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Caley Albert

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Liability in International Law and the Ramifications on Commercial Space Launches and Space Tourism

CALEY ALBERT

I. INTRODUCTION

In the beginning, space exploration and the use of space were opportunities exclusively reserved for national governments.¹ However, in the twenty-first century, this statement is no longer true as commercial companies begin to take center stage in a field that was exclusively reserved for governments. An article written in 1984 states that “[t]he recent development of the United States space shuttle marks a new era in the commercial utilization of outer space. Although the shuttle is currently being operated by the federal government, the new space transportation system will result in greater use of the space by private industries.”² While the author may have predicted this event two decades early, his prediction was nonetheless accurate. For example, the last U.S. shuttle was launched on July 8, 2011.³ Moving forward, the United States government plans to rely on contracts with commercial companies, such as SpaceX and Orbital Sciences, to complete certain missions in space, such as resupplying the International Space Station (ISS).⁴ These commercial companies have in effect been stepping into the role government once played and have been doing so successfully thus far. Due to their success, these companies are poised to play an integral part in worldwide space exploration and launch capabilities. For instance, in a report to the United States President, the President’s

1. Charles L. Deem, *Liability of Private Space Transportation Companies to Their Customers*, 51 INS. COUNSEL J. 340, 341 (1984).

2. *Id.*

3. Ralph Vartabedian & W.J. Hennigan, *Space Shuttle Atlantis Lifts Off*, L.A. TIMES (July 8, 2011), <http://articles.latimes.com/2011/jul/08/nation/la-naw-atlantis-shuttle-launch-20110709>.

4. See Kenneth Chang, *Private Sector Edges Deeper Into Space*, N.Y. TIMES (May 14, 2012), <http://www.nytimes.com/2012/05/15/science/space/contracts-help-private-sector-edge-deeper-into-space.html?pagewanted=all> [hereinafter *Private Sector Edges Deeper*].

National Security Telecommunications Advisory Committee (NSTAC) stated that the commercial satellite industry is vital to our national and economic interests as well as homeland security.⁵

The Federal Aviation Administration (FAA) has licensed 207 launches, including commercial ones, since 1989.⁶ The annual number of launches from 1989 to 2012 averaged between four and eight launches per year.⁷ There was an increase in commercial launches during the late nineties followed by a general decline. Since 2009, however, thirteen commercial launches have been licensed, which include the contracts granted to SpaceX to resupply the ISS.⁸ During this period, there has also been a steady stream of investments by commercial launch companies in research and development.⁹ The tests associated with launch do not require licenses and as such are not reflected in these launch figures.¹⁰ These numbers are expected to increase as governments begin relying on commercial companies more and more for launch capabilities and as the space tourism industry continues growing.¹¹

Although the United States government retired its shuttle fleet and is no longer able to send humans into space, people all over the world are now interested in space travel more than ever.¹² Due to this demand, commercial space companies are incentivized to provide these people with the opportunity they are looking for. George Nield, the head of the Office of Commercial Space Transportation at the FAA said, "I'm convinced in the next few years we're going to see multiple companies flying several times a week. And that will mean hundreds of launches every year, with thousands of people getting to experience space flight first hand."¹³ There is no question that "space tourism" is on the rise. The first space tourist climbed on a Russian Soyuz rocket in 2001 for an

5. Piotr Manikowski & Mary Weiss, *Cyclicity or Volatility? The Satellite Insurance Market*, 28 SPACE POL'Y 192, 192 (2012).

6. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-12-836T, COMMERCIAL SPACE TRANSPORTATION: INDUSTRY TRENDS, GOVERNMENT CHALLENGES, AND INTERNATIONAL COMPETITIVENESS ISSUES 5 (2012) [hereinafter COMMERCIAL SPACE TRANSPORTATION ISSUES].

7. *Id.*

8. *Id.* at 1, 5.

9. *Id.* at 6.

10. *Id.*

11. *Id.* at 7.

12. See Jesse McKinley, *Space Tourism Is Here! Wealthy Adventures Wanted*, N.Y. TIMES (Sept. 7, 2012), <http://www.nytimes.com/2012/09/09/travel/space-tourism-is-here-wealthy-adventurers-wanted.html>.

13. Joe Palca, *A New Frontier in Space Travel: The Law*, NPR (July 15, 2011), <http://www.npr.org/2011/07/15/138159514/a-new-frontier-in-space-travel-the-law>.

eight-day galactic vacation.¹⁴ Since then, companies such as Space Adventures, Virgin Galactic, and XCOR have all begun accepting deposits for rides to space.¹⁵

Traditionally, international cooperation and self-regulation managed and maintained these activities through a series of international treaties dealing with space law.¹⁶ The question is: now that the players have changed, should the same rules still apply? Under international law, a “launching state” is liable for damages caused by its space object on the surface of the earth or to aircraft in flight.¹⁷ Included in the definition of launching state is: “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.”¹⁸ This definition encompasses commercial space companies that launch from, for example, United States bases or from inside the United States; either way, these companies are covered under this liability convention. Therefore, the United States would be liable for any damage these commercial space companies cause to a third party.

Within their power as nation states, many countries have formed indemnity agreements with commercial space companies to limit their liability in the event of a catastrophic space accident.¹⁹ Under these agreements, the injured nation state can hold commercial space companies accountable for part of the damage to the injured nation state, thus limiting the launching state’s liability. There are, however, consequences to this approach. Having each nation state make its own indemnity agreements creates an uneven playing field and encourages commercial space companies to forum shop to limit liability in the event of a catastrophic space incident. This also raises the issue of sovereign immunity; if there is a catastrophic space incident, will sovereign nation states actually pay the damages under the liability treaty?

14. ERIC ANDERSON, *THE SPACE TOURIST’S HANDBOOK* 7, 14 (2005).

15. *Private Sector Edges Deeper*, *supra* note 4.

16. Christopher J. Newman & Ben Middleton, *Space Law and the New Era of Commercial Spaceflight*, *THE SPACE REVIEW* (Apr. 4, 2011), <http://www.thespacereview.com/article/1812/1>.

17. Convention on International Liability for Damage Caused by Space Objects, Mar. 29 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762, 961 U.N.T.S.187 [hereinafter Liability Convention].

18. *Id.* art. I(c)(i), (ii).

19. Center for Space Policy and Strategy National Space Systems Engineering, *Study of the Liability Risk-Sharing Regime in the United States for Commercial Space Transportation*, 44 AEROSPACE REPORT NO. ATR-2006(5266)-1 (Aug. 1, 2006), available at [http://www.faa.gov/about/office_org/headquarters_offices/ast/reports_studies/media/Risk_Study\(final\).pdf](http://www.faa.gov/about/office_org/headquarters_offices/ast/reports_studies/media/Risk_Study(final).pdf).

The liability regime currently followed under international law was created in an era when the domain of space itself was reserved exclusively for national governments. Now that the players have changed, this liability regime is outdated. Commercial companies, not nation states, should be liable for the damages they cause.

II. BRIEF HISTORY OF SPACE PROGRAMS

A. History of U.S. Government Space Exploration Programs

The now infamous space race between the United States and the Soviet Union began with the launch of Sputnik 1 by the Soviet Union on October 4, 1957, which was quickly followed by the United State's Explorer 1 on January 31, 1958.²⁰ Explorer 1 was launched even before the National Aeronautics and Space Administration (NASA) was founded; the U.S. Army Ballistic Missile Agency was directed to launch the satellite and enlisted the Jet Propulsion Laboratory (JPL) to design, build, and operate it.²¹ Later in 1958, United States President Dwight Eisenhower created NASA out of the National Advisory Committee on Aeronautics (NACA), which was established to research aeronautics over forty years prior.²² Under its new title, NASA had the power to "plan, direct, and conduct aeronautical and space activities."²³

The Soviet space program claimed many of the firsts during this period, including the first human in orbit, the first space walk, and the first human space flight. However, on July 20, 1969, the United States claimed the most important milestone of all when it successfully landed the first human beings on the moon.²⁴ When Apollo 11's crew successfully landed on the moon, they "achieved the primary goal of the Apollo program—and the entire U.S. space effort up to that point—by fulfilling the late President John F. Kennedy's 1961 challenge to land an astronaut on the Moon and return him safely to Earth by the end of the 1960s."²⁵

20. Katherine Brick et al., *50 and Counting*, in U.S. NATIONAL DEBATE TOPIC 2011-2012: AMERICAN SPACE EXPLORATION AND DEVELOPMENT 12 (Christopher Mari ed., 2011).

