

Vulnerability as a Launching State: Why the United States Should Adopt Explicit Indemnification Procedures in Response to the Growth of the Commercial Space Industry

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NOTES

VULNERABILITY AS A LAUNCHING STATE: WHY THE UNITED STATES SHOULD ADOPT EXPLICIT INDEMNIFICATION PROCEDURES IN RESPONSE TO THE GROWTH OF THE COMMERCIAL SPACE INDUSTRY

MOLLIE CARNEY[†]

INTRODUCTION

I believe that space travel will one day become as common as airline travel is today. I'm convinced, however, that the true future of space travel does not lie with government agencies . . . but real progress will come from private companies competing to provide the ultimate adventure ride¹

On July 11, 1979, in the desert of Australia, the sky was falling.² A seventy-seven-ton United States space station called Skylab—at the time, the largest object to ever be in orbit³—“decayed faster than expected” and fell from orbit.⁴ To mitigate anticipated destruction, NASA tried to orchestrate the station's reentry path so that Skylab would land in the Indian Ocean, but

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¹ BUZZ ALDRIN & KEN ABRAHAM, *MAGNIFICENT DESOLATION: THE LONG JOURNEY HOME FROM THE MOON* 582–83 (2009) (ebook).

² Richard D. Lyons, *Skylab Debris Hits Australian Desert; No Harm Reported*, *N.Y. TIMES* (July 12, 1979), <https://nyti.ms/1iiiOaK> [<https://perma.cc/W8EY-CV5Z>].

³ *Id.*; see also Rebecca J. Rosen, *The Strange Tale of the Skylab's Fall from Orbit*, *ATLANTIC* (Sept. 19, 2011), <https://www.theatlantic.com/technology/archive/2011/09/the-strange-tale-of-the-skylabs-fall-from-orbit/245332/> [<https://perma.cc/QQV9-982K>].

⁴ Elizabeth Howell, *Skylab: First U.S. Space Station*, *SPACE.COM* (July 11, 2018), <https://www.space.com/19607-skylab.html> [<https://perma.cc/N3KD-W4MK>].

the station reentered the atmosphere “several thousand miles farther down its orbital track than had been expected.”⁵ As a result, pieces of the fallen space station landed across western Australia rather than in the sea as planned.⁶

Luckily, Skylab’s descent caused no real damage,⁷ and therefore there were no legal ramifications.⁸ Because Western Australia is largely desert, there was not much risk of property damage.⁹ But, what if the pieces of Skylab had fallen, for example, in modern-day Mumbai—the most densely populated city on Earth?¹⁰ In this scenario, significant destruction would have likely resulted.

Had damage occurred, Australia would have been able to bring a claim against the United States of America under a treaty known as the Liability Convention,¹¹ regardless of whether the damage was caused by NASA or a United States private launch company.¹² If claims were brought against the United States for damage caused by a private company, the United States would be responsible for compensating the claimant State.¹³ In this scenario, it remains unclear whether the United States government could hold the private company responsible and whether the private company would have to reimburse the United States government.¹⁴

This Note argues that the current United States launch license requirements should be amended to include explicit indemnification procedures, should the United States be held liable for damages as a Launching State under the Liability Convention. Part I of this Note examines the evolution of the space industry from a field marked by Cold War tensions to one that is dominated by private industry, and the risks that are

⁵ See Lyons, *supra* note 2.

⁶ FRANCIS LYALL & PAUL B. LARSEN, *SPACE LAW: A TREATISE* 106–07 (2d ed. 2018).

⁷ *Id.*

⁸ *Id.*

⁹ Lyons, *supra* note 2.

¹⁰ Elzy Kolb, *75,000 People Per Square Mile? These are the Most Densely Populated Cities in the World*, USA TODAY (July 11, 2019), <https://www.usatoday.com/story/news/world/2019/07/11/the-50-most-densely-populated-cities-in-the-world/39664259/> [<https://perma.cc/7C4G-DB5U>].

¹¹ See Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter *Liability Convention*].

¹² *Id.* art. 1.

¹³ *Id.* art. 2–3.

¹⁴ See *infra* Part III.

associated with the rapid growth of the commercial space industry. Part II will explain the current legal regime by (1) setting a framework of liability generally, (2) examining the Liability Convention of 1972, and (3) examining the current United States regulations regarding launch licensing requirements. Part III of this Note will analyze the shortcomings of the current United States regulations, namely the lack of specific indemnification procedures. Lastly, Part IV will compare the regulations of the United States with those of other nations which have sophisticated commercial launch providers, namely Australia and France, to examine how explicit indemnification procedures may be implemented.

I. BACKGROUND

A. *The Evolution of Space Launches and the Role of the Private Industry*

On October 4, 1957, the USSR launched Sputnik-1 into the Earth's orbit.¹⁵ This launch marked the dawn of the space age¹⁶ and shocked American experts who grew concerned that the United States was falling behind in the race to develop new technology.¹⁷ In the wake of the Sputnik launch, President Eisenhower poured resources into the space program, and United States policymakers worked to accelerate the space program and weapons development.¹⁸ In December 1957, the first American artificial satellite, Vanguard, exploded on its launchpad.¹⁹ This failure was soon rectified when the Explorer launched in January

¹⁵ *A Timeline of the Exploration and Peaceful Use of Outer Space*, U.N. OFF. FOR OUTER SPACE AFF.'S, <https://www.unoosa.org/oosa/en/timeline/index.html> [<https://perma.cc/KQ5D-7XBN>] (last visited Apr. 10, 2022); see also *Sputnik and the Dawn of the Space Age: Chronology of Sputnik/Vanguard/Explorer Events 1957-58*, NASA HIST. DIV. [hereinafter *Sputnik and the Dawn of the Space Age*], <https://history.nasa.gov/sputnik-timeline.html> [<https://perma.cc/Z4Z8-UMEX>] (last visited Apr. 10, 2022).

¹⁶ See *Sputnik and the Dawn of the Space Age*, *supra* note 15.

¹⁷ *Sputnik, 1957*, OFF. OF THE HISTORIAN, FOREIGN SERV.'S INST., U.S. DEP'T OF STATE, <https://history.state.gov/milestones/1953-1960/sputnik> (last visited Apr. 10, 2022); see also R. Cargill Hall, *Civil-Military Relations in America's Early Space Program*, in *THE U.S. AIR FORCE IN SPACE 1945 TO THE TWENTY-FIRST CENTURY* 21, 27-28 (R. Cargill Hall & Jacob Neufeld eds., 1995).

¹⁸ *Sputnik, 1957*, *supra* note 17.

¹⁹ *Vanguard Rocket Test*, NASA, https://www.nasa.gov/multimedia/imagegallery/image_feature_926.html [<https://perma.cc/8TPD-QBCA>] (Aug. 7, 2017).

1958.²⁰ Over the next two decades, Cold War tensions between the United States and the USSR escalated and spilled over into space exploration; each nation sought to outdo the other in what became known as the “Space Race.”²¹ In December 1958, the United Nations established the ad-hoc Committee on the Peaceful Use of Outer Space to “dicuss[] the scientific and legal aspects of the exploration and use of outer space.”²² Ultimately, the Committee on the Peaceful Use of Outer Space gave rise to a series of multilateral treaties which govern space activities.²³

While the early days of American space activities were defined by military developments and Cold War tensions, the United States’ government-led space activities relied on private industry, namely for manufacturing purposes.²⁴ Beginning in 1963, private expendable launch vehicle (“ELV”) manufacturers produced vehicles for the government: Titan rockets were built by Martin Marietta; Atlas rockets by General Dynamics; Delta rockets by McDonnell Douglas; and Scout rockets by LTV Aerospace Corporation.²⁵ Sixteen years later, in 1979, the European Space Agency launched its first ELV, becoming the first entity to compete with the United States government in the global launch provider market.²⁶

In 1978, the United States began to phase out all but one of the ELVs in favor of the United States space shuttle, which would eventually take all United States government and commercial satellites into orbit.²⁷ NASA declared the shuttle

²⁰ *Explorer 1 Overview*, NASA, https://www.nasa.gov/mission_pages/explorer/explorer-overview.html [<https://perma.cc/7JFQ-TTNM>] (Aug. 3, 2017).

²¹ Maddie Davis, *The Space Race: Soviets and Americans Race to the Stars*, UNIV. OF VA., MILLER CTR., <https://millercenter.org/the-presidency/educational-resources/space-race> [<https://perma.cc/9EML-ETU4>] (last visited Apr. 10, 2022).

