

# COMMENT

## AD ASTRA PER ASPERA:<sup>1</sup> SHAPING A LIABILITY REGIME FOR THE FUTURE OF SPACE TOURISM\*

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1. “To the stars through difficulties.” The phrase *Ad Astra per Aspera* is present on the “golden records” launched on the Voyager spacecraft in 1977 as a sort of galactic time capsule. In 2006, Voyager 1 was more than 9.3 billion miles from the sun—farther than any human-made object has traveled in space. A.J.S. Rayl, *Voyager 1 Sailing Past 100 AU En Route to Interstellar Space*, PLANETARY SOC’Y, Aug. 15, 2006, [http://www.planetary.org/news/2006/0815\\_Voyager\\_1\\_Sailing\\_Past\\_100\\_AU\\_en\\_route.html](http://www.planetary.org/news/2006/0815_Voyager_1_Sailing_Past_100_AU_en_route.html). Voyager 1 continues to travel towards interstellar space. *Id.*

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I. INTRODUCTION

In 1968, Stanley Kubrick imagined the future of space tourism as a side note to his classic film, 2001: A Space Odyssey. In the film, flight attendants on a shuttle to the moon wore attractive white pant suits with inexplicable, egg-shaped hats and served space food on cafeteria trays or sat demurely in powder pink skirt suits in a futuristic flight lounge.2 The public announcement system informed passengers departing for the moon that

[d]espite [an] excellent and continually improving safety record there are certain risks inherent in space travel . . . [I]t is [therefore] necessary for the Space Carrier to advise you that it cannot be responsible for the return of your body to Earth should you become deceased on the Moon . . . . However[,] . . . insurance covering this contingency is available in the Main Lounge.3

While Kubrick’s estimate of when commercial human space flight would become routine was extremely optimistic, his prediction that insurance and liability would play a crucial role in the commercialization of space was accurate.4 The liability regime that exists today was designed around a commercial space industry that primarily serviced the government and private satellite launch customers. Among these groups, liability for harm or damage is strictly limited by statutorily required

2. 2001: A SPACE ODYSSEY (MGM 1968).
3. R. Thomas Rankin, Space Tourism: Fanny Packs, Ugly T-Shirts, and the Law in Outer Space, 36 SUFFOLK U. L. REV. 695, 695 (2003) (quoting 2001: A SPACE ODYSSEY, supra note 2).
4. See Charity Trelease Ryabinkin, Let There Be Flight: It’s Time to Reform the Regulation of Commercial Space Travel, 69 J. AIR L. & COM. 101, 119 (2004) (highlighting the importance of liability insurance to the commercial launch industry).

reciprocal waivers. Payload customers, launch providers, and contractors all self-insure. Further, liability for third-party damages is capped at the “maximum probable loss,” with the government acting as an insurer for losses above that level.

This Comment examines the existing liability regime and argues that it is not suited to the particular challenges of space tourism. The current liability regime is not conducive to the growth of a commercial human space flight industry for several reasons. The regulatory requirements that mandate reciprocal waivers between launch providers and their customers do not extend to space tourists—“space flight participants” in the terminology of the Federal Aviation Administration (FAA)—and crew. Because there is no federal law requirement for reciprocal waivers, any waivers that are executed are interpreted under state law, and the efficacy of the waivers varies widely among states. The result is highly uncertain liability for launch providers. This Comment argues that the United States should implement a federal statutory liability regime for space tourists similar to the one that governs commercial launch providers, which is based on the limited liability regime that governed early commercial air transportation.

Part II of this Comment provides an overview of the existing international and domestic liability regimes governing third-party damages and harm to space tourists. Part III discusses the development of limited liability regimes during the early commercial aviation industry and, more recently, for the general aviation sector that provide models for a liability regime for space tourism. Finally, Part IV of this Comment recommends that the United States adopt a limited liability regime for space tourism to encourage the growth of the industry. Such a regime should require reciprocal waivers for space flight participants to create a basis for consistent enforcement of those waivers and set a statutory limit on damages that can be recovered by space flight participants.