21. *Explorer: America's First Spacecraft*, NASA, (Jan. 8, 2014), http://www.nasa.gov/mission_pages/explorer/explorer-overview.html.

22. *The Birth of NASA: November 3, 1957-October 1, 1958*, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, <http://history.nasa.gov/monograph10/nasabrth.html> (last visited Jun. 21, 2014).

23. National Aeronautics and Space Act of 1958, PUB. L. NO. 85-568, § 203(a)(1), 72 Stat. 426, 429 (1970) (prior to 2004 amendment) (codified as amended 42 U.S.C. §§2451-2478g) 426, 429 (2004), available at <http://history.nasa.gov/spaceact.html>.

24. PATRICK J. WALSH, SPACEFLIGHT: A HISTORICAL ENCYCLOPEDIA 43 (2010).

25. *Id.* at 41.

After accomplishing lunar landing and successfully ending the space race, the United States turned its attention to projects that focused on experimentation and on the expansion of the government's knowledge of outer space. In 1972, President Richard Nixon initiated the space shuttle program; he concluded that the year 1972 was the end of America's series of manned moon flights and that this "[new space transportation system] will go a long way toward[s] delivering the rich benefits of practical space utilization and the valuable spin-offs from space efforts into the daily lives of Americans and all people."²⁶ In furtherance of the United States' new goals in space, the first Skylab project was launched in early 1973.²⁷ Skylab was the United States' first space station and was a complex laboratory that produced studies of the Earth's crust, the Sun, and the universe itself.²⁸ In 1975, the United States and Russia partnered on a mission called the Apollo-Soyuz test project, where a U.S. Apollo craft docked with a Russian Soyuz spacecraft and its crew to perform joint experiments for two days.²⁹ After the test project, the United States did not fly a single manned space mission for nearly six years.

Finally in 1981, the shuttle program era in the United States began with the launch of the shuttle *Columbia* from the Kennedy Space Center.³⁰ In total, the United States built six orbiters, where a total of five were fit for spaceflight. *Enterprise* was completed in 1976 but never flew in space, *Columbia* launched for the first time in 1981, *Challenger* launched for the first time in 1983, *Discovery* launched for the first time in 1984, *Atlantis* launched for the first time in 1985, and *Endeavour* launched for the first time in 1992.³¹ There were 24 successful shuttle launches from 1981 to 1986 before tragedy struck.³² On January 28, 1986, the space shuttle *Challenger* caught on fire and exploded seventy-three seconds after liftoff; there were no survivors.³³ The shuttle program was grounded for the entire year but moved forward into the twenty-first century after safety upgrades. Tragedy

26. Richard Nixon, *Statement Announcing Decision to Proceed with Development of the Space Shuttle*, THE AMERICAN PRESIDENCY PROJECT, <http://www.presidency.ucsb.edu/ws/?pid=3574> (last visited Jun. 17, 2014).

27. GEORGE C. MARSHALL SPACE FLIGHT CENTER, SKYLAB, OUR FIRST SPACE STATION 15 (Leland F. Belew ed., 1977), available at <http://history.nasa.gov/SP-400/ch2.htm>.

28. *Id.* at 1.

29. *Apollo-Soyuz, A Pioneering Partnership*, NASA, http://www.nasa.gov/mission_pages/apollo-soyuz/index.html (last visited Nov. 15, 2011).

30. TIM FURNISS, SPACE SHUTTLE LOG 34 (1986).

31. *Id.* at 14.

32. ROGER D. LAUNIUS, FRONTIERS OF SPACE EXPLORATION 9, 164-68 (1998).

33. *Id.* at xxvii.

struck again in 2003 when the shuttle *Columbia* broke apart during its reentry into the earth's atmosphere.³⁴ This devastating loss weakened the country's faith in the shuttle program. The agency had promised to build a safer and more reliable shuttle in the wake of the *Challenger* disaster, but after this loss, both Congress and the American people wondered whether NASA was capable of carrying out its designated task safely.³⁵ The shuttle program was once again grounded and no more flights were carried out until 2005; even then, only one flight was allowed.³⁶

It was not long until the era of the shuttle program was over. On July 8, 2011, shuttle *Atlantis* launched from the Kennedy Space Center for the last time; this not only marked the last launch of *Atlantis*, but of the entire shuttle program.³⁷

B. History of Commercial Space Programs

Since the beginning of space exploration, nation states have dominated all facets of the space industry. During the early 1980s, however, some private individuals and private space companies began investing in the space industry, which included launch capabilities and space tourism.

Arianespace, founded in 1980, was the first commercial space launch service in the world and launched its first payload in 1984 from Evry at the Guiana Space Center (CSG).³⁸ Arianespace has strategically chosen this spaceport, located in French Guiana, for numerous reasons. Mainly, its location near the equator at 5.3 degrees north latitude makes it ideal for launching satellites into geostationary orbit.³⁹ This in turn reduces the amount of energy required for the orbit plane to reach its required destination, which reduces the amount of fuel needed for launch. When less fuel is needed for launch, the lifetime of the satellite payload increases, which would thereby increase the investment return

34. Elizabeth Howell, *Columbia Disaster: What Happened, What NASA Learned*, SPACE.COM (Feb. 1, 2013), <http://www.space.com/19436-columbia-disaster.html>.

35. KIM M. EVANS, SPACE EXPLORATION: TRIUMPHS AND TRAGEDIES 30 (2009).

36. *Id.*

37. *See The Shuttle: Timeline*, NASA, http://www.nasa.gov/externalflash/the_shuttle/ (last visited Jan. 3, 2014), in the "Timeline" tab.

38. *Service & Solutions*, ARIANESPACE, <http://www.arianespace.com/about-us/service-solutions.asp> (in the "About Arianespace" tab) (last visited Nov. 15, 2012); *Introduction*, ARIANESPACE, <http://www.arianespace.com/spaceport-intro/overview.asp> (in "The Spaceport" tab) (last visited Jan. 17, 2013); *Milestones*, ARIANESPACE, <http://www.arianespace.com/about-us/milestones.asp> (in the "About Arianespace" tab) (last visited Apr. 20, 2014).

39. *Introduction*, *supra* note 38.

to Arianespace customers.⁴⁰ Also, French Guiana has low population density and relatively few earthquakes and natural disasters, making it an ideal launch location.⁴¹ Arianespace's shareholders include French space agency Centre National d'Etudes Spatiales (CNES), Astrium, and all the European space companies, which in sum represents ten different European countries.⁴² Its shareholders also include scientific, technical, financial, and political entities from Germany, Belgium, Denmark, Spain, France, Italy, Netherlands, Norway, Sweden, and Switzerland.⁴³ Arianespace has successfully launched more than half of the world's commercial satellites now in service worldwide.⁴⁴

Orbital Sciences Corp., founded in the United States in 1982, has manufactured 140 spacecraft for commercial, government, and civil customers.⁴⁵ Orbital received a cash payout from NASA under the Commercial Orbital Transportation Services Program (COTS),⁴⁶ a program that assigns cash payouts for achieving specific milestones related to logistical services being developed for launch vehicles to resupply the International Space Station (ISS).⁴⁷ Under NASA's Commercial Resupply Service Program (CRS), Orbital will provide eight resupply cargo missions.⁴⁸

On April 22, 2013, Orbital launched a successful test flight of its Antares rocket from Wallops Island and put a dummy payload into orbit.⁴⁹ The first launch of Antares represents a \$1 billion dollar investment, shared by both the corporation and the U.S. government, "aimed to create an alternative space-transportation system to satisfy commercial launch customers and allow the National Aeronautics and Space Administration to outsource some key functions to private

40. *Id.*

41. *Id.*

42. *Service & Solutions*, *supra* note 38.

43. *Corporate Information*, ARIANESPACE, <http://www.arianespace.com/about-us/service-solutions.asp> (in the "Shareholders" tab) (last visited Jun. 22, 2014).

44. *The Spaceport*, *supra* note 38.

45. *Satellites & Space Systems Overview*, ORBITAL, <http://www.orbital.com/SatellitesSpace/> (last visited Nov. 15, 2012).