²² Ethel Baraona, *Space – New World Colony?*, ROCA GALLERY (Jan. 3, 2019), <http://www.rocagallery.com/space-new-world-colony> [<https://perma.cc/H2M9-9E5B>].

²³ *See Treaties*, U.N. OFF. FOR OUTER SPACE AFF.’S, <https://www.unoosa.org/oosa/en/aboutus/history/treaties.html> [<https://perma.cc/WM6K-2TQR>] (last visited Apr. 10, 2022); *infra* Part II.B.

²⁴ *Origins of the Commercial Space Industry*, FAA 1, 1 (Nov. 24, 2014), https://www.faa.gov/about/history/milestones/media/Commercial_Space_Industry.pdf.

²⁵ *Id.*; For much of this time, the U.S. government served as the sole commercial provider of space travel, as private companies and foreign governments had to contract with NASA to launch their communications satellites on ELVs. *Id.*

²⁶ *Id.*; see also John Krige, *The Decision Taken in the Early 1970s to Develop an Expendable European Heavy Satellite Launcher*, in 2 A HISTORY OF THE EUROPEAN SPACE AGENCY 1958–1987: THE STORY OF THE ESA, 1973 TO 1987 389, 389 (R.A. Harris ed., 2000).

²⁷ *Origins of the Commercial Space Industry*, *supra* note 24; see also Donald J. Kutyna, *Indispensable: Space Systems in the Persian Gulf War*, in THE U.S. AIR

operational in 1982 and the government stopped funding the production of ELVs in 1983.²⁸ However, the flight schedule of the shuttle “could not meet all of the [United States’] security, civil, and commercial launch requirements,”²⁹ leading some launch vehicle manufacturers to offer commercial launch services.³⁰ Though American private companies started to see successful test launches by 1982, the process of obtaining approval for such launches was time-consuming and cumbersome.³¹ As a result, policymakers eased the process with the goal of spurring growth in the commercial space industry throughout the 1980s.³² On August 15, 1986, over six months after the Challenger explosion, President Reagan announced that NASA would “no longer be in the business of launching private satellites,” and that private companies would “take over.”³³

In recent years, the commercial space industry has seen rapid expansion. In 2010, *The Space Report* showed that the global space economy grew almost 40% in five years.³⁴ Since then, the global space economy has continued to grow and, as of 2019, was reported to be \$423.8 billion.³⁵ Of this, space products and services—a key driver of commercial space revenue, which includes launches³⁶—were valued at \$217.72 billion in 2019, a 1.7% increase from 2018.³⁷ Space infrastructure and support industries—the other main sector of commercial space revenue—

FORCE IN SPACE 1945 TO THE TWENTY-FIRST CENTURY 103, 105 (R. Cargill Hall & Jacob Neufeld eds., 1995).

²⁸ *Origins of the Commercial Space Industry*, *supra* note 24.

²⁹ *Id.*

³⁰ *Id.*

³¹ *Id.*

³² *Id.* at 1–3.

³³ Ronald W. Reagan, President of the U.S., Statement on the Building of a Fourth Shuttle Orbiter and the Future of the Space Program (Aug. 15, 1986), in THE PUB. PAPERS OF PRESIDENT RONALD W. REAGAN 1111, <https://www.reaganlibrary.gov/archives/speech/statement-building-fourth-shuttle-orbiter-and-future-space-program> [<https://perma.cc/378E-Y8UY>].

³⁴ Space Found., *The Space Report Reveals Steady Space Growth*, 9 SPACE WATCH (2010), <https://www.spacefoundation.org/2010/05/02/the-space-report-reveals-steady-space-growth/> [<https://perma.cc/VAU2-3DXM>].

³⁵ *Global Space Economy Grows in 2019 to \$423.8 Billion*, *The Space Report 2020 Q2 Analysis Shows*, SPACE FOUND. (July 30, 2020) [hereinafter *Global Space Economy Grows in 2019 to \$423.8 Billion*], <https://www.spacefoundation.org/2020/07/30/global-space-economy-grows-in-2019-to-423-8-billion-the-space-report-2020-q2-analysis-shows/> [<https://perma.cc/J75F-A2NY>].

³⁶ *Id.*; *Commercial Space: Overview*, INT’L TRADE ADMIN., <https://www.trade.gov/commercial-space> [<https://perma.cc/7YX9-CA78>] (last visited Apr. 10, 2022).

³⁷ *Global Space Economy Grows in 2019 to \$423.8 Billion*, *supra* note 35.

totaled \$119.17 billion, a 16.1% increase from 2018.³⁸ In total, commercial space revenue increased by 6.3% from 2018, and in 2019 accounted for 79.49% of the global space economy.³⁹ Morgan Stanley estimated in 2020 that the global space industry could generate more than \$1 trillion in revenue by 2040, up from this year's \$350 billion—a 185.71% increase over the course of twenty years.⁴⁰ The space industry is also growing globally: already, close to fifty nations have government space budgets, nine of which are over \$1 billion, and nearly twenty of them under \$100 million but at least over \$20 million.⁴¹

B. Risk Associated with Developing Private Launch Programs

Society's reliance on satellites in an increasingly connected world creates enthusiasm for investment in the private launch industry and a desire to keep space accessible to private launch providers.⁴² This dependence will inevitably lead to rapid advancement of the private launch industry. As the industry develops, private launch providers must experiment to determine which technologies and techniques will be the future of the industry. Just as Cold War nations that sought to win the Space Race embraced risk and were often met with failure on their journey to orbit, private launch providers seeking profit and repute encounter risk and failure as they embark on that very same path.⁴³

Space Exploration Technologies ("SpaceX"), a company that designs, manufactures, and launches rockets, was founded in 2002 by Elon Musk and began grabbing headlines when it became the first private company to launch a payload into orbit and successfully return the payload unharmed in 2010.⁴⁴ The

³⁸ *Id.*

³⁹ *Id.*

⁴⁰ *Space: Investing in the Final Frontier*, MORGAN STANLEY (July 24, 2020), <https://www.morganstanley.com/ideas/investing-in-space#:~:text=Morgan%20Stanley%20estimates%20that%20the,from%20satellite%20broadband%20Internet%20access> [<https://perma.cc/7KBE-GHAQ>].

⁴¹ BRYCE SPACE AND TECH., GLOBAL SPACE INDUSTRY DYNAMICS 1 (2019), https://www.industry.gov.au/sites/default/files/2019-03/global_space_industry_dynamics_-_research_paper.pdf. The nine space actors with budgets that exceed \$1 billion are: the United States, China, Europe (collectively), Russia, India, Japan, France, Germany, and Italy. *Id.* at 3.

⁴² *Id.* at 5.

⁴³ *See supra* Part I.A.

⁴⁴ Jeffrey Kluger, *10 Things to Know About SpaceX*, TIME, <https://time.com/space-x-ten-things-to-know/> [<https://perma.cc/E4G9-H66J>] (last visited Apr. 10,

company is perhaps the most well-known private aerospace company and has contracts with NASA, the United States military, and private companies seeking to launch satellites.⁴⁵ SpaceX has launched most of its rockets from three locations in the continental United States.⁴⁶ The only foreign site, Omelek Island located in the northern Pacific Ocean, was used for SpaceX's earliest launch attempts from 2006 until 2009.⁴⁷ Since then, all missions have been conducted from two launchpads in Cape Canaveral, Florida, and from a third launchpad in California—the Space Launch Complex 4E at Vandenberg Air Force Base.⁴⁸ Between 2006 and 2019, SpaceX conducted 86 launches, five of which have failed.⁴⁹

Two minutes into a June 2015 flight, a SpaceX Falcon 9 rocket exploded, destroying the entire capsule, and with it, all the supplies destined for the International Space Station.⁵⁰ NASA lost \$118 million for the cargo on the launch,⁵¹ and SpaceX lost \$260 million.⁵² An additional \$200 million was lost in September 2016 when another SpaceX Falcon 9 rocket exploded

2022). A “payload” is what is being brought into space, which varies depending on the mission of the launch. Payloads can be fireworks, missiles, satellites, people, animals, or anything else launched into orbit. *Payload Systems*, NASA, <https://www.grc.nasa.gov/www/k-12/rocket/payload.html> [<https://perma.cc/2G4E-NR6V>] (May 13, 2021).