#### A. *Background*

Today, eight years after Kubrick’s imagined date for the discovery of intelligence beyond the Earth, space tourism remains, to some degree, the province of science fiction. Human space flight is not yet routine,<sup>5</sup> and private companies seeking to

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5. See, e.g., *The Future of Human Space Flight: Hearing Before the H. Comm. on Science*, 108th Cong. 4 (2003) (discussing the failure of the Space Shuttle to meet its original goal of making human access to space cheap, routine, and reliable).

provide commercial human access to space continue to make steady but slow progress toward that goal.<sup>6</sup> In December 2006, only two U.S. companies were licensed by the FAA to perform launches with humans onboard: Scaled Composites and XCOR.<sup>7</sup> The FAA considered six other companies “serious candidates” for licensing and estimated that over the next decade five or six more companies will be licensed for human launches.<sup>8</sup>

Given the slow progress of commercial launch providers, it is not surprising that the only tourists to go beyond suborbital flight into outer space have traveled on Russian government-launched Soyuz spacecraft.<sup>9</sup> In 2001, Russia, looking to help fund its struggling space program, sold Dennis Tito the first private ticket to the International Space Station (ISS).<sup>10</sup> Space Adventures, a company that has brokered five of such trips, is currently advertising a “journey to the far side of the moon” on the Soyuz for \$100 million per seat; there are two seats available.<sup>11</sup> Space Adventures’ vision statement claims that “[o]ver the next decade Space Adventures will fly more people to

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6. See Rachel A. Yates, *Minimizing Regulation of Space Tourism to Stimulate Commercial, Private Launch Capabilities 1*, Paper Presented at the 57th International Astronautical Congress (Oct. 3, 2006), available at <http://www.hollandhart.com/articles/minimizingregsofspacetourism.pdf> (detailing the “increased activity” by private companies to expand commercial space ventures).

7. Human Space Flight Requirements for Crew and Space Flight Participants, 71 Fed. Reg. 75,616, 75,630 (Dec. 15, 2006) [hereinafter Final Rule]. Of the two, only Scaled Composites successfully launched a vehicle; thus, the FAA stated that “the industry currently consists of one company.” *Id.*

8. *Id.* In a recent report to Congress, the Congressional Research Service noted that Virgin Galactic has a spaceport under construction in New Mexico and plans to begin suborbital passenger flights on its six-passenger “spaceliner” in 2008. DEBORAH D. STINE, CONG. RESEARCH SER., U.S. CIVILIAN SPACE POLICY PRIORITIES: REFLECTIONS 50 YEARS AFTER SPUTNIK 7 (2008). Similarly, EADS-Astrium, a European aerospace consortium, has a four-person craft in development that may provide suborbital commercial flights by 2012. *Id.*; Press Release, EADS-Astrium, Astrium Rockets Into Space Tourism (June 13, 2007), available at <http://www.astrium.eads.net/en/press-center/press-releases/2007/astrium-rockets-into-space-tourism>; see also *Commercial Space Transportation Beyond the X Prize: Hearing Before the Subcomm. on Aviation of the H. Comm. on Transportation & Infrastructure*, 109th Cong. (2005) [hereinafter *Commercial Space Transportation Hearing*] (discussing the future of the U.S. commercial space transportation industry).

9. The Soyuz is a reusable vehicle that Russia uses to transport crew and supplies to the International Space Station (ISS). It launches from Baikonur, Kazakhstan, and seats three people. The Soyuz is also the emergency crew egress vehicle for permanent ISS crews. NASA, Space Station Assembly: Russian Soyuz TMA Spacecraft, [http://www.nasa.gov/mission\\_pages/station/structure/elements/soyuz/index.html](http://www.nasa.gov/mission_pages/station/structure/elements/soyuz/index.html) (last visited Apr. 10, 2009).