46. *See Commercial Resupply Services*, ORBITAL, <http://www.orbital.com/AdvancedSystems/CRS> (last visited Nov. 15, 2011).

47. CESAR JARAMILLO, *SPACE SECURITY INDEX 2012*, 103 (Cesar Jaramillo ed., 2012), available at http://swfound.org/media/93632/SSI_FullReport_2012.pdf [hereinafter *SPACE SECURITY INDEX*].

48. *See Commercial Resupply Services*, *supra* note 46.

49. Andy Pasztor, *NASA Partner Orbital Sciences Tests Rocket*, WALL ST. J., <http://online.wsj.com/news/articles/SB10001424127887324874204578437191088985994> (last updated Apr. 26, 2013).

industry.⁵⁰ On September 18, 2013, Orbital successfully launched the first unmanned Antares rocket on its maiden voyage to resupply the ISS.⁵¹ With this successful launch of Antares, Orbital can begin the eight-resupply missions to the ISS under its \$1.9 billion contract with NASA.⁵² The first of these resupply missions to the ISS successfully launched on January 9, 2014.⁵³ The second Orbital resupply mission to the ISS took place on July 13, 2014.⁵⁴

Another company sometimes used by government customers is Sea Launch. Founded in 1995, Sea Launch is a space launch service that uses a platform at sea to launch commercial space satellites into orbit.⁵⁵ Sea Launch is now headquartered in Bern, Switzerland after going through bankruptcy proceedings in 2009.⁵⁶ It was previously headquartered in Long Beach, California, where the launch platform homeport is still located.⁵⁷

Virgin Galactic, founded in 1999 but was not fully in operation until 2005, currently builds two types of commercial spacecrafts equipped to accommodate passengers for trips into space.⁵⁸ Sir Richard Branson became interested in Scaled Composites and its air launch space plane, SpaceShipOne, after a Virgin team discovered it was competing for the AnsariX-Prize.⁵⁹ This competition challenged competitors to fly a reusable craft carrying a pilot and two human-sized figures twice around the Earth within three weeks an altitude of over

50. *Id.*

51. Andy Pasztor, *Orbital Sciences Launches Cargo Capsule for Space Station*, WALL ST. J. (Sept. 18, 2013), <http://online.wsj.com/news/articles/SB10001424127887323808204579083090512214568>.

52. Stephen Clark, *Freezing Forecast Forces Antares Launch Delay*, SPACEFLIGHT NOW (Jan. 3, 2014), <http://www.spaceflightnow.com/antares/orb1/140103temperatures/#.UsijqHnPUc>.

53. *Cygnus Heads to Space for First Station Resupply Mission*, NASA (Jan. 9, 2014), <http://www.nasa.gov/content/cygnus-heads-to-space-for-first-station-resupply-mission/#.VAZ9cmSwl2Y>.

54. *NASA Cargo Launches to Space Station aboard Orbital Sciences Resupply Mission*, NASA, <http://www.nasa.gov/press/2014/july/nasa-cargo-launches-to-space-station-aboard-orbital-sciences-resupply-mission/> (last visited Aug. 11, 2014).

55. *See generally History*, SEA LAUNCH, <http://www.sea-launch.com/about/11129> (last visited June 8, 2014).

56. W.J. Hennigan, *Sea Launch Has Successful Blastoff From Ocean Platform*, L.A. TIMES (June 1, 2012), <http://articles.latimes.com/2012/jun/01/business/la-fi-mo-sea-launch-20120601>.

57. *Launch Platform*, ENERGIA, <http://www.energia.ru/english/energia/sea-launch/launch-platf.html> (last visited June 6, 2014).

58. *Overview: History*, VIRGIN GALACTIC, <http://www.virgingalactic.com/overview> (last visited Feb. 17, 2014).

59. *Id.*

100 kilometers, for a \$10 million prize.⁶⁰ Designed by Burt Rutan and financed by Paul Allen, SpaceShipOne was the first spacecraft to reach this altitude.⁶¹

Branson and Rutan announced the formation of The Spaceship Company in 2005 and stated that the objective of their joint venture would be to manufacture a spaceship (SpaceShipTwo)⁶² and a launch aircraft (WhiteKnightTwo).⁶³ In 2006, the Governor of New Mexico approved \$132 million in funding to build the world's first commercial spaceport, Spaceport America, in New Mexico near Virgin Galactic's operating base.⁶⁴ Virgin Galactic has signed on to be the spaceport's primary tenant for the next twenty years and has promised hundreds of millions of dollars to the project.⁶⁵

In 2009, the company unveiled the world's first commercial space shuttle, named the Virgin Spaceship Enterprise; it only took two years after the initial design was revealed to finish Virgin Galactic's first SpaceShipTwo.⁶⁶ On April 29, 2013, the SpaceShipTwo "ignited its rocket motor in mid-flight for the first time and sped to Mach 1.2, faster than sound, reaching about 56,000 feet in altitude."⁶⁷ This is Virgin Galactic's biggest milestone to date in its attempt to become the first company to send tourists to space. Most recently, Virgin Galactic revealed LauncherOne, which it states is "a low cost, highly flexible small satellite launch vehicle."⁶⁸ As of 2009, the President of Virgin Galactic stated that the company already had \$38 million in deposits from interested space travelers.⁶⁹ By September 2013, 650 people had purchased tickets to fly on Virgin Galactic's commercial spacecraft for as early as 2014.⁷⁰ The current price for a flight into space: \$250,000.⁷¹

60. Shane Chaddha, *U.S. Commercial Space Sector: Matured and Successful*, 36 J. SPACE L. 19, 35 (2010).

61. *Id.* at 36.

62. *Id.*

63. Overview: Spaceships, VIRGIN GALACTIC,
<http://www.virgingalactic.com/overview/spaceships/> (last visited Feb. 17, 2014).

64. Dan Frosch, *New Mexico's Bet on Space Tourism Hits a Snag*, N.Y. TIMES (Feb. 23, 2011), <http://www.nytimes.com/2011/02/24/us/24spaceport.html>.

65. *Id.*

66. *Overview: History, supra* note 58.

67. W.J. Hennigan, *Virgin Galactic Goes Supersonic In Test*, L.A. TIMES (Apr. 30, 2013), <http://articles.latimes.com/print/2013/apr/30/business/la-fi-virgin-galactic-20130430>.

68. *Id.*; *Overview: History, supra* note 58.

69. JOSEPH N. PELTON & PETER MARSHALL, LICENSE TO ORBIT: THE FUTURE OF COMMERCIAL SPACE TRAVEL 29 (2009).

70. Alexandra Wolfe, *Richard Branson on Space Travel*, WALL ST. J. (Nov. 1, 2013), <http://online.wsj.com/news/articles/SB10001424052702304527504579167612163179636>.

71. *Id.*

Robert T. Bigelow founded Bigelow Aerospace in 1999 to achieve his lifelong goal of building hotels in space, or “next generation commercial space stations.”⁷² According to the company’s mission statement, “our mission has been to provide affordable options for spaceflight to national space agencies and corporate clients Using our patented expandable habitats, our plan is to greatly exceed the usable space of the International Space Station at a fraction of the cost by developing our next generation spacecraft.”⁷³ In 2006 and 2007, Bigelow launched its orbiting prototypes Genesis I and Genesis II successfully.⁷⁴ On January 16, 2013, NASA announced a \$17.8 million contract with Bigelow to build an “inflatable laboratory” for the International Space Station.⁷⁵ This inflatable test facility is known as the Bigelow Expandable Activity Module (BEAM) and will be launched aboard a SpaceX resupply mission to the International Space Station in 2015.⁷⁶ By 2016, Bigelow expects to have a fully functional station in orbit and to charge rent to those who can afford it; he envisions prices will start at \$28,750,000 per astronaut for a 30-day tour.⁷⁷

Elon Musk founded Space Exploration Technologies Corporation, now known only as SpaceX, in 2002.⁷⁸ After three launch failures, Musk achieved a success that caught NASA’s eye; like Orbital Sciences, SpaceX also received a government contract with NASA under the COTS program for ongoing resupply flights to the ISS after the shuttle program ended in 2011.⁷⁹ At the time of the COTS announcement, SpaceX received \$278 million and had already completed four of the necessary milestones, worth about \$5 million each.⁸⁰ In May 2012, SpaceX successfully launched the Falcon 9 from Cape Canaveral, Florida and completed its mission to resupply the

72. See generally BIGELOW AEROSPACE, <http://www.bigelowaerospace.com> (last visited Jan. 23, 2013).

73. *Id.*

74. PELTON & MARSHALL, *supra* note 69, at 38.

75. David M. Ewalt, *NASA Expanding ISS With Bigelow Aerospace Inflatable*, FORBES (Jan. 16, 2013), <http://www.forbes.com/sites/davidewalt/2013/01/16/nasa-expanding-iss-with-bigelow-aerospace-inflatable>.