⁴⁵ Kluger, *supra* note 44; Clay Dillow, *SpaceX Poised to Win First U.S. Military Mission*, FORTUNE (Nov. 17, 2015), <https://fortune.com/2015/11/17/spacex-military-mission/> [<https://perma.cc/DP37-D7HB>]; Jeff Foust, *NASA Selects Boeing and SpaceX for Commercial Crew Contracts*, SPACE NEWS (Sept. 16, 2014), <https://spacenews.com/41891nasa-selects-boeing-and-spacex-for-commercial-crew-contracts/> [<https://perma.cc/L5MX-P7BC>].

⁴⁶ Júlia Ledur, *Falcon Flights*, REUTERS GRAPHICS (Dec. 5, 2019), <https://graphics.reuters.com/SPACE-EXPLORATION-SPACEX/010091Q82NF/index.html> [<https://perma.cc/UWR5-U5PK>].

⁴⁷ *Id.*

⁴⁸ *Id.*

⁴⁹ *Id.*

⁵⁰ Jessica Lovering et al., *Commercial Spaceflight*, BREAKTHROUGH INST. (Apr. 26, 2017), <https://thebreakthrough.org/issues/energy/commercial-spaceflight#Major%20Setbacks%20in%20Innovation> [<https://perma.cc/A3P4-WG96>].

⁵¹ NASA, NASA'S RESPONSE TO SPACEX'S JUNE 2015 LAUNCH FAILURE: IMPACTS ON COMMERCIAL RESUPPLY OF THE INTERNATIONAL SPACE STATION 1 (2016), <https://oig.nasa.gov/docs/IG-16-025.pdf>.

⁵² Rolfe Winkler & Andy Pasztor, *Exclusive Peek at SpaceX Data Shows Loss in 2015, Heavy Expectations for Nascent Internet Service*, WALL ST. J. (Jan. 13, 2017), <https://www.wsj.com/articles/exclusive-peek-at-spacex-data-shows-loss-in-2015-heavy-expectations-for-nascent-internet-service-1484316455#:~:text=The%20company%20lost%20%24260%20million,year%3B%20instead%20it%20launched%20six> [<https://perma.cc/M6U3-T9LZ>].

during a prelaunch test and destroyed a communications satellite payload.⁵³

Though SpaceX regularly dominates headlines, it is not the only United States commercial launch provider. As of October 2020, ten other companies have active launch licenses with the Federal Aviation Administration, including Orbital Sciences Corp., Rocket Lab Global, United Launch Alliance, Virgin Galactic, Virgin Orbit, Exos Aerospace, Astra Space, Inc., Lockheed Martin Commercial Launch Services, Blue Origin, and S7 Sea Launch Limited.⁵⁴ However, these companies engage in various types of activities. For example, both Virgin Origin and Virgin Galactic are a part of Virgin Group's commercial space portfolio, Galactic Ventures, but Virgin Origin performs small satellite launch services while Virgin Galactic is a "commercial spaceline" and focuses on making progress in human spaceflight.⁵⁵ Additionally, although Lockheed Martin Commercial Launch Services has two active launch licenses,⁵⁶ United Launch Alliance—the joint firm between Boeing and Lockheed Martin—took over providing launch services on behalf of Lockheed Martin in 2018.⁵⁷ The remaining eight companies offer launch services for payloads.⁵⁸ From January to October

⁵³ Lovering et al., *supra* note 50.

⁵⁴ *Commercial Space Data: Licenses*, FAA, https://www.faa.gov/data_research/commercial_space_data/licenses/ [<https://perma.cc/2FGD-8QPX>] (Aug. 20, 2021, 9:40 AM).

⁵⁵ *Virgin Galactic Announces New Commercial Space Company Virgin Orbit Featuring LauncherOne Small Satellite Launch Service*, VIRGIN ORBIT (Mar. 26, 2017), <https://virginorbit.com/the-latest/virgin-galactic-announces-new-commercial-space-company-virgin-orbit-featuring-launcherone-small-satellite-launch-service/> [<https://perma.cc/DW74-6G7J>].

⁵⁶ One of these licenses is effective from December 14, 2016, until December 13, 2021, and the other from December 20, 2016, until December 19, 2021. *Commercial Space Data: Licenses*, *supra* note 54.

⁵⁷ David Todd, *Lockheed Martin Commercial Launch Services Will Be No More as ULA Takes Over Role*, SERADATA (Jan. 25, 2018), <https://www.seradata.com/lockheed-martin-commercial-launch-services-will-be-no-more-as-ula-takes-over-role/> [<https://perma.cc/LX37-5YCX>].

⁵⁸ *Services*, ASTRA, <https://astra.com/services/> [<https://perma.cc/W56Q-VJY2>] (last visited Apr. 10, 2022); *Rocket Lab*, ROCKET LAB USA, <https://www.rocketlabusa.com/> [<https://perma.cc/M7SP-CZLX>] (last visited Apr. 10, 2022); *Launch Services*, UNITED LAUNCH ALL., <https://www.ulalaunch.com/launch-services> [<https://perma.cc/842F-62RS>] (last visited Apr. 10, 2022); *Who We Are*, EXOS AEROSPACE, <https://exosaero.com/who-we-are/> [<https://perma.cc/W5NH-CZBH>] (last visited Apr. 10, 2022); VIRGIN ORBIT, <https://virginorbit.com/> [<https://perma.cc/NQV2-DHZ6>] (last visited Apr. 10, 2022); *Fly a Payload on New Glenn*, BLUE ORIGIN, <https://www.blueorigin.com/new-glenn/fly-payload-new-glenn> [<https://perma.cc/LW9Q-5KSA>] (last visited Apr. 10, 2022); *Sea Launch*, S7 SPACE,

2020, twenty-nine launches took place in the United States, three of which were considered failures.⁵⁹

On May 25, 2020, Virgin Orbit conducted its first test launch of LauncherOne.⁶⁰ The mission was terminated shortly after release from its aircraft due to a premature shutdown of the first stage's engine to break in a propellant feed line—a cause Virgin Orbit officials called an “anomaly.”⁶¹ Only a mass simulator was on board LauncherOne, a common practice for the first launch of a rocket.⁶²

On July 4, 2020, Rocket Lab launched its Electron rocket from the Mahia Peninsula in New Zealand.⁶³ A detached electrical connector caused mission failure, which resulted in the destruction of the launch vehicle and seven payloads onboard.⁶⁴ Until this failure, Electron's record consisted of 53 successful launches of customer payloads into orbit.⁶⁵ In a conference call with reporters following the failure, founder and CEO of Rocket Lab Peter Beck noted, “This is the launch industry, and unfortunately these things do happen.”⁶⁶

<https://s7space.ru/en/> [<https://perma.cc/G2LU-3AJY>] (last visited Apr. 10, 2022); *Smallsat Rideshare Program*, SPACE X, <https://www.spacex.com/rideshare/> [<https://perma.cc/72LY-Y8X4>] (last visited Apr. 10, 2022).

⁵⁹ *Commercial Space Data: Licensed Launches*, FAA, https://www.faa.gov/data_research/commercial_space_data/launches/?type=Licensed [<https://perma.cc/GR78-5JVY>] (Feb. 18, 2020, 10:21 AM); *see infra* Part I.B.

⁶⁰ Thomas Burghardt, *Virgin Orbit's First Orbital Launch Attempt Terminated Shortly After Release*, NASASPACEFLIGHT.COM (May 25, 2020), <https://www.nasa.spaceflight.com/2020/05/virgin-orbit-first-orbital-launch-launcherone/> [<https://perma.cc/35CV-JP74>].

⁶¹ Stephen Clark, *Virgin Orbit Traces Cause of LauncherOne Engine Failure to Propellant Line*, SPACEFLIGHT NOW (July 25, 2020), <https://spaceflightnow.com/2020/07/25/virgin-orbit-traces-cause-of-launcherone-test-flight-mishap-to-propellant-line/#:~:text=Virgin%20Orbit's%20first%20orbital%20launch,in%20a%20propellant%20feed%20line> [<https://perma.cc/7RCS-BUUH>]; Jeff Foust, *Virgin Orbit First Launch Attempt Fails*, SPACE NEWS (May 25, 2020), <https://spacenews.com/virgin-orbit-first-launch-attempt-fails/> [<https://perma.cc/6PML-2ZYT>].

⁶² Burghardt, *supra* note 60.

⁶³ *Commercial Space Data: Licensed Launches*, *supra* note 59.

⁶⁴ Darrell Etherington, *Rocket Lab Launch Fails During Rocket's Second-Stage Burn, Causing a Loss of Vehicle and Payloads*, TECH CRUNCH (July 4, 2020, 6:50 PM), <https://techcrunch.com/2020/07/04/rocket-lab-launch-fails-during-rockets-second-stage-burn-causing-a-loss-of-vehicle-and-payloads/> [<https://perma.cc/3JF9-VYU4>].