10. See Catherine E. Parsons, *Space Tourism: Regulating Passage to the Happiest Place Off Earth*, 9 CHAP. L. REV. 493, 499 (2006) (asserting that Russia began its space tourism enterprise to seek “funds for its struggling space program and grossly indebted country”).

11. Space Adventures, Lunar Mission, <http://www.spaceadventures.com/index.cfm?fuseaction=Lunar.Details> (last visited Apr. 10, 2009).

space than have made the journey since the dawn of the Space Age.”<sup>12</sup> Despite its advertising, Space Adventures does not launch people into outer space. Instead, they broker arrangements for the Russian Space Agency to provide a seat on a previously scheduled Soyuz flight to the ISS.<sup>13</sup>

### *B. Space Tourism Today*

Over the last few years, private companies have begun significant efforts to make commercial human space flight viable.<sup>14</sup> As of 2003, the European Aeronautic and Defense Company (EADS) Astrium Space Transportation Group had studied the feasibility of a space hotel and was developing a small, reusable tourist transport vehicle.<sup>15</sup> In 2006, Bigelow Aerospace launched the first inflatable human habitat into space and created a \$50 million prize as an incentive for U.S. companies to develop a transportation system to carry tourists and crew to a future space hotel and possibly a pharmaceutical lab.<sup>16</sup>

All of these attempts to extend the human reach into space take place within a legal and regulatory regime that developed over the past half-century around unmanned launches and launches by state actors. The liability regime, in particular, has a significant impact on the viability of the space tourism industry and its ability to manage cost and risk as it grows into maturity.<sup>17</sup>

## II. LIABILITY REGIME FOR SPACE TOURISM

One of the biggest commercial challenges facing private launch providers today, and by implication the future of the

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12. Space Adventures, Vision, [http://www.spaceadventures.com/index.cfm?fusaction=Our\\_Vision.welcome](http://www.spaceadventures.com/index.cfm?fusaction=Our_Vision.welcome) (last visited Apr. 10, 2009).

13. See Parsons, *supra* note 10, at 501 (explaining the role of Space Adventures in space tourism).

14. See Yates, *supra* note 6, at 1 (reviewing recent developments in private space travel, including work by Space Adventures, the European Space Agency, and Bigelow Aerospace).

15. Lesley Jane Smith & Kay-Uwe Hörl, *Legal Parameters of Space Tourism* 1 (2003), available at [http://www.weber-steinhaus.com/bereiche\\_de/publikation\\_downloads/003LegalParameters.pdf](http://www.weber-steinhaus.com/bereiche_de/publikation_downloads/003LegalParameters.pdf).

16. Yates, *supra* note 6, at 1; see also Victor Godinez, *Where No Enterprise Has Gone Before: From Orbital Hotels to Low-Gravity Manufacturing, Texas Ventures Prepare for Launch*, DALLAS MORNING NEWS, Sept. 23, 2007, at D1 (stating that Bigelow plans to have humans in the first habitat by 2012; by 2017, he expects to have three habitats in orbit that can be rented by hotels or pharmaceutical firms).

17. See Ryabinkin, *supra* note 4, at 119–20 (describing the challenges to the reusable launch vehicle (RLV) industry posed by the existing regulatory regime, including the current liability and indemnification provisions).

space tourism industry, is the liability regime attaching to commercial reusable launch vehicle (RLV) operations.<sup>18</sup> As a result, several industry observers have concluded that limits on liability are a requirement if the space tourism industry is to flourish.<sup>19</sup> Similar limitations on liability were central to the financial viability of the commercial aviation industry,<sup>20</sup> which in turn drew inspiration from the early limits placed on liability in maritime law.<sup>21</sup> This Comment suggests that the United States should establish a limited liability regime for space tourists who voluntarily use private launch services.

#### A. *International Liability Regime*

Internationally, commercial launch providers come under the provisions of the 1967 United Nations 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).<sup>22</sup> The Outer Space Treaty incorporated the “principles of peaceful use of outer space, cooperation between spacefaring nations and the extension of the rule of law into outer space.”<sup>23</sup> The treaty was negotiated long before any states

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18. *Id.* at 119.