76. *Id.*

77. David M. Ewalt, *Cosmic Landlord*, FORBES (June 27, 2011), <http://www.forbes.com/forbes/2011/0627/features-robert-bigelow-aerospace-real-estate-cosmic-landlord.html>.

78. *About*, SPACE X, <http://www.spacex.com/about> (last visited June 6, 2014).

79. See Kenneth Chang, *Big Day for Space Entrepreneur Promising More*, N.Y. TIMES (May 22, 2012), <http://www.nytimes.com/2012/05/23/science/space/spacexs-private-cargo-rocket-heads-to-space-station.html>; see also, *Commercial Crew and Cargo: C3PO*, NASA, <http://www.nasa.gov/offices/c3po/about/c3po.html> (last visited Nov. 15, 2012).

80. SPACE SECURITY INDEX, *supra* note 47, at 103.

ISS.⁸¹ This was an important moment in history. That moment, SpaceX joined an exclusive club that until then included only the United States, European, Japanese, and Russian government.⁸² This was the first of twelve resupply missions under SpaceX's Commercial Resupply Services Contract with NASA, worth \$1.6 billion.⁸³ To date, SpaceX has completed three of its twelve missions to resupply the ISS.⁸⁴ The third resupply mission under the Commercial Resupply Services contract took place on April 18, 2014.⁸⁵

In 2010, Sierra Nevada Corporation (SNC) received an initial \$20 million dollars from NASA through the Commercial Crew Development Competition (CCDev) to start developing the commercial version of the space shuttle named the Dream Chaser.⁸⁶ Designed by SpaceDev Company and built by the SNC, the reusable space shuttle is "designed to carry as many as seven crew members to the International Space Station or low-Earth orbit."⁸⁷ To date, NASA has contributed \$330 million to the project, and if it successfully outperforms its competitors, who are relying on capsule models instead of space planes, it could go into orbit by 2017.⁸⁸

81. *Mission Summary: Dragon Becomes First Private Spacecraft to Visit the Space Station*, SPACEFLIGHT NOW (June 1, 2012), <http://www.spaceflightnow.com/news/2013/02/08/mission-summary>.

82. Douglas Messier, *Dragon Soars to the International Space Station*, ADASTRALINK (Fall 2012).

83. Kenneth Chang, *Private Cargo Rocket Heads to Space Station*, N.Y. TIMES (May 23, 2012), <http://www.nytimes.com/2012/05/23/science/space/space-x-rocket-heads-to-space-station.html>.

84. *World Wide Launch Schedule*, SPACEFLIGHT NOW (Apr. 20, 2014), <http://spaceflightnow.com/tracking/index.html>; see also Stephen Clark, *SpaceX supply ship begins journey to space station*, SPACEFLIGHT NOW (Apr. 18, 2014), <http://www.spaceflightnow.com/falcon9/009/140418launch/#.U5Kty5RdV9R>.

85. *NASA Cargo Launches to Space Station Aboard SpaceX ReSupply Mission* (Apr. 18, 2014), <http://www.nasa.gov/press/2014/april/nasa-cargo-launches-to-space-station-aboard-spacex-resupply-mission/#.U5Kzi5RdV9Q>.

86. Brian Berger, *Biggest CCDev Award Goes to Sierra Nevada*, SPACENEWS (Feb. 1, 2010), <http://www.spacenews.com/article/biggest-ccdev-award-goes-sierra-nevada>.

87. Joseph Stromberg, *Coming Soon: The Dream Chaser, a Nimbler Space Shuttle*, SMITHSONIAN.COM (July – Aug. 2013), <http://www.smithsonianmag.com/ideas-innovations/Coming-Soon-The-Dream-Chaser-a-Nimbler-Space-Shuttle-213885201.html>.

88. *Id.*

III. THE CONVENTION ON INTERNATIONAL LIABILITY FOR DAMAGE CAUSED BY SPACE OBJECTS THAT GOVERNS WAS CREATED IN THE 1970S AND IS INEFFICIENT TO DEAL WITH THE RISE OF COMMERCIAL SPACE PROGRAMS

A. *The Outer Space Treaty and the Liability Convention*

“The United Nations Office for Outer Space Affairs (UNOOSA) is the Secretariat for the Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS),” which is the main international body for the development of international space law.⁸⁹ The General Assembly established the Committee as a permanent body in 1959⁹⁰ when it became clear that space was the new frontier and to ensure a “responsible approach to the exploration and use of outer space for the benefit and in the interests of all humankind.”⁹¹

This body concluded five main treaties in the past fifty years that continues to be the governing law in all space-related activities: 1) The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (“Outer Space Treaty”); 2) The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (“Rescue Agreement”); 3) The Convention on International Liability for Damage Caused by Space Objects (“Liability Convention”); 4) The Convention on Registration of Objects Launched into Outer Space (“Registration Convention”); and 5) The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (“Moon Agreement”).⁹² Since these agreements were completed between 1967 and 1984, they are outdated when it comes to dealing with commercial launch companies, which did not even emerge until the 1980s and was not popular until more recently.

89. *International Space Law*, UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS (UNOOSA), <http://www.oosa.unvienna.org/oosa/SpaceLaw/index.html> (last visited June 6, 2014); see generally UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS (UNOOSA), <http://www.oosa.unvienna.org/oosa/en/OOSA/index.html> (last visited Jan. 20, 2014).

90. *United Nations Committee on the Peaceful Uses of Outer Space: History and Overview of Activities*, UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS (UNOOSA), http://www.oosa.unvienna.org/oosa/COPUOS/cop_overview.html (last visited June 6, 2014).

91. *Space Law: Frequently Asked Questions*, UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS (UNOOSA), <http://www.oosa.unvienna.org/oosa/en/FAQ/splawfaq.html#Q2> (last visited Nov. 15, 2012).

92. *United Nations Treaties and Principles on Space Law*, UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS (UNOOSA), <http://www.oosa.unvienna.org/oosa/en/SpaceLaw/treaties.html> (last visited Nov. 15, 2012).

The first treaty concluded by this body, the Outer Space Treaty, addresses the idea of state liability in two places—Article VI and Article VII.⁹³ In Article VI, the treaty states “States Parties to the Treaty shall bear international responsibility for national activities in outer space . . . whether such activities are carried on by governmental agencies or by non-governmental entities.”⁹⁴ This article clearly states that regardless of the activity being carried out by a state or a non-state actor, the launching state will still be liable.

Further, in Article VII, the treaty states that “[e]ach State Party to the Treaty that launches or procures the launching of an object into outer space . . . and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or judicial persons by such object or its component parts on the Earth, in air space or in outer space”⁹⁵ Again, it is clear from this article that if the damage is caused by an object launched by a commercial company at the behest of a government, that state would be liable. It also makes clear that a state will be liable if the object is launched from within its borders or from its facility, regardless of the purpose for its launch. While this treaty was not meant to address liability specifically, it laid the groundwork for the treaty to follow in relation to this topic. It is important to note that this treaty does not establish a standard of fault.

The treaty that specifically governs the topic of liability is the Liability Convention of 1972. This convention has been ratified by ninety-one states and signed by an additional twenty-two.⁹⁶ Article I of the treaty defines, for the purposes of the convention, what the term “launching state” means. It defined “launching state” as “[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.”⁹⁷ Article II of this convention states, “[a] launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of

93. Susan Trepczynski, *The Effect of the Liability Convention on National Space Legislation*, 33 J. OF SPACE L. 221, 222 (2007).

94. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27 1967, 610 U.N.T.S. 205 [hereinafter *Outer Space Treaty*].

95. *Id.* at 4.

96. Committee on the Peaceful Uses of Outer Space, *Status of International Agreements relating to activities in outer space as at 1 January 2014*, UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS (UNOOSA), (Mar. 24-Apr. 4, 2014) 10, http://www.oosa.unvienna.org/pdf/limited/c2/AC105_C2_2014_CRP07E.pdf (last visited Apr. 20, 2014).