⁶⁵ Stephen Clark, *Rocket Lab Identifies Faulty Electrical Connector as Cause of Launch Failure*, SPACEFLIGHT NOW (July 31, 2020), <https://spaceflightnow.com/2020/07/31/rocket-lab-identifies-faulty-electrical-connector-as-cause-of-launch-failure/> [<https://perma.cc/N7CP-7HGU>].

⁶⁶ *Id.*

On September 12, Astra Space, Inc. launched Astra Rocket-3.1.⁶⁷ The flight, however, terminated about 30 seconds after launch due to oscillations that pushed the rocket off course.⁶⁸ Even so, Astra said it was a “beautiful launch” that provided “valuable experience, plus even more valuable flight data,” and noted that it expects it to take three flights before it successfully reaches orbit.⁶⁹ Astra also specified that it plans to “learn fast through iterative development.”⁷⁰

These recent failures indicate that the industry gives newer private launch providers “more leeway when an accident does occur” because these companies consider failure as necessary to learning and ultimately achieving their goals.⁷¹ For example, less than two months after Rocket Lab’s Electron was destroyed, Rocket Lab successfully launched Electron Photon-LEO, which brought a small satellite into orbit and marked Rocket Lab’s fourteenth successful launch.⁷² Indeed, the July 2020 failure was not considered a major setback but part of the iterative process. Additionally, Astra’s remarks that the September 12 failure was “beautiful” is more than a search for silver linings. Astra’s primary objective for that launch was to achieve “nominal first stage burn;” officials noted that the company aimed to learn enough from the Rocket 3.1 launch for it to successfully achieve orbit within three flights.⁷³ Astra further reported, “No matter what happens with Rocket 3.1, we’ve ensured that we are set up to learn, improve, and return to the launch pad with a more capable vehicle as quickly as possible.”⁷⁴ Commercial launch

⁶⁷ *Commercial Space Data: Licensed Launches*, *supra* note 59.

⁶⁸ Chris C. Kemp & Adam London, *We Have Lift Off*, ASTRA (Sept. 12, 2020), <https://astra.com/blog/we-have-lift-off/> [<https://perma.cc/GP4H-DM7U>]; Jeff Foust, *Astra Launch Terminated During First Stage Burn*, SPACE NEWS (Sept. 11, 2020), <https://spacenews.com/astra-launch-terminated-during-first-stage-burn/> [<https://perma.cc/GYE5-SHRH>].

⁶⁹ Kemp & London, *supra* note 68.

⁷⁰ *Id.*

⁷¹ Miriam Kramer, *Why the Private Space Industry Embraces Risk*, AXIOS (Sept. 1, 2020), <https://www.axios.com/private-space-industry-risk-9a595298-d2f3-44a5-bcd3-cf7e8d20964a.html> [<https://perma.cc/L6BK-U53K>].

⁷² Loren Grush, *Rocket Lab Returns to Flight Less than Two Months After Launch Failure*, VERGE (Aug. 31, 2020, 9:17 AM), <https://www.theverge.com/2020/8/31/21408378/rocket-lab-electron-return-to-flight-capella-space-sequoia-satellite?stream=science> [<https://perma.cc/73JC-Y9P4>].

⁷³ Chris C. Kemp & Adam London, *Rocket 3.1 and Astra’s Path to Orbit*, ASTRA (Aug. 2, 2020), <https://astra.com/blog/rocket-3-1/> [<https://perma.cc/L45F-YMFF>].

⁷⁴ *Id.*

providers are capable of embracing risk and are prepared to fail on the road to success.⁷⁵

While it is crucial that private launch providers are willing to take the sort of risks that advance the industry, it is also important that companies and policymakers remain cognizant of both the degree and nature of risks associated with such progress. In the above examples, the financial ramifications of the risk embraced and failures experienced impacted the launch providers themselves—especially in the instances of test launches.⁷⁶ The financial repercussions have increased significance, however, when more experienced companies such as Rocket Lab or SpaceX fail because their flights often carry payloads.⁷⁷ Therefore, financial loss is experienced not only by the launch providers, but also by the owners of the payloads.⁷⁸ As more private launch providers become stable and able to perform missions rather than simply test launches, the ramifications of failure gain significance even though the perceived chances of failure might lessen. In addition to remaining aware of the risk that is passed to their clients when launches occur, private launch providers must consider the risk failure poses to the public should property damage or casualties result from a disastrous launch. Because of the inherent riskiness of launches, regulations need to balance protection of the public with industry growth in a way that encourages private companies to pursue advancement responsibly.

II. THE LEGAL REGIME

A. *General Liability*

Risks in transporting goods from point A to point B, like from a launch site to the International Space Station, are not unique to the commercial space industry; there are risks, and therefore liability allocations, associated with any commercial transportation. For example, barring waivers of liability, any customer can sue FedEx for damages if their package is destroyed while a delivery truck brings it across town.⁷⁹ When a

⁷⁵ Kramer, *supra* note 71.

⁷⁶ See Burghardt, *supra* note 60.

⁷⁷ See Etherington, *supra* note 64; see also Lovering et al., *supra* note 50.

⁷⁸ See Etherington, *supra* note 64; see also Lovering et al., *supra* note 50.

⁷⁹ *Guide to Loss and Damage Claims*, FEDEX, 1, 2–4, http://images.fedex.com/us/freight/pdf/Guide_to_Loss_and_Damage_Claims.pdf (last visited Apr. 10, 2022).

party entrusts cargo to a delivery service and the cargo is destroyed, the party may hold the delivery service liable.⁸⁰ This holds true across methods of delivery.⁸¹ If the same person instead shipped a package across the country and it was destroyed on FedEx's delivery plane, she could still recover damages from FedEx.⁸² If, in addition to the package sent, all of the plane's cargo was destroyed because the plane, manufactured by Boeing and operated by FedEx, crashed due to engine failure, everyone who had cargo on the plane could sue the aircraft manufacturer and operator—here Boeing and FedEx—for damages.⁸³

This would also be true if the French government had cargo on the flight that was destroyed; it too could sue the aircraft operator and manufacturer for damages.⁸⁴ Such a suit would be in accordance not only with the policies of the shipping company, but also with international law.⁸⁵ The same principles apply when cargo is destroyed on an international flight.⁸⁶ Under international agreements, a carrier is “liable for damage sustained in the event of the destruction or loss of, or of damage to” cargo if the damage was caused during air carriage.⁸⁷

The scenario becomes more complicated when the cargo in question is a communications satellite, the destination is the International Space Station, and the mode of transportation is a rocket. Unlike delivery services that utilize planes and trucks, the manufacturer of a rocket is often also the party providing commercial launch services.⁸⁸ Therefore, fewer parties may be sued in the event of damage. If a private company, such as

⁸⁰ *Id.*

⁸¹ *Id.*

⁸² *Id.*

⁸³ *Id.*

⁸⁴ *Id.*

⁸⁵ *Id.*; see also Convention for the Unification of Certain Rules Relating to International Transportation by Air art. 18, Oct. 12, 1929, 49 Stat. 3000, T.S. No. 876, 137 L.N.T.S. 11 [hereinafter Warsaw Convention].

⁸⁶ *Id.*; see also Convention for the Unification of Certain Rules for International Carriage by Air art. 18, May 28, 1999, S. Treaty Doc. No. 106-45, 2242 U.N.T.S. 350 [hereinafter Montreal Convention].

⁸⁷ Warsaw Convention, *supra* note 85, art. 18; Montreal Convention, *supra* note 86, art. 18.

⁸⁸ For example, United Launch Alliance is a joint venture between Lockheed Martin and Boeing. These companies manufacture the rockets that United Launch Alliance provides launch services for. *United Launch Alliance*, BOEING, <https://www.boeing.com/space/united-launch-alliance/> [https://perma.cc/7KUK-ABZB] (last visited Apr. 10, 2022).