19. See *Extension of Space Launch Indemnification: Hearing Before the Subcomm. on Space & Aeronautics of the H. Comm. on Science*, 106th Cong. 1–2 (1999) (statement of Rep. Dana Rohrabacher, Chairman, H. Subcomm. on Space & Aeronautics) (reviewing the strength of the U.S. commercial space launch industry); ASSOC. ADM’R FOR COMMERCIAL SPACE TRANSP., U.S. DEPT. OF TRANSP., LIABILITY RISK-SHARING REGIME FOR U.S. COMMERCIAL SPACE TRANSPORTATION: STUDY AND ANALYSIS 3 (2002) [hereinafter LIABILITY RISK-SHARING REGIME], available at [http://www.faa.gov/about/office\\_org/headquarters\\_offices/ast/media/FAALiabilityRiskSharing4-02.pdf](http://www.faa.gov/about/office_org/headquarters_offices/ast/media/FAALiabilityRiskSharing4-02.pdf) (reviewing public comments on the existing liability regime and industry views in an effort to improve the U.S. launch industry); Ryabinkin, *supra* note 4, at 136 (“[I]f tourism is to become a vital part of the commercial space equation, limits on liability for the owners and operators of space facilities and vehicles will be a necessity.” (quoting Patrick Collins, *The Regulatory Reform Agenda for the Era of Passenger Space Transportation* (Univ. of Tokyo, Research Ctr. for Advanced Sci., Paper No. 96-f-13, 1996), available at [http://www.spacefuture.com/archive/the\\_regulatory\\_reform\\_agenda\\_for\\_the\\_era\\_of\\_passenger\\_space\\_transportation.shtml](http://www.spacefuture.com/archive/the_regulatory_reform_agenda_for_the_era_of_passenger_space_transportation.shtml))).

20. See *infra* Part III.A (discussing the history of limits on liability on international air travel).

21. See José A. Cabranes, *Limitations of Liability in International Air Law: The Warsaw and Rome Conventions Reconsidered*, 15 INT’L & COMP. L.Q. 660, 666–67 (1966) (citing HUIBERT DRION, LIMITATION OF LIABILITIES IN INTERNATIONAL AIR LAW 12–13 (1954)) (noting commonly asserted justifications for limited liability in commercial aviation).

22. 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, 18 U.S.T. 2410, 2412, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty]; see also Ryabinkin, *supra* note 4, at 119–20 (describing the international liability regime governing commercial space launches).

23. Richard Berkley, *Space Law Versus Space Utilization: The Inhibition of Private*

seriously contemplated the possibility of a viable commercial space tourism industry.<sup>24</sup> As a result, the treaty places responsibility for all launching activities, both governmental and nongovernmental, on national governments.<sup>25</sup> In other words, under the treaty, the U.S. government is liable for the actions of U.S. commercial launch providers.<sup>26</sup> The lack of an international system of law and liability for commercial space exploration and space tourism leaves a significant lacuna.<sup>27</sup>

The Outer Space Treaty was a product of the multilateral approach to outer space that developed in the 1960s and 1970s in the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS).<sup>28</sup> The United Nations' approach was well suited to the Cold War context that framed the initial attempts to explore beyond Earth. It has proven too rigid, however, to accommodate the more complex constellation of commercial space exploration and space tourism emerging fifty years later. The design of the multilateral regime governing the exploration of outer space does not foster private exploitation of and access to

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*Industry in Outer Space*, 15 WIS. INT'L L.J. 421, 423 (1996).