97. Liability Convention, *supra* note 17.

the Earth or to aircraft in flight.”⁹⁸ The treaty also lays out a variety of other provisions, including who is liable when two states jointly launch a space object, but they are beyond the scope of this paper.

Returning to Article I of the Liability Convention, the definition of “launching state” is what places all responsibility and liability for space activities with the nation state. By defining launching state broadly to include a state whose territory or facility a space object is launched from, the definition automatically includes launches and activities conducted by commercial space companies such as SpaceX and Virgin Galactic. For example, SpaceX currently launches from government launch sites in Florida while Virgin Galactic operates out of the world’s first commercial spaceport in New Mexico. Both of these facilities are within U.S. territory, thereby falling within the launching state definition. Hence, if either company is involved in a catastrophic launch accident, the United States will be liable under international law for the entirety of the damages per the Liability Convention and the Outer Space Treaty’s liability parameters.

B. Indemnification Programs

Because a nation state under this treaty is liable for any damage its space activities cause, many nation states in turn choose to enact space-specific national legislation covering commercial launch activities. For instance, individual countries such as the United States, China, France, and Russia have each developed their own separate policies to deal with commercial space companies.⁹⁹ To date, the international community as a whole has not developed a unified indemnification policy.

In the United States, the Commercial Space Launch Activities Act (CSLA) and the associated regulations (CSLR) are the primary body of national U.S. law governing commercial launch activities.¹⁰⁰ The CSLA, enacted in 1984 and later amended in 1988, is the principal source of law governing licensing and regulation of commercial space transportation in the United States.¹⁰¹ Originally under the CSLA, entities and persons were prohibited from launching without a license or operating a launch site without a Department of Transportation (DOT)

98. *Id.*

99. COMMERCIAL SPACE TRANSPORTATION ISSUES, *supra* note 6.

100. 51 U.S.C. § 50901 (2013); Timothy R. Hughes & Esta Rosenberg, *Space Travel Law (And Politics): The Evolution of the Commercial Space Law Act of 2004*, 31 J. SPACE L. 1, 11-12 (2005).

101. *Id.* at 11-18.

license.¹⁰² Likewise, any United States citizen who wished to launch a vehicle or operate a launch site outside the United States also had to acquire a DOT permit.¹⁰³ The CSLA established DOT as the lead executive branch authority to oversee and coordinate commercial space launch activities in the United States.¹⁰⁴ In 1984, the DOT created the Office of Commercial Space Transportation (OCST), which reported directly to the Secretary of Transportation.¹⁰⁵ In 1995, the OCST transferred responsibility to the Administrator of the FAA who established the Office of the Associate Administrator for Commercial Space Transportation.¹⁰⁶ “Following the passage of the Commercial Space Act of 1998, the FAA was granted definitive authority to oversee space launches and landings.”¹⁰⁷

In the relevant Congressional findings of 51 U.S.C. § 50901 (formerly 49 U.S.C. §70101), Congress concluded that providing private launch services is consistent with United States national security and foreign policy.¹⁰⁸ This section states that “the United States should encourage private sector launches, reentries, and associated services and, only to the extent necessary, regulate those launches, reentries, and services to ensure compliance with international obligations of the United States”¹⁰⁹ Once a license is awarded, the launch company is then required to purchase a fixed amount of insurance, calculated by the FAA, for each launch and reentry.¹¹⁰

The launch indemnification system currently used in the United States was established by the CSLA amendments in 1988 and has been renewed six times since its establishment.¹¹¹ The United States has a “three-tier approach” for sharing liability between the government and private commercial space sector to cover third party claims in the case something goes wrong during launch or launch-related activities.¹¹² The

102. 49 U.S.C. § 50904(a)(1), (d) (2013).

103. 49 U.S.C. § 50904(a)(3) (2013).

104. Exec. Order No. 12465, 3 C.F.R. 163 (1984).

105. Hughes & Rosenberg, *supra* note 100, at 12-13.

106. *Id.* at 13.

107. Chaddha, *supra* note 60, at 43-44.

108. 51 U.S.C. § 50901(a)(6) (2013).

109. 51 U.S.C. § 50901 (a)(7) (2013).

110. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-12-899, COMMERCIAL SPACE LAUNCHES: FAA SHOULD UPDATE HOW IT ASSESSES FEDERAL LIABILITY RISK 4 (2012) [hereinafter FAA SHOULD UPDATE].

111. Dan Leone, *U.S. House Approves One-year Launch Indemnity Extension*, SPACE NEWS (Dec. 9, 2013), <http://www.spacenews.com/article/launch-report/38526us-house-approves-one-year-launch-indemnity-extension>.

112. FAA SHOULD UPDATE, *supra* note 110, at 4.

first level of coverage is the insurance policy that all companies are required to purchase as a part of the FAA's issuance of a license.¹¹³ The FAA determines a set amount of liability each company must purchase from a private third party to reflect the "maximum probable loss" (MPL) that is likely to occur as a result of an accident related to launch and reentry.¹¹⁴ According to the Government Accountability Office (GAO), the insurance market is generally willing to provide around \$500 million per launch in private sector third party liability coverage.¹¹⁵ "To date, the required amount of insurance based upon MPL analysis has been less than \$500 million in all cases."¹¹⁶ The licensee's liability insurance must include or "cover all of the entities involved in carrying out the launch," including the United States government, as if each had purchased its own liability insurance.¹¹⁷

According to the GAO, the United States government then provides the second tier of coverage.¹¹⁸ This tier covers third party claims in excess of the first tier, described above, "up to a limit of \$1.5 billion adjusted for post-1988 inflation; in 2012, the inflation-adjusted amount was approximately \$2.7 billion."¹¹⁹ The third and final tier includes any excess damages above the cap of the second tier, adjusted for inflation.¹²⁰ This third tier is also the responsibility of the launch company, but unlike the first tier, no insurance is required for this tier by federal law.¹²¹

It is important to note this indemnification protection is extended not only to commercial launches, which can involve national security interests and are often launched at the behest of the government, but to commercial space tourism companies as well. "By extending benefits to operators of man-rated commercial vehicles comparable to those afforded operators of [Expendable Launch Vehicles], Congress has determined that the emerging human space flight industry, with its attendant risks, requires and is deserving of this unusual, though not extraordinary, safety net."¹²²

113. *Id.*

114. *Id.*

115. *Id.* at 14.

116. Hughes & Rosenberg, *supra* note 100, at 56.

117. *Id.*

118. FAA SHOULD UPDATE, *supra* note 110, at 5.

119. *Id.* at 5.

120. *Id.*

121. *Id.*

122. Hughes & Rosenberg, *supra* note 100, at 58.

It is also interesting to note the other industries in which the United States has established similar risk-sharing regimes. These industries include: National Flood Insurance Program, Overseas Private Investment Corporation, Terrorism Risk Insurance Act, and Price-Anderson Act for the nuclear power industry.¹²³ This places the commercial launch industry, along with civil and national security launches, with other vital industries the United States government sees fit to share liability with.

Other countries have set up indemnification systems similar to the United States to limit state liability. While they will ultimately be held liable under international law, indemnification programs such as these help ensure that states can collect from commercial companies in the case of a catastrophic space disaster. According to the GAO, China, France, and Russia all have a first tier of insurance similar to that in the United States;¹²⁴ however, that is where the similarities end. Unlike the three-tier system established by the United States, these other countries all have a two-tier system.¹²⁵ This means that these governments essentially provide unlimited third party indemnification over the initial insurance required by the commercial launch companies.¹²⁶ The People's Republic of China, for example, provides indemnification for third party claims exceeding \$100 million.¹²⁷ The Russian government provides indemnification for third party claims exceeding \$80 million for smaller launch vehicles and up to \$500 million for the larger launch vehicle; the limit is pre-determined by contract before launch.¹²⁸ The French government, along with the European Space Agency, provides indemnification for claims exceeding \$53 million at the exchange rate in 2002, which was approximately 400 million French Francs.¹²⁹

All these countries' insurance regimes provide greater relief than the United States against third party claims because there is no third tier limit on government indemnification. It is, however, important to keep in mind that the insurance commitments of these countries have never

123. AEROSPACE INDUSTRIES ASSOCIATION, RENEW U.S. COMMERCIAL SPACE LAUNCH COMPETITIVENESS (2012), *available at* http://www.aia-aerospace.org/assets/AIA_-_Renew_U_S_Commercial_Space_Launch_Indemnification.pdf.