Facebook, sends a communications satellite to space on a rocket and the cargo is destroyed, then Facebook could proceed just as it would if its cargo had been destroyed on a plane or a truck: Facebook could sue the launch provider regardless of where the launch occurred so long as the laws of that country allowed such action.⁸⁹ Similarly, if the United States government contracted with a United States based commercial launch provider to send cargo to space and the cargo was destroyed, the government could proceed by suing the launch provider.⁹⁰ However, if the destroyed cargo belonged to a foreign government, the foreign government could either take action against the launch provider *or* against the United States as a launching State under the Liability Convention of 1972.⁹¹

B. *International Law*

The global space industry has been governed by international agreements since 1967.⁹² The Outer Space Treaty of 1967 established the freedom of exploration and use of outer space for the benefit of all countries, and prohibited appropriation of outer space, including the moon and other celestial bodies, and the deployment of any weapons of mass destruction into outer space.⁹³ This was later supplemented by other international agreements,⁹⁴ including (1) the Rescue Agreement of 1968, which requires States to assist any astronaut in case of an accident, distress, emergency, or unintended landing;⁹⁵ (2) the Liability Convention of 1972, which establishes the standards of liability for damage caused by space objects;⁹⁶ (3) the Registration Convention of 1975, which requires States to register all objects launched into outer space with the United

⁸⁹ In reality, this would likely be handled by insurance agencies that would subrogate losses and deal directly with each other. Bethan Moorcraft, *Satellite Insurance – A Brief Introductory Guide*, INS. BUS. MAG. (Aug. 5, 2019), <https://www.insurancebusinessmag.com/us/guides/satellite-insurance—a-brief-introductory-guide-174465.aspx> [https://perma.cc/U4W4-WF5C].

⁹⁰ *Id.*

⁹¹ Liability Convention, *supra* note 11, art. XI.

⁹² *History: Treaties*, *supra* note 23.

⁹³ Rachel Mitchell, Note, *Into the Final Frontier: The Expanse of Space Commercialization*, 83 MO. L. REV. 429, 431–32 (2018).

⁹⁴ *Id.*

⁹⁵ Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119.

⁹⁶ Liability Convention, *supra* note 11.

Nations;⁹⁷ and (4) the Moon Agreement of 1979, which explains how the Outer Space Treaty applies to the Moon and other celestial bodies.⁹⁸

The Liability Convention of 1972 governs the assignment of liability between States in the event of damage during activity in outer space or during launch or reentry.⁹⁹ Article I establishes a list of key definitions. Under the treaty, "damage" means "loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations."¹⁰⁰ "[L]aunching State" constitutes either a "State which launches or procures the launching of a space object" or a "State from whose territory or facility a space object is launched."¹⁰¹ Further, the term "launch[]" includes attempted launches.¹⁰² This means that the United States, for example, is the launching State for any launches occurring on United States soil, regardless of what party commissions the launch or where that party is from.

Articles II–VII of the Liability Convention outline the scope of liability for relevant damage. Under Article II, a launching State is absolutely liable for compensation to claimant States for damage caused by its space object to Earth's surface or to an aircraft in flight.¹⁰³ Article III establishes that if damage is caused to a space object or its contents by a space object of another launching State, then the latter can be held liable if it is at fault.¹⁰⁴ Neither article imposes a limitation on liability. In the event that a launching State is subject to absolute liability,¹⁰⁵ "exoneration . . . shall be granted to the extent that . . . the damage has resulted either wholly or partially from gross negligence or from an act or omission done with intent to cause damage on the part of a claimant State or of natural or juridical persons it represents."¹⁰⁶ This exoneration does not apply when

⁹⁷ Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15.

⁹⁸ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, 18 I.L.M. 1434, 1362 U.N.T.S. 3.

⁹⁹ Liability Convention, *supra* note 11, arts. II–III.

¹⁰⁰ *Id.* art. I(a).

¹⁰¹ *Id.* art. I(c).

¹⁰² *Id.* art. I(b).

¹⁰³ *Id.* art. II.

¹⁰⁴ *Id.* art. III.

¹⁰⁵ A launching State can be held absolutely liable under Articles II, IV and V. *Id.* art. III–V.

¹⁰⁶ *Id.* art. VI.

damage is caused by the launching State's engagement in activities that are not in conformity with international law.¹⁰⁷

Furthermore, Article VII precludes the application of the Liability Convention when a launching State's space object damages its own nationals or foreign nationals who are participating in the operation of that space object.¹⁰⁸ Such participation begins at the time of the launching of the space object "or at any stage thereafter until its descent."¹⁰⁹ It also includes any time in which a foreign national is "in the immediate vicinity of a planned launching or recovery area as the result of an invitation by [the] launching State."¹¹⁰

A claimant State is not required to exhaust available local remedies prior to presenting a launching State with a claim for compensation under the Liability Convention, though it cannot present a claim under the Convention for the same damage that "is being pursued in the courts or administrative tribunals or agencies of a launching State or under another international agreement which is binding on the States concerned."¹¹¹ A claimant State, or any natural or juridical persons it represents, may pursue local remedies and subsequently present a claim for the same damage under the Liability Convention once these remedies have been exhausted. Additionally, a claimant State may pursue local remedies for compensation for hypothetical damage A, while presenting a claim under the Liability Convention for compensation for hypothetical damage B.

The Liability Convention has only been used to present claims once, and in that instance, a settlement was reached outside of the procedures outlined within the Liability Convention.¹¹² On January 24, 1978, a Soviet radar surveillance satellite, Cosmos 954, fell from orbit and crashed into the northwestern territories of Canada.¹¹³ The satellite fragmented into approximately 4,000 pieces and scattered over a largely

¹⁰⁷ *Id.*

¹⁰⁸ *Id.* art. VII.

¹⁰⁹ *Id.*

¹¹⁰ *Id.*

¹¹¹ *Id.* art. XI.

¹¹² Protocol on Settlement of Canada's Claim for Damages Caused by "Cosmos 954", Can.-U.S.S.R., Apr. 2, 1981, 20 I.L.M. 689 [hereinafter Protocol Between Canada and the USSR].

¹¹³ LYALL & LARSEN, *supra* note 6, at 107.

uninhabited area the size of Austria.¹¹⁴ Because several thousand pieces contained “cores [composed] of nearly pure uranium-235,” Canada claimed that these pieces had “lethal level[s] of radioactivity.”¹¹⁵ Canada brought suit against the Union of Soviet Socialist Republics under Article II of the Liability Convention and “general principles of international law,” arguing that “[t]he intrusion of the Cosmos 954 satellite into Canada’s air space and the deposit on Canadian territory of hazardous radioactive debris from the satellite constitute[d] a violation of Canada’s sovereignty.”¹¹⁶ In its claim, Canada identified the USSR as the launching State of Cosmos 954 and asserted that the USSR was therefore absolutely liable for \$6,041,174.70 (Canadian), though the total cost of the cleanup was estimated to be \$14 million (Canadian).¹¹⁷ In settlement proceedings, the Soviet Union ultimately agreed to pay \$3 million (Canadian).¹¹⁸

C. Domestic Law

In March 2012, the Committee on the Peaceful Use of Outer Space (“COPUOS”) issued recommendations on national legislation relevant to the peaceful exploration and use of outer space.¹¹⁹ In doing so, COPUOS observed “that, in view of the increasing participation of private actors in space activities, appropriate action at the national level is needed, in particular with respect to the authorization and supervision of non-governmental space activities.”¹²⁰ COPUOS suggested that the State recall its role as a launching State under United Nations treaties when enacting regulations, and further recommended

¹¹⁴ Andrew Brearley, *Reflections upon the Notion of Liability: The Instances of Kosmos 954 and Space Debris*, 34 J. SPACE L. 291, 297 (2008); Kathleen Teltsch, *Canada to Continue Search for Fragments of Satellite that Fell*, N.Y. TIMES (July 6, 1978), <https://www.nytimes.com/1978/07/06/archives/canada-to-continue-search-for-fragments-of-satellite-that-fell.html> [<https://perma.cc/RJV2-HWUW>].

¹¹⁵ Brearley, *supra* note 114, at 297–98.

¹¹⁶ *Claim Against the Union of Soviet Socialist Republics for Damage Caused by Soviet Cosmos 954*, 18 INT’L LEGAL MATERIALS 899, 905, 907 (1979).

¹¹⁷ *Id.* at 905, 908 (referencing Liability Convention, *supra* note 11, art. II); Andrew Cohen, *Canada Settles with Russia for Satellite Crash*, UPI (Apr. 2, 1981), <https://www.upi.com/Archives/1981/04/02/Canada-settles-with-Russia-for-satellite-crash/7336355035600/> [<https://perma.cc/XGZ3-VPVC>].

¹¹⁸ Protocol Between Canada and the USSR, *supra* note 112; Brearley, *supra* note 114, at 310.

¹¹⁹ Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifty-First Session, U.N. Doc. A/AC.105/C.2/2012/Leg/L.1 (2012).