24. See Steven Freeland, *Up, Up and . . . Back: The Emergence of Space Tourism and Its Impact on the International Law of Outer Space*, 6 CHI. J. INT'L L. 1, 4–5, 10 (2005) (suggesting that the terms of the treaty make it clear that the drafters did not anticipate the advent of commercial space tourism); see also Glenn Harlan Reynolds, *International Space Law in Transformation: Some Observations*, 6 CHI. J. INT'L L. 69, 71 (2005) (observing that drafters of the space treaties envisioned a world in which governments dominated space travel); Julie C. Easter, Note, *Spring Break 2023—Sea of Tranquility: The Effect of Space Tourism on Outer Space Law and World Policy in the New Millennium*, 26 SUFFOLK TRANSNAT'L L. REV. 349, 371 (2003) (“The drafters of space law treaties did not contemplate tourism in outer space as an industry requiring international legislation. The U.N. treaties exhibited the global belief that human space travel and tourism were far-fetched realities.” (internal footnote omitted)); Michael Wollersheim, *Considerations Towards the Legal Framework of Space Tourism* (2nd Int'l Symposium on Space Tourism Paper, 1999), available at [http://www.spacefuture.com/archive/considerations\\_towards\\_the\\_legal\\_framework\\_of\\_space\\_tourism.shtml](http://www.spacefuture.com/archive/considerations_towards_the_legal_framework_of_space_tourism.shtml) (“When the Outer Space Treaty was created and went into force, nobody would have wasted a thought about direct private activities in outer space.”).

25. See Outer Space Treaty, *supra* note 22, art. VI (“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 . . . . The activities of non-governmental entities in outer space . . . shall require authorization and continuing supervision by the appropriate State Party to the Treaty.”).

26. See Yates, *supra* note 6, at 1–2 (observing that under the 1972 Convention on International Liability for Damage Caused by Space Objects, “the U.S. government bears responsibility as a launching state for activities conducted on its territory or by its citizens which launch or procure a launch”).

27. See Freeland, *supra* note 24, at 5 (“[T]he absence of clear international legal principles is a concern.”).

28. See Easter, *supra* note 24, at 359 (describing the development of the U.N. system of space law and governance in the 1960s and 1970s).

space,<sup>29</sup> and it fails to account for the variety of private and commercial actors and the tasks they will undertake in space.<sup>30</sup> In fact, some observers argue that the regime has, at least to some extent, inhibited the private development of space access.<sup>31</sup>

The Outer Space Treaty is supplemented by the 1972 Convention on International Liability for Damage Caused by Space Objects (Liability Convention).<sup>32</sup> The Liability Convention imposes liability on the launching state for damage caused by space objects, as opposed to placing the burden of liability on the private actors responsible for commercial launches.<sup>33</sup> The launching states are absolutely liable for any damage done on Earth and are subject to fault-based liability for damage done to objects in space, such as satellites and space stations.<sup>34</sup> The Convention is inhospitable to space tourists in that it does not allow for a private cause of action; rather, only states may bring claims under the Liability Convention.<sup>35</sup> The Liability Convention is also unfriendly to launching states because it prescribes no ceiling on the amount of liability that may be claimed against them.<sup>36</sup> The absolute liability provisions of the Liability Convention motivated many countries, including the United States, to draft legislation that allows the countries to share their liability with commercial launch providers.<sup>37</sup>

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29. See Berkley, *supra* note 23, at 422 (arguing that at the time the international outer space law regime was created, a bias existed toward government control and use of outer space); see also Smith & Hörl, *supra* note 15, at 4 (asserting that although the U.N. space conventions address liability, they do not do so from the perspective of commercial operators).

30. See Freeland, *supra* note 24, at 18 (“[I]t is clear that the existing rules of space law, which rely solely on state responsibility and liability, are not appropriate for an industry that will principally be undertaken as a private commercial venture.”).

31. Berkley, *supra* note 23, at 422.

32. Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 2389, 2391, 961 U.N.T.S. 187 [hereinafter Liability Convention].

33. See Freeland, *supra* note 24, at 16 (explaining the liability regime as it emerged from the “state oriented” system of the outer space treaties).