124. FAA SHOULD UPDATE, *supra* note 110, at 9.

125. *Id.*

126. *Id.*

127. FEDERAL AVIATION ADMINISTRATION & U.S. DEPARTMENT OF TRANSPORTATION, LIABILITY RISK OF SHARING REGIME FOR U.S. COMMERCIAL SPACE TRANSPORTATION: STUDY AND ANALYSIS, 4-13 (2002).

128. *Id.*

129. *Id.*

been tested. There has never been a third party claim for a commercial space launch accident that reached the second tier.¹³⁰

IV. THE LIABILITY REGIME CREATED BY THIS TREATY CREATES AN UNEVEN PLAYING FIELD AND MAY ENCOURAGE COMMERCIAL SPACE COMPANIES TO FORUM SHOP

The liability regime described above was created when nation states dominated the space industry, which is why it now creates a potential problem in the new era of commercial space activity. This regime creates an uneven playing field for nation states. As mentioned above, each country has a different indemnification plan, and this uneven playing field may encourage forum shopping. While there are various cost factors that determine where companies decide to launch from, if in the future a commercial company does suffer a catastrophic launch event, a country's indemnification plan will become more important to commercial companies. Companies will be incentivized to do business where they can get the "best deal," or in this case, the most coverage above their insurance plan as opposed to where they can be held fiscally responsible or held to higher safety standards.

Under current international law, the nation state is liable if anything goes wrong during launch or launch related activities. But, international law does not limit the nation state's right to limit its own liability by passing on some of this liability to the launch provider. As such, most states with launch capabilities have implemented the indemnification programs described above. But, these programs are not all the same and do not limit liability evenly across the board.¹³¹ The only significant outlier is the United States, which limits its liability even more than other countries by adding a third tier of indemnification in which the liability is again handed back over to the commercial launch company.¹³² This variation among nation states gives commercial space companies a variety of options to choose from when deciding where to launch. As a result, companies are encouraged to go where they can get the best deal as opposed to where they will be held to higher standards. Countries that offer the "best deal" may also be less likely to pay damages if and when there is a catastrophic launch incident, which means the injured parties will be unable to recover.

130. FAA SHOULD UPDATE, *supra* note 110, at 6.

131. See generally FEDERAL AVIATION ADMINISTRATION & U.S. DEPARTMENT OF TRANSPORTATION, *supra* note 127, at 4-13.

132. FAA SHOULD UPDATE, *supra* note 110, at 5, 9.

A. *Flags of Convenience*

A parallel can be drawn here between the commercial space industry and the maritime law concept of the Flag of Convenience. The term has evolved over time, but in this day and age, it is commonly used to mean the owner of a vessel does not want to create an obligation with a country with stricter standards for registry; hence, the owner will register strictly for economic reasons with a country that has a more convenient registry.¹³³ By flying a Flag of Convenience, ship owners are able to avoid taxation on earnings of ships registered under these flags, and in some cases, they can also receive relief from stricter crew standards and corresponding operating costs.¹³⁴ A Flag of Convenience is flown by a vessel that is registered in one state, which the vessel has little if any connection to, when in reality the vessel is owned and operated from another state.¹³⁵ This way the vessel avoids any unfavorable economic requirements from its true home state.¹³⁶

In this sense, “flag shopping” is similar to “launch forum shopping,” similar in that Flags of Convenience are utilized for economic reasons, such as to avoid high taxes and compliance with certain restrictive international conventions, commercial space companies will forum shop when choosing which country to launch from. As of today, there has yet to be a catastrophic commercial launch incident, so for now commercial space companies do not have an incentive to forum shop, but if there is, the indemnification policies described above may lead companies to seek out countries that provide more coverage so they pay less in the event something goes wrong.

This comparison to Flags of Convenience brings up two separate yet equally important issues. First, launch companies may try to follow the Flags of Convenience model and soon catch on to the wisdom of their maritime predecessors by “registering” in countries with more favorable conditions. Of course, in this case the concern is not with registration so much as launching. If launch companies follow the Flags of Convenience model, they will seek out the most convenient state for launch, most likely the state that provides the most liability coverage and has the least safety precautions. Launching from states with lower

133. H. Edwin Anderson, *The Nationality of Ships and Flags of Convenience: Economics, Politics, and Alternatives*, 21 TUL. MAR. L.J. 140, 157 (1997).

134. BOLESŁAW A. BOCZEK, *FLAGS OF CONVENIENCE: AN INTERNATIONAL LEGAL STUDY* 26-27 (1962).

135. William Tetley, *The Law of the Flag, “Flag Shopping,” and Choice of Law*, 17 TUL. MAR. L.J. 139, 173-74 (1993).

136. *See id.*

safety standards increases the potential for catastrophic launch events. This, in turn, will place states that are potentially incapable of paying for damages from launch disasters in a position they would not normally assume if these commercial companies had not been drawn to their shores with the promise of more favorable regulations.

Second, launch customers may also seek out companies located in states with lower cost liability regimes (lower insurance policy limits) since those companies will presumably charge less to launch their payloads. In this scenario, instead of the launch companies seeking out states with lower liability caps and softer regulations, the launch customers themselves will seek companies located in states with low-cost liability regimes. Here, the effect will be the same as above. Under the Liability Convention, the launching state will be liable for any damage caused by a vehicle launched from within its borders; hence, if customers start engaging in “launch forum shopping,” states will be incentivized to put in place low-cost liability regimes, which in turn will increase the states’ potential payout in the event of a catastrophic launch incident.

Looking at the indemnification program the United States has in place in comparison to other countries, it is possible to see how either launch companies or launch customers could engage in “launch forum shopping” when a catastrophic launch incident ever occur. It is also important to keep in mind that various factors go into where a company or customer decides to launch from. A state’s indemnification program is just one factor in this decision. With this in mind, it is clear that if a launch incident did occur in the United States, the commercial launch company would be liable for much more than it would in another country.

For instance, why would a commercial space company launch in the United States, where it would be liable up to \$500 million and the additional costs that the government would not cover? The argument can be made that a catastrophic space incident has yet to occur, and even if it did, it is unlikely to cost above the \$2.7 billion covered by the United States government. Other states like Russia or France, which has the two-tier liability system, would simply cover all claims above the initial insurance, which is much lower than the \$500 million mark required by the United States. In that case, the commercial company would never have to pay more than the initial liability insurance. If there ever is a catastrophic commercial space incident in the future, it is easy to see why commercial companies or launch customers might be drawn to “launch forum shop” outside the United States.

It is also worthwhile to ask why we are concerned with “launch forum shopping” and where commercial companies launch. While there is no right answer to this question, one potential answer is national security. If companies such as SpaceX and Orbital Sciences are going to be responsible for launching the next era of U.S. satellites into orbit, then the United States should not want these companies launching satellites from other countries. Another potential answer to this question is more straightforward: jobs. If these commercial space companies stay in the United States and conduct their business here, more space launch jobs will stay within the United States and not be transferred overseas. Another potential argument is that it encourages the continuing growth of the commercial space sector in the United States. If new companies continue to enter the market here, the United States should continue encouraging them to launch from the United States to strengthen our competitiveness in the global launch market.

It is also interesting to note that the U.S. government’s indemnification program has to be renewed. It is normally granted every five years. When CSLA was amended in 2004, it was extended five years, but in 2009 it was only extended for three years, set to expire on December 31, 2012.¹³⁷ However, in November, the House of Representatives approved the extension of the commercial launch indemnification system by another year. The Senate also approved this extension of coverage to commercial space launch companies, and the bill was signed by President Obama and became Public Law No: 112-273 on January 14, 2013.¹³⁸ On December 2, 2013, the U.S. House of Representatives again passed a compromise bill, H.R. 3547, which only extended the current indemnity regime for U.S. commercial companies for one year.¹³⁹ On December 12, 2013, the Senate then passed H.R. 3547, Space Launch Liability Indemnification Act, amended as a three-year indemnity extension, lasting until December 31, 2016.¹⁴⁰

There is a changing tide in the United States. When the CSLA was enacted, the general feeling was that the commercial space industry needed the indemnification program to survive in the competitive space industry. Now, the tide is changing and many in Congress are

137. Jeff Foust, *House hearing today to examine launch indemnification*, SPACE POLITICS (June 6, 2012), <http://www.spacepolitics.com/2012/06/06/house-hearing-today-to-examine-launch-indemnification>; Jeff Foust, *HR 3819 signed into law*, SPACE POLITICS (Dec. 29, 2009), <http://www.spacepolitics.com/2009/12/29/hr-3819-signed-into-law>.