¹²⁰ *Id.* at 3.

that “[s]pace activities should require authorization by a competent national authority” and “[t]he conditions for authorization should be consistent with the international obligations and commitments of States.”¹²¹ Forty states have enacted laws that establish space agencies or in some way regulate space activity.¹²² Generally, these states require either a license or a permit to conduct space activities “within its territory or by its residents, citizens or corporations anywhere in the world.”¹²³

In 1984, the United States passed the Commercial Space Launch Act (“CSLA”),¹²⁴ which has since been adopted in Chapter 509 of the United States Code.¹²⁵ The CSLA was enacted “to promote economic growth and entrepreneurial activity through [the] use of the space environment for peaceful purposes” and “to encourage the United States private sector to provide launch vehicles, reentry vehicles, and associated services.”¹²⁶ It further provides that “the Secretary of Transportation is to oversee and coordinate the conduct of commercial launch and reentry operations, issue permits and commercial licenses . . . authorizing those operations, and protect the public health and safety, safety of property, and national security and foreign policy interests of the United States.”¹²⁷

Under the CSLA, an issued or transferred license or permit is required for any person to launch a launch vehicle, reenter a reentry vehicle, or operate a launch or reentry site within the United States.¹²⁸ Additionally, an issued or transferred license or permit is required for any citizen to conduct the same activities outside of the United States.¹²⁹ “[P]erson” is defined as “an individual and an entity organized or existing under the laws of a

¹²¹ *Id.* at 4.

¹²² Jeanne Suchodolski, *An Overview and Comparison of Aviation and Space Insurance*, 14 J. BUS. & TECH. L. 469, 487 (2019).

¹²³ Paul Stephen Dempsey, *National Laws Governing Commercial Space Activities: Legislation, Regulation, & Enforcement*, 36 NW. J. INT’L L. & BUS. 1, 19 (2016). These requirements are consistent with the definition of “launching State” in the Liability Convention. *See* Liability Convention, *supra* note 11, art. I.

¹²⁴ Commercial Space Launch Act, Pub. L. No. 98-575, 98 Stat. 3055 (1984).

¹²⁵ Commercial Space Launch Activities, 51 U.S.C. §§ 50901–23 (2020).

¹²⁶ 51 U.S.C. § 50901(b).

¹²⁷ *Id.*

¹²⁸ 51 U.S.C. § 50904(a).

¹²⁹ *Id.* Some exceptions apply where the United States has agreed with a foreign country that the foreign country has jurisdiction. *Id.*

State or country,” meaning that these requirements apply to private companies.¹³⁰

To obtain a launch or reentry license, an individual or entity must meet certain liability insurance or financial responsibility requirements.¹³¹ The licensee or transferee must be able to compensate, either through insurance or financial responsibility, for the maximum probable loss from claims by “a third party for death, bodily injury, or property damage or loss resulting from an activity carried out under the license” and from claims by “the United States Government . . . for damage or loss to Government property resulting from an activity carried out under the license.”¹³² “Loss” is not defined by this act. Policies for third-party claims must protect the licensee, its customer, the United States, United States agencies, government personnel, and any contractors and subcontractors—and the employees of each—involved in a licensed activity from “their respective potential liabilities against covered claims.”¹³³ Policies for claims brought by the United States government must also protect against claims brought by American agencies or any government contractors or subcontractors, and must protect the same parties for any licensed activity.¹³⁴

The exact maximum probable loss the licensee or transferee must be able to compensate for is determined on a case-by-case basis;¹³⁵ however, the amount may not exceed \$500,000,000 for claims brought by third parties, or \$100,000,000 for claims brought by the United States government.¹³⁶ These statutory caps have been in place since the passage of the Commercial Space Launch Act Amendments of 1988.¹³⁷ Though the tier system of liability was initially scheduled to expire five years after the passage of the Commercial Space Launch Act Amendments of 1988, these provisions have been extended several times and are now in place until September 30, 2025.¹³⁸

¹³⁰ 51 U.S.C. § 50902(12).

¹³¹ 51 U.S.C. § 50914(a).

¹³² *Id.*

¹³³ 14 C.F.R. § 440.9 (2005).

¹³⁴ *Id.*

¹³⁵ 51 U.S.C. § 50914.

¹³⁶ *Id.*; Both of these statutory caps are limited, in the alternative, to the “maximum liability insurance available on the world market at reasonable cost.” *Id.*

¹³⁷ Commercial Space Launch Act Amendments of 1988, Pub. L. No. 100-657, 102 Stat. 3900.

¹³⁸ *See id.*; 51 U.S.C. § 50915.

In the event that a successful third-party claim surpasses the required insurance or financial responsibility of a licensee or transferee, the United States government will pay exceeding damages up to \$3.1 billion.¹³⁹ This amount was limited to \$1.5 billion at the time of the passage of the Commercial Space Launch Act Amendments of 1988.¹⁴⁰ However, unlike the liability insurance or financial responsibility limitations, this sum is statutorily adjusted for inflation.¹⁴¹ Should a successful claim exceed the total required liability insurance or financial responsibility in addition to the government-provided \$3.1 billion, the licensee or transferee will be responsible for excess damages.¹⁴²

The Federal Aviation Administration (“FAA”) determines the maximum probable loss that must be covered, which is “the greatest dollar amount of loss for bodily injury or property damage that is reasonably expected to result from a launch or reentry,”¹⁴³ “based on an analysis and assessment of the maximum monetary losses likely to be incurred . . . in the event of a mishap.”¹⁴⁴ The FAA uses a risk profile method to examine thousands of discrete accident scenarios that can occur as a result of a launch or reentry and to determine the expected casualties and expected property damage.¹⁴⁵ Though expected property damage is measured in thousands of dollars, expected casualties are measured in number of casualties, and therefore the FAA multiplies this number by the cost of casualty—

¹³⁹ 51 U.S.C. § 50915; U.S. INFLATION CALCULATOR, <https://www.usinflationcalculator.com/> [<https://perma.cc/S4KN-K8FZ>] (last visited Sept. 2, 2022).

¹⁴⁰ 51 U.S.C. § 50915.

¹⁴¹ *Id.*

¹⁴² *Necessary Updates to the Commercial Space Launch Act: Hearing Before the Subcomm. on Space of H. Comm. on Sci., Space, & Tech.*, 113th Cong. 32 (2014) (statement of Alicia Puente Cackley, Director, Financial Markets and Community Investment)

¹⁴³ FED. AVIATION ADMIN., FAA’S DEVELOPMENT OF AN UPDATED MAXIMUM PROBABLE LOSS METHOD 4 (2016).

¹⁴⁴ *Expendable Launch Vehicle Financial Responsibility Determination*, FAA (Jan. 4, 2017, 5:06 PM), https://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_reentry/expendable/financial/#:-:text=The%20MPL%20determination%20is%20based,the%20event%20of%20a%20mishap [https://web.archive.org/web/20210320104400/https://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_reentry/expendable/financial/]; 14 C.F.R. § 440.7 (2005).

¹⁴⁵ FAA’S DEVELOPMENT OF AN UPDATED MAXIMUM PROBABLE LOSS METHOD FAA, *supra* note 143, at 6–7. “[C]asualties’ include both fatalities and serious injuries.” *Id.* at 4.

currently valued at \$3 million—to determine the maximum probable loss.¹⁴⁶

III. THE MISSING PIECE: INDEMNIFICATION PROCEDURES

A treaty that is made under the authority of the United States is given the same weight as laws passed by Congress—both are considered the supreme law of the land.¹⁴⁷ Accordingly, the Secretary of Transportation must carry out Chapter 509 of Title 51 of the United States Code consistent with any “obligation the United States Government assumes in a treaty, convention, or agreement in force between the Government and the government of a foreign country.”¹⁴⁸ Additionally, Chapter 509 of Title 51 of the United States Code expressly finds that the United States should regulate launches in a way that ensures compliance with its international obligations.¹⁴⁹ Therefore, the United States’ obligations as a launching State under the Liability Convention must be considered when examining commercial space activity regulations set by the United States government. This includes launch license requirements, though the regulations never mention the Liability Convention or any other treaty.

The current United States regulations do not define the term “loss.”¹⁵⁰ This absence presents potential gaps in understanding what is encompassed in launch license requirements, given that the licensees are required to obtain insurance that would compensate for claims brought by the United States Government or third parties for loss resulting from an activity carried out under the license.¹⁵¹ However, the history of the Commercial Space Launch Act provides some guidance.

The original version of the CSLA, passed in 1984, stated that a licensee must have “liability insurance at least in such amount as is considered by the Secretary to be necessary for such launch or operation, considering the international obligations of the United States.”¹⁵² Because the statute mentions no

¹⁴⁶ *Id.* at 5.