34. Liability Convention, *supra* note 32, arts. II, III; see also LIABILITY RISK-SHARING REGIME, *supra* note 19, at 6-2 to -3 (noting that absolute liability applies to damage on the ground or to aircraft in space, whereas fault-based liability applies to damage that occurs elsewhere, such as in orbit).

35. Liability Convention, *supra* note 32, art. VIII (“A State which suffers damage, or whose natural or juridical persons suffer damage, may present to a launching State a claim for compensation . . . .”); *id.* art. IX (“A claim for compensation for damage shall be presented to a launching State through diplomatic channels.”); Freeland, *supra* note 24, at 16.

36. Liability Convention, *supra* note 32, art. XII (limiting liability to that amount which “restores” the damaged party); see also Freeland, *supra* note 24, at 17–18 (outlining various approaches to liability).

37. See Freeland, *supra* note 24, at 16 (positing that the imposition of joint and

*B. The United States Liability Regime*

Within the United States, commercial launch providers are regulated by the Commercial Space Launch Amendments Act (CSLAA).<sup>38</sup> Passed by Congress in 2004, the CSLAA provides the regulatory system for commercial uses of space.<sup>39</sup> The Act established the authority of the FAA over commercial launch activities,<sup>40</sup> created a licensing structure that included a requirement for liability insurance by the launching entities, and limited the United States' liability under the multilateral Liability Convention by sharing liability with commercial operators.<sup>41</sup> However, like the United Nations before it,<sup>42</sup> Congress constructed the early versions of the Act without space tourism in mind.<sup>43</sup> Rather, the Commercial Space Launch Act (CSLA) developed in the late 1980s around the commercial expendable launch vehicle (ELV) industry work of launching satellites into orbit.<sup>44</sup>

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several liability is one of the reasons that many countries are enacting national space laws that allow them to reduce their liability by passing on financial responsibility to private launching companies); *see also infra* Section II.B (discussing the existing U.S. liability regime for commercial launch providers).

38. Commercial Space Launch Amendments Act of 2004, Pub. L. 108-492, 118 Stat. 3974 (2004) (codified at 49 U.S.C. §§ 70101–70121 (2006)).

39. 49 U.S.C. §§ 70101, 70103 (2006) (advancing “the goal of safely opening space to the American people and their private commercial . . . enterprises” and granting the Secretary of Transportation the authority to promulgate regulations to encourage private space ventures).

40. *See* Parsons, *supra* note 10, at 514–15 (“In 2012 . . . full regulatory control will pass to the FAA.”).

41. *Id.* at 513. For further discussion of the legislative history of the Commercial Space Launch Act (CSLA), *see* Parsons, *supra* note 10, at 512–18.

42. *See* Easter, *supra* note 24, at 371 (“The drafters of space law treaties did not contemplate tourism in outer space as an industry requiring international legislation. The U.N. treaties exhibited the global belief that human space travel and tourism were far-fetched realities.” (internal footnote omitted)); *see also* LIABILITY RISK-SHARING REGIME, *supra* note 19, at 1-1 to -8 (tracing the development of the current regulatory and risk sharing regime from the CSLA of 1984 through the amendments to the Act made in 2000).

43. *See* LIABILITY RISK-SHARING REGIME, *supra* note 19, at 1-1 to -8 (illustrating Congress's concern with private space flights for commercial activities while failing to contemplate space tourism). The United States has yet to come to terms with the implications of personal space flight on the liability regime. Chris Kunstadter, co-chair of the FAA's Commercial Space Transportation Advisory Committee (COMSTAC) Risk Management Working Group (RMWG) noted that the RMWG had formed a Commercial Human Space Flight Task Force to address risk and insurance for space tourism and other commercial human space flight, but that the RMWG felt that “a study on the availability of insurance for personal space flight is premature at this time.” COMSTAC, Meeting Minutes, Oct. 11, 2007, at 8–9, *available at* [http://www.faa.gov/about/office\\_org/headquarters\\_offices/ast/advisory\\_committee/meeting\\_news/archive/](http://www.faa.gov/about/office_org/headquarters_offices/ast/advisory_committee/meeting_news/archive/) (follow “Oct. 2007” hyperlink).