138. Space Exploration Sustainability Act, P.L. No. 112-273, 51 U.S.C. § 10101 (2013).

139. Consolidated Appropriations Act, H.R. 3547, 113th Cong. (2014).

140. S. 1753, 113th Cong. (2013).

wondering if the commercial space industry is developed enough to stand on its own. Clearly, many are still divided on this issue. The commercial space industry certainly would like to think of itself as developed and having evolved since 1984, however, as some commercial space companies are launching at the behest of the United States government, why should they not get the same indemnification benefit as other ELV launches?

B. Sovereign Immunity

Now, understanding the liability regime established under the appropriate treaties discussed above, another question to ask is: if there is a catastrophic space accident, will a sovereign nation state pay the damages it is liable for? According to the doctrine of sovereign immunity, “a sovereign may not, without its consent, be made a defendant in the courts of another state.”¹⁴¹

To this day, Canada is still the only country to make a claim that actually fell under the liability convention.¹⁴² In January 1978, large amounts of debris from a malfunctioning Soviet satellite, Cosmos 954, entered the earth’s atmosphere and fell over a large area of northern Canada.¹⁴³ A large amount of this debris was radioactive, which is why the cleanup that the Canadian government initiated was both necessary and incredibly expensive. The cleanup cost the Canadian government around \$14 million Canadian dollars.¹⁴⁴ The Canadian government submitted a claim for \$6 million Canadian dollars to the Soviet Union in January 1979; the Soviet Union and Canada settled the claim for \$3 million Canadian dollars in April 1981.¹⁴⁵

A little over a year later, Skylab, one of the United States’ “cylindrical labs and living spaces” reentered orbit on July 11, 1979.¹⁴⁶ While ground crews tried to ground the craft away from population centers, they failed and debris from Skylab scattered across the Australian Outback.¹⁴⁷ The Australian government reported that the craft

141. James J. Hogan, *International Law—Sovereign Immunity*, 15 U. MIAMI L. REV. 450, 450-51 (1960-61) (citation omitted).

142. Edward G. Lee & D.W. Sproule, *Liability for Damage Caused by Space Debris: The Cosmos 954 Claim*, 26 CAN. Y.B. INT’L L. 273, 273 (1988).

143. *Id.*

144. *Id.*

145. *Id.* at 373-74.

146. Richard D. Lyons, *Skylab Debris Hits Australian Desert; No Harm Reported*, N.Y. TIMES (2010), <http://www.nytimes.com/learning/general/onthisday/big/0711.html#article>.

147. Don Keko, *When Skylab Fell to Earth*, EXAMINER.COM (Sept. 19, 2011), <http://www.examiner.com/article/when-skylab-fell-to-earth>.

went down in the Indian Ocean, but locals in the town of Esperance reported debris.¹⁴⁸ There were no injuries, but the president of Esperance's town council did issue a \$400 "littering ticket" to the United States government, which the U.S. never paid.¹⁴⁹

These two instances involve government spacecraft that took place before the commercial space industry had even been developed. There is no data to predict how sovereign nation states will act; but this raises the question: how will a sovereign nation state respond if there is a catastrophic space incident involving a commercial space launch company? Will it follow through with its obligations under the 1972 Liability Convention like the Soviet Union did? Or will it claim sovereign immunity? This remains to be seen.

Now, after identifying the issues in the current international legal framework surrounding launching state liability, it is clear the treaties on this topic did not envision the involvement of the commercial sector in space launch activities to the extent that they are now. Hence, the treaties cannot adequately deal with the subject matter they are designed to handle since they do not include specific rules or regulations governing the commercial launch sector. So what can be done to solve this problem with the current international framework?

V. SHOULD THE PURPOSE OF THE LAUNCH MATTER: A POTENTIAL SOLUTION

This analysis leads to the issue: should commercial space companies that send tourists into space be provided the same indemnification protection as those that launch satellites for the United States government? In essence, is there a difference between indemnifying those who launch to further the United States' national interests and those who launch simply for capital gain? To answer this, it is necessary to take a closer look at interests and motives to analyze if they really are that different after all.

Commercial launch companies and space tourism companies are both interested in making a profit; however, some commercial launch companies have been contracted by nation states to launch payloads into space for them, which introduces an element of national interest and security that space tourism companies lack. Recently, the government-

148. Michael Listner, *Examining Space Law and Policy Part 3: the Liability Convention of 1972*, EXAMINER.COM (Mar. 27, 2011), <http://www.examiner.com/article/examining-space-law-and-policy-part-3-the-liability-convention-of-1972>.

149. *Id.*

supported shuttle program in the United States was deemed too expensive to continue. President Obama's plans for the future involve a radical change for NASA. Instead of developing its own space vehicles, however, NASA would fund private companies' development of space vehicles to take United States astronauts into space, in particular to the ISS.¹⁵⁰ These commercial launch companies are, in a nutshell, taxi services that take supplies up to the ISS that the United States is obligated under the treaty to bring. In the future, these commercial launch companies will potentially design capsules that can carry astronauts up to the ISS as well.¹⁵¹ SpaceX and Orbital Sciences, for instance, received contracts under the COTS project to resupply the ISS with this specific goal in mind.

So far, both SpaceX and Orbital Sciences have successfully completed resupply missions to the ISS.¹⁵² Despite the success of these two companies, it is clear that these launches have a national component that space tourism lacks—the United States is the customer.

It is also important to note that the three SpaceX launches to date were launched from Cape Canaveral, Florida, the same government property the shuttle launched from.¹⁵³ SpaceX also has a launch location at Vandenberg Air Force Base, where the company hopes to launch its Falcon 9 Heavy rocket from Space Launch Complex (SLC) 4.¹⁵⁴ SpaceX invested over \$30 million in the SLC to renovate it for the Falcon 9 Heavy. Its founder, Elon Musk, hopes SLC will compete with United Launch Alliance (ULA)'s Delta IV Heavy, which the United States government currently uses to launch its largest satellites. According to Musk, “[w]e want to launch large satellites for the Air Force . . . [t]he aim is for the Air Force to open up the competition.”¹⁵⁵ As of now, the Delta IV Heavy is the only launch vehicle of its size capable of handling large payloads up to 50,000 pounds for a total of \$275 million.¹⁵⁶ Musk

150. Charles Homans, *The Wealth of Constellations: Can the Free Market Save the Space Program?*, in U.S. NATIONAL DEBATE TOPIC 2011-2012 AMERICAN SPACE EXPLORATION AND DEVELOPMENT 43 (Christopher Mari, ed., 2011).

151. Kenneth Chang, *Businesses Take Flight, With Help from NASA*, N.Y. TIMES (Jan. 31, 2011), http://www.nytimes.com/2011/02/01/science/space/01private.html?pagewanted=all&_r=0.

152. *Spaceflight Now*, <http://www.spaceflightnow.com/tracking/launchlog.html> (last visited June 21, 2014).

153. *Launch Manifest*, SPACEX, <http://www.spacex.com/missions#completed-missions-header> (last visited June 21, 2014).

154. W.J. Hennigan, *SpaceX is making \$30-million bet on rocket at Vandenberg*, L.A. TIMES (July 12, 2011), <http://articles.latimes.com/2011/jul/12/business/la-fi-vandenberg-launchsite-20110713>.