¹⁴⁷ U.S. CONST. art. VI.

¹⁴⁸ 51 U.S.C. § 50919.

¹⁴⁹ 51 U.S.C. § 50901.

¹⁵⁰ *See* 51 U.S.C. § 50902.

¹⁵¹ 51 U.S.C. § 50914.

¹⁵² Commercial Space Launch Act, Pub. L. No. 98-575, § 16, 98 Stat. 3055, 3061 (1984).

considerations other than the United States' international obligations, such as those under the Liability Convention, it is clear that Congress included liability insurance requirements to protect itself as a launching State against claims from other nations.¹⁵³ Additionally, the 1988 amendments to the CSLA, which introduced the current risk-sharing regime, were implemented to help private launch providers in the United States remain competitive on a global scale.¹⁵⁴ The amendments' supporters argued that it was in the best interest of the United States to introduce these policies because the United States would remain protected regardless of whether liability caps and risk-sharing procedures were implemented.¹⁵⁵

These policies were implemented *while* considering the international obligations of the United States, not *in spite* of these obligations.¹⁵⁶ The liability caps simultaneously reflected a desire to protect both the government and private launch providers from limitless liability and demonstrated commitment to holding companies accountable for launch activities, thus ensuring that companies will pursue advancement in a responsible way without stifling growth of the industry.¹⁵⁷ Accordingly, when licensees are required to obtain insurance to compensate for claims brought by "the United States Government . . . for damage or loss to Government property resulting from an activity carried out under the license," the term "loss" can include financial loss suffered by the United States Government as a result of successful claims brought against the United States, as a launching State, by another country under the Liability Convention.¹⁵⁸

It is possible that the United States never brings a claim against a private launch provider for losses suffered as a result of Liability Convention claims; the Liability Convention claims would be considered third-party claims, and launch insurance

¹⁵³ *Id.*

¹⁵⁴ See 134 CONG. REC. 31127–32 (1988); see also Kevin M. Costello, Note, *The Commercial Space Launch Act Amendments of 1988 and Launch Industry Insurance Reform*, 14 SUFFOLK TRANSNAT'L L.J. 492, 500 (1991).

¹⁵⁵ See 134 CONG. REC. 31127–32 (1988).

¹⁵⁶ *Id.*

¹⁵⁷ *Id.*

¹⁵⁸ 51 U.S.C. § 50914; Commercial Space Launch Act, Pub. L. No. 98-575, § 16, 98 Stat. 3055, 3061 (1984).

policies for third-party claims must protect the United States.¹⁵⁹ Under the CSLA, a third party means a person—an individual or an entity organized or existing under the laws of a State or country—other than the United States Government or its contractors or subcontractors; a licensee or transferee; the licensee's or transferee's contractors, subcontractors, or customers; the customer's contractors or subcontractors; or crew, government astronauts, or space flight participants.¹⁶⁰ Therefore, a claimant State could be considered a third party bringing a claim against a party protected by launch insurance.

However, because the current regulations make no mention of the Liability Convention or any other international obligations, there is no established process the United States Government would use if it were found liable for compensatory damages under the Liability Convention due to a private company's launching activities.¹⁶¹ While the Liability Convention imposes clear standards of liability assumption for launching States, the United States regulations do not describe the level of fault a licensee may or must assume below the imposed liability cap.¹⁶² Though the United States Government can participate in the defense of claims brought against licensees by third parties, it is unclear whether licensees could participate in the defense of the United States as a launching State against claims brought under the Liability Convention.¹⁶³ This could potentially put the United States government at risk of assuming complete responsibility for compensating a claimant State or assuming more responsibility than appropriate, because a licensee could argue against an assumption of liability even if the United States has already assumed liability under the Liability Convention.

¹⁵⁹ See *supra* Part II.B; FED. AVIATION ADMIN., LIABILITY RISK-SHARING REGIME FOR U.S. COMMERCIAL SPACE TRANSPORTATION 6-4 to 6-5 (2002).

¹⁶⁰ 51 U.S.C. § 50902.

¹⁶¹ §§ 50914-15 make no mention of how claims would be presented by the government to licensees. § 50915 provides that the United States Government must be given an opportunity to participate or assist in the defense of a third-party claim against a licensee. Additionally, § 50917(b) gives the Secretary of Transportation authorization to conduct investigations and inquiries, administer oaths, take affidavits, and lawfully conduct inspections or make seizures of property. However, § 50912 only provides that the Secretary of Transportation must provide the opportunity for a hearing for an applicant denied a license, the owner of a payload that is denied launch or reentry, or the holder of a license that has been suspended.

¹⁶² See Liability Convention, *supra* note 11, art. II-III; *cf.* 51 U.S.C. §§ 50914-15.

¹⁶³ 51 U.S.C. § 50915(b).

No country has ever brought claims against the United States as a launching State under the Liability Convention.¹⁶⁴ Therefore, there has never been an occasion in which a private launch provider would have needed to indemnify the United States government for compensation owed to another country under the Liability Convention, and there is no precedent to rely upon to gain an understanding of how such an indemnification would proceed.¹⁶⁵ That the Liability Convention has only been invoked once—in the claims brought by Canada against the USSR,¹⁶⁶ is not necessarily an indication that there will be few claims brought under the treaty in the future. As the private space launch industry grows, private launch providers have exhibited a willingness to risk failure on the path to advancement.¹⁶⁷ This could mean an increase in damage and claims for compensation that would fall within the purview of the Liability Convention.

The issue of how the United States government should be repaid for compensatory damages paid to a claimant State as a result of the launching activities of a private company could still arise. The CSLA can be interpreted to mean either that the government would need to bring an indemnification action against the licensee to be repaid for such damages up to \$100 million, or that the claimant State is bringing a claim for third-party damages and that the licensee responsible for the compensation up to \$500 million.¹⁶⁸ The current procedures in domestic regulations need to be clarified; they are ambiguous and provide little guidance to the government and to private companies. Other nations with similar interests and domestic regulations as the United States have implemented indemnification procedures that can serve as a model for replication in the United States.

IV. LOOKING TO OTHER COUNTRIES FOR GUIDANCE

The United States is not the only nation that has had to balance a desire for growth of domestic private launch providers

¹⁶⁴ LYALL & LARSEN, *supra* note 6, at 106–07.

¹⁶⁵ *Id.*

¹⁶⁶ *See supra* Part II.B.

¹⁶⁷ *See supra* Part I.B.

¹⁶⁸ *Liability Risk-Sharing Regime for U.S. Commercial Space Transportation*, *supra* note 159, at 6–5.

and a need to honor its international obligations.¹⁶⁹ Twenty-three nations, including the United States, have some type of compulsory insurance requirements as of 2019.¹⁷⁰ Fifteen of these nations have compulsory insurance requirements for claims brought by third parties and all but two of the nations that have compulsory insurance requirements mandate insurance to protect against government loss.¹⁷¹ Some of these nations, such as Norway and Sweden, allow for insurance requirements to be decided at the discretion of the government, with no liability cap.¹⁷² Other nations, such as Australia and France, utilize maximum probable loss calculations, just like the United States.¹⁷³ These nations have extensive regulations and include explicit indemnification procedures that may be useful in considering how the United States might amend and revamp its domestic regulations.¹⁷⁴

A. *Australia's Space (Launch and Returns) Act of 2018*

The Space (Launch and Returns) Act 2018 (“SLRA”) went into effect in Australia on August 31, 2019.¹⁷⁵ Like the CSLA, the SLRA was implemented to balance “the removal of barriers to participation in space activities and the encouragement of innovation and entrepreneurship in the space industry” with “the safety of space activities, and the risk of damage to persons or property as a result of space activities.”¹⁷⁶ The SLRA also seeks “to implement certain of Australia’s obligations under the UN Space Treaties,”¹⁷⁷ and not only references but also directly adopts language from the Liability Convention.¹⁷⁸

¹⁶⁹ See generally *National Space Law Collection*, U.N. OFFICE FOR OUTER SPACE AFFAIRS, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/index.html> [<https://perma.cc/7U9R-A8BQ>] (last visited Sept. 2, 2022).

¹⁷⁰ Suchodolski, *supra* note 122, at 489.

¹⁷¹ *Id.*

¹⁷² *Id.*

¹⁷³ *Id.*

¹⁷⁴ *Space (Launches and Returns) Act 2018* (Cth) (Austl.); Loi 2008-518 du 3 juin 2008 relative aux opérations spatiales [Law 2008-518 of June 3, 2008 Relating to Space Operations] (Fr.), translated in 34 J. SPACE L. 453, 353–70 (Fr.) [hereinafter French Space Operations Act].

