

If the commercial space security dilemma is to be resolved, it will require different types of actions and methods to build trust between the United States and China and to better integrate commercial actors into the international legal regime. Understanding the unique dynamics and implications of the CSSD will be even more important in the near-to-midterm, as plans to build outposts on the Moon and Mars will necessarily involve both state and commercial actors. A third player to this security dilemma, in the form of the collective of commercial actors themselves, may be added with such future ventures. It will likely be far easier to resolve the commercial space security dilemma on Earth before it is transferred to the stars. ***Æ***