155. *Id.*

156. *Id.*

wants to open up this market by offering lower cost launches with his Falcon 9 Heavy that can lift up to 117,000 pounds for \$80 to \$125 million.¹⁵⁷ There is no guarantee that the United States government will take him up on his offer; however, his company's successful resupply missions to the ISS will certainly count in his favor.¹⁵⁸

Certainly, SpaceX also wants to attract commercial customers other than the United States government, as it is simply the customer that gets the most attention. SpaceX also has a large commercial contract with the satellite communications company Iridium, worth \$492 million.¹⁵⁹ SpaceX has yet to complete this contract but it will after completing its resupply missions with NASA.¹⁶⁰ For the time being, however, SpaceX seems to be focused on its contracts with NASA. Besides its contract to resupply the ISS, SpaceX also received a \$440 million contract to design a manned spacecraft under NASA's Commercial Crew Integrated Program (CCiCap).¹⁶¹ Along with two other companies, SpaceX is now in the running to build both the spacecraft and the rocket to launch it; the goal of this program is to launch manned spacecraft once again from U.S. soil in the next five years.¹⁶²

There are also commercial space launches from the United States where the government is not the customer. According to the FAA's Office of Commercial Space Transportation, since 2009, there has been twenty-seven completed commercial launches.¹⁶³ Of these twenty-seven, nine launches appears to be completed at the behest of the government.¹⁶⁴ Two were the launch of national weather satellites for NOAA and NASA, and the others corresponded to the launch of the Falcon 9 and the reentry of the Dragon capsule along with the Orbital Sciences equivalent.¹⁶⁵ This demonstrates that while the United States

157. *Id.*

158. *Id.*

159. Kevin Fitchard, *How Iridium Took a Chance on SpaceX and Won*, GIGAOM (Aug. 27, 2012), <http://gigaom.com/2012/08/27/how-iridium-tohttp://gigaom.com/2012/08/27/how-iridium-took-a-chance-on-spacex-and-won>.

160. *Id.*

161. Barb Darrow, *SpaceX, Boeing, Sierra Nevada Hit Big in NASA Sweepstakes*, GIGAOM (Aug. 3, 2012), <http://gigaom.com/2012/08/03/spacex-boeing-sierra-nevada-hit-big-in-nasa-sweepstakes>.

162. *Id.*

163. Office of Commercial Space Transportation: Launches, FAA, http://www.faa.gov/data_research/commercial_space_data/launches/?type=Licensed (last visited June 22, 2014).

164. *Id.*

165. *Id.*

government is committed to investing in commercial space launches, it is evident that there are also commercial space launches where, like space tourism, the nation state is not the customer and no national interests are being furthered.

There are no better examples of private or non-government launches than those associated with space tourism, an industry on the rise ever since it began a little over a decade ago. It is estimated that by 2021, suborbital space tourism demand will be just over 13,000 passengers.¹⁶⁶ This is relatively impressive considering the limited number of passengers that can travel into space at this time.¹⁶⁷ Besides the companies listed above, there are numerous commercial space companies interested in space tourism, known as suborbital companies. Suborbital companies include: Rocketplane, SpaceDev, XCOR Aerospace, Starchaser Industries, and Blue Origin.¹⁶⁸ These companies all have the same overall goal: to take passengers to suborbital attitudes with various suborbital spaceships and space planes.

Space tourism companies are interested in making a profit, but as discussed above, they tend to lack a national interest component. However, that is not always the case. In 2011, Virgin Galactic was selected by NASA's Flight Opportunities Program to provide the agency with up to three charter flights on the company's SpaceShipTwo, a contract worth up to \$4.5 million.¹⁶⁹ The purpose of these flights is to provide scientists and researchers with the opportunity to conduct experiments in space, which up to now has been an extremely expensive and reserved exclusively for a few scientists.¹⁷⁰ This is an important step for Virgin Galactic, which until this announcement had only been thought of as a space tourism company. Other tourism companies like Bigelow Aerospace, for example, recently received a contract from NASA to build an extension for the ISS.¹⁷¹ If successful, it could be the first of many contracts and potentially be

166. *Suborbital Space Tourism Demand Revisited*, FUTRON, (Aug. 24, 2006), http://www.futron.com/upload/wysiwyg/Resources/Whitepapers/Suborbital_Space_Tourism_Revisted_0806.pdf.

167. *Id.*

168. See ERIK SEEDHOUSE, *TOURISTS IN SPACE: A PRACTICAL GUIDE* 27-45 (2008).

169. *Virgin Galactic Signs Deal with NASA for Research Missions on SpaceShipTwo*, VIRGIN GALACTIC (Oct. 13, 2011), <http://www.virgingalactic.com/news/item/virgin-galactic-signs-deal-with-nasa-for-research-missions-on-spaceshiptwo>.

170. *Id.*

171. *Private Sector Edges Deeper*, *supra* note 4; Kenneth Chang, *For Space Station, a Pod That Folds Like a Shirt and Inflates Like a Balloon*, N.Y. TIMES (Jan. 16, 2013), <http://www.nytimes.com/2013/01/17/science/space/for-nasa-bigelow-aerospaces-balloonlike-module-is-innovative-and-a-bargain-too.html>.

used to build a base on the Moon or Mars.¹⁷² Clearly, while the space tourism industry is still young and most companies have yet to take tourists to their desired suborbital destination, it is clear that NASA is taking notice of these companies and slowly beginning to partner with some of them.

As it stands, current international law does not distinguish between these two types of launches. Under the Liability Convention, a nation state will be liable for catastrophic damage caused by a commercial space company regardless of the purpose of the launch.¹⁷³ The treaty does not have a provision specifying if the launch was for purely commercial reasons, tourism purposes, or if it was in the national interest of the launching state.¹⁷⁴ The language is clear. “[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” is liable for any damage caused by its space object.¹⁷⁵ The question is, should it matter whether the launch is purely for commercial reasons or whether it involves national interests?

Looking at the United States, it is clear that when Congress amended the CSLA in 2004, it intended to indemnify commercial space transportation industries. The law states, “private industry has begun to develop commercial launch vehicles capable of carrying human beings into space and greater private investment in these efforts will stimulate the Nation’s commercial space transportation industry as a whole.”¹⁷⁶ This same sentiment is echoed in the original language of the CSLA. Clearly, the United States government intended to indemnify such programs and has continued to renew their indemnification every few years along with other commercial launch companies. However, there are other passages in the more recent Commercial Space Launch Act that predominantly focuses on supporting commercial launch companies.

For example, one passage reads, “the United States should encourage private sector launches, reentries, and associated services and, only to the extent necessary, regulate those launches, reentries, and services to ensure compliance with international obligations of the United States and to protect the public health and safety, safety of

172. *Id.*

173. Liability Convention, *supra* note 17, at 2392.

174. *Id.*

175. *Id.* art. I(c)(i), I(c)(ii).

176. Commercial Space Launch Amendments Act, H.R. 5382, 108th Cong. (2004) H.R. 5382, Pub. L. No. 108-492, 108th Congress, 2d Sess.

property, and national security and foreign policy interests of the United States.”¹⁷⁷ The more recent Commercial Space Launch Act appears to contain more language that strongly emphasizes the importance of stimulating commercial launch rather than commercial space tourism.¹⁷⁸ Was this done intentionally? Should it make a difference? Do space tourism companies deserve the same level of indemnification as commercial launch companies? Should nation states be liable for launches that do not further their interests and do not involve national security?

Perhaps the answer should not depend on the classification of the company but the purpose of the mission. There are clearly some commercial launch companies that launch for purely commercial reasons and some that launch under government contracts. There are also clearly some space tourism companies that operate purely to make a profit by bringing paying customers into space. But then again, there are those that have government contracts to bring astronauts and scientists into space for scientific research. Taking this information into account, it is not correct to classify all commercial launch companies as having a “national interest” and all space tourism companies as operating strictly for themselves and the highest paying customer without taking into account the “national interest.” If the nation state is going to be liable for any damage caused by launches from within its borders, these launches should involve the nation state’s national interest; if not, then the commercial space company should be the ultimate guarantor of liability should something go wrong in space.

VI. THE INTERNATIONAL FRAMEWORK NEEDS TO BE UPDATED TO REFLECT THE CURRENT STATE OF THE SPACE INDUSTRY

Ultimately, the liability regime established by the Outer Space Treaty and the Liability Convention needs to be updated to reflect the current state of the space industry. Mainly, commercial space companies are on the rise and that needs to be taken into account when deciding when and if launching states are liable for space activities within the nation state. These treaties were written in an era when national governments dominated the space industry, and as demonstrated above, this is no longer the case. Commercial space launches, both for the national interest and for the space tourism, are on

177. 51 U.S.C. § 50901(a)(7) (2010).

178. See generally FAA SHOULD UPDATE, *supra* note 110, at 5.

the rise and these treaties either need to be re-written to incorporate this reality or new treaties need to be written to encompass this idea.