¹⁷⁵ *Space (Launches and Returns) Act of 2018* (Cth) (Austl.).

¹⁷⁶ *Id.* pt I div 1 s 3; cf. 51 U.S.C. § 50901.

¹⁷⁷ *Space (Launches and Returns) Act of 2018* (Cth) (Austl.) pt I div 1 s 3; cf. 51 U.S.C. § 50901.

¹⁷⁸ For example, the Act defines “fault” by stating “fault has the same meaning as in the Liability Convention.” See *Space (Launches and Returns) Act of 2018* (Cth) (Austl.) pt I div 2 s 8 (emphasis omitted).

As a part of the SLRA's regulations of liability for damages caused by space objects, the SLRA specifically addresses "[c]ompensation claims by foreign countries."¹⁷⁹ The SLRA states that if a foreign country presents claims against Australia for compensation for damage under the Liability Convention and "Australia becomes liable to any extent to pay compensation for the damage," then "[t]he responsible party for the relevant launch . . . is liable to pay the Commonwealth an amount equal to the lesser of" either "the amount of that compensation [or] . . . the insured amount for the permit."¹⁸⁰ The SLRA defines the "responsible party" in the event of a "launch or return authorised by an Australian launch permit" as "the holder of the permit," precluding any argument about who is responsible for paying damages.¹⁸¹ Therefore, if Australia is held liable as a launching State under the Liability Convention, then the party that held the permit for the failed launch must compensate Australia either for the total compensation Australia owes the claimant State or the amount for which the permit holder was insured for the launch. This procedure is an example of how a licensee can be held responsible for compensating the government directly up to the insured amount. Additionally, the SLRA does not require the Commonwealth to bring a claim against the responsible party to prove that the party owes damages to the Australian government.¹⁸²

This section of the SLRA directly follows other regulations that explain liability for third-party damages and procedures for claims brought by third parties.¹⁸³ In defining procedures for third-party damages, the SLRA states that if a foreign country presents a claim against Australia under the Liability Convention or otherwise under international law, and "such a claim made by a foreign country has been settled," then "a person who has suffered damage covered by the claim may not commence an action, against the responsible party, seeking compensation for that damage."¹⁸⁴ This language and the placement of the regulations addressing claims brought by foreign countries indicate that while Australia considers claims

¹⁷⁹ *See id.* at pt IV div 4 s 74.

¹⁸⁰ *Id.*

¹⁸¹ *Id.* at pt I div 2 s 8 (emphasis omitted).

¹⁸² *Id.* at pt IV div 4 s 74.

¹⁸³ *Id.* ss 74–75.

¹⁸⁴ *Id.* at pt IV div 3 s 73.

brought directly against a responsible party to be a third-party claim, claims brought under the Liability Convention are not third-party claims, and therefore need to be addressed separately. If the United States adopted the sentiments of the Australian regulations, it would remove any temptation to consider claims brought under the Liability Convention against the United States as third-party claims and would instead clarify that the private launch providers would be responsible for repaying the government up to the required insurance amount.

B. The French Space Operations Act

Arianespace, a major commercial launch provider, launches from a facility in French Guiana in South America.¹⁸⁵ Accordingly, the French government is a launching State for any Arianespace launch from the spaceport in French Guiana.¹⁸⁶ The French Space Operations Act (“FSOA”), passed in 2008, governs liability for France’s space activities.¹⁸⁷ The FSOA adopted the liability standards of the Liability Convention, and holds the operator, defined as “any natural or juridical person carrying out a space operation under its responsibility and independently,”¹⁸⁸ absolutely liable for damages caused on the ground or in airspace and “liable only due to his fault for damages caused elsewhere than on the ground or in airspace” in the case of damage to third parties.¹⁸⁹

Article 14 of the FSOA refers to an operator’s liability to the French government and references both the Outer Space Treaty and the Liability Convention.¹⁹⁰ Specifically, the FSOA states that if the French Government has paid compensation under the Liability Convention, “it may present a claim for indemnification against the operator having caused the damage for which France was held internationally liable, to the extent that the Government has not already benefitted from the insurance . . . up

¹⁸⁵ *Space Licensing in France*, ANGELS, <https://spacelaws.com/articles/space-licensing-in-france/> [<https://perma.cc/3NYK-WSSG>] (last visited Sept. 2, 2022); *The Spaceport*, ARIANESPACE, <https://www.arianespace.com/spaceport-facility/> [<https://perma.cc/Q5KX-LTMR>] (last visited Sept. 2, 2022).

¹⁸⁶ *See Europe’s Spaceport*, THE EUROPEAN SPACE AGENCY, https://www.esa.int/Enabling_Support/Space_Transportation/Europe_s_Spaceport/Europe_s_Spaceport2 [<https://perma.cc/X68F-MMKS>] (last visited Sept. 2, 2022).

¹⁸⁷ French Space Operations Act, *supra* note 174, at 462.

¹⁸⁸ *Id.* at 453.

¹⁸⁹ *Id.* at 462; *cf.* Liability Convention, *supra* note 11, art. II–III.

¹⁹⁰ French Space Operations Act, *supra* note 174, at 463.

to the amount of the compensation.”¹⁹¹ This language demonstrates that the French government does not consider claims brought under the Liability Convention to be third-party claims against an operator, and the government will not present a claim for indemnification if damage occurs as a result of an operation that is licensed and targets governmental interests.¹⁹²

While these provisions are not as clear as the Australian regulations and leave open questions regarding whether an operator could argue that it did not cause the damage for which France was held internationally liable, they do directly address the Liability Convention and provide some guidance as to how the French government would proceed if a claim was brought under the Liability Convention. The regulations express straightforward standards for liability assumption, and therefore put private launch providers on notice as to the extent to which companies can be held liable should damage occur from launch activities.¹⁹³ The FSOA also makes clear that the government will take full responsibility, without bringing an indemnification action against an operator, if a mission targets governmental interests, though the term “governmental interests” is not defined.¹⁹⁴

C. *Benefits to the United States*

The risk-sharing system embedded into United States regulations provides security to both private launch providers and the government by protecting both parties from potentially limitless liability.¹⁹⁵ Because private launch providers will be responsible for damage that results from launch activities, the system, in turn, protects the public by ensuring private companies embrace risk in a responsible manner. At the same time, it allows the private launch industry to grow: companies are responsible for damages only up to the required insurance amount, provided damages are not more than \$3.1 billion.

However, this shared security is undermined by the lack of clarity in domestic regulations regarding the procedures that would follow if the United States was found liable as a launching State under the Liability Convention for the actions of a private

¹⁹¹ *Id.*

¹⁹² *Id.*

¹⁹³ *Id.* at 462.

¹⁹⁴ *Id.* at 453–54, 463.

¹⁹⁵ *See supra* Part II.C.

launch provider. The United States faces potentially unlimited liability if a private launch provider takes advantage of gaps in domestic regulations to avoid compensating the government for damages paid to a claimant State. On the other hand, private launch providers are not given notice of the extent of damages that might potentially need to be repaid, because it is not clear whether claims brought under the Liability Convention would be considered third-party claims or if the government would need to bring a separate action against private launch providers.

Adopting (1) language explicitly stating that Liability Convention claims are not third-party claims, as Australia and France have done, and (2) indemnification procedures similar to those implemented in Australia, would make clear that private launch providers must repay the United States government for compensatory damages paid to a claimant State, but only up to \$100 million. This would not only protect the United States from the possibility of assuming total responsibility, but also protect private launch providers from paying up to \$500 million in damages without notice.

CONCLUSION

While the United States launch license requirements prioritize the growth of the private sector in providing launch services, they only address the international obligations of the United States in a cursory and implicit manner. This is particularly relevant in a time of significant growth of private space activities, including launches provided by the private sector, because this growth is accompanied by increased risk. The current United States regulations provide no guidance as to which procedures would be implemented should the United States government be found liable as a launching State under the Liability Convention because of actions taken by private launch providers. This puts the United States government in a vulnerable position—the lack of procedures could prevent the United States from successfully indemnifying the party responsible for damages that the United States is obligated to pay a claimant State under the Liability Convention. It also fails to give private launch providers adequate notice as to the extent of damages they may be required to pay. Therefore, it would be in the best interest of the United States to adopt explicit indemnification procedures that directly address claims brought against the United States under the Liability Convention, such

as the procedures codified in Australian and French law; to provide clarity; security; and notice to all involved parties.