44. *See* Ryabinkin, *supra* note 4, at 110–12, 119 (discussing the Commercial Space

1. *Overview of CSLAA Liability Provisions.* The CSLAA contains three distinct systems of liability. First, the CSLAA addresses limited indemnification for commercial launch providers against catastrophic third-party damage. To meet the United States' international obligations, CSLAA imposes strict liability on commercial space launch providers and requires them to obtain \$500 million in third-party liability insurance.<sup>45</sup> The United States is obligated to indemnify the launch providers against excess liability up to \$1.5 billion.<sup>46</sup> Any liability above \$2 billion is the responsibility of the launch provider.<sup>47</sup> Other space-faring nations have a much more forgiving liability regime for commercial launch providers.<sup>48</sup> France, for instance, does not cap the government's indemnification for third-party claims.<sup>49</sup> Further, the limited U.S. indemnity provisions are scheduled to expire at the end of 2009 without further congressional action.<sup>50</sup>

The CSLAA provides a second, lesser level of protection against first-party liability risks for launch providers, their contractors and customers, and space tourists: the Act provides mandatory reciprocal waivers for harm suffered by the U.S. government, launching parties, and their contractors and customers.<sup>51</sup>

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Act of 1998, the predecessor to the CSLA); *see also* Reynolds, *supra* note 24, at 70–71 (noting that the 2004 version of the CSLA explicitly recognizes the space tourism industry where prior versions had not).

45. 49 U.S.C. § 70112(a) (2006).

46. 49 U.S.C. § 70113(a)(1) (2006).

47. Ryabinkin, *supra* note 4, at 120. *But see* Laura Montgomery, *Space Tourism and Informed Consent: To Knowingly Go*, 51 FED. LAW 26, 28 (2004) (noting that the indemnification provisions of the law are “only a provisional agreement by the government subject to conditions, including congressional appropriation of funds”).

48. *See* Ryabinkin, *supra* note 4, at 135–36 (highlighting the limits that the U.S. indemnification regime places on the competitiveness of U.S. launch providers in the international market for launch services).

49. *Id.*

50. *See* 49 U.S.C. § 70113 (2006) (setting forth the conditions under which the U.S. government will indemnify launch providers against claims for third-party liability in excess of the required insurance coverage amounts and limiting such indemnification to claims received before Dec. 31, 2009); S. REP. NO. 108-111, at 1 (2003) (giving the purpose of the Commercial Space Transportation Act of 2003 as the extension of the CSLA indemnification provisions through Dec. 31, 2009).

51. 49 U.S.C. § 70112(b) (2006); *see also* Brooke Nicole Weeber, Dirk C. Gibson & Matthew Petrunia, *Adequate Risk Communication & Informed Consent: The Duty to Warn, Judicial Warning Adequacy Standards, and the Federal Aviation Administration's Proposed "Human Space Flight Requirements for Crew & Spaceflight Participants" 1*, Paper Presented at AIAA Space 2006 Conference and Exposition (Sept. 19–21, 2006) (noting that the regulatory protection ordinarily given to citizens was specifically not provided to space tourists, and instead, the FAA imposed strict informed consent requirements).

Third, and finally, the CSLAA does not require reciprocal waivers between commercial launch providers and space tourists and crew for harm suffered during a flight, although the same parties are required to execute reciprocal waivers of liability with the U.S. government.<sup>52</sup> The Act also includes a “fly at your own risk” provision that allows uncertified vehicles to fly tourists, provided the tourists give informed consent.<sup>53</sup>

Each of the three systems of liability is discussed in detail below. This Comment argues that the liability regime governing space tourism is the weakest of the three and the most in need of revision in order to foster development of a commercial human space flight industry.<sup>54</sup>

2. *Indemnification for Third-Party Liability in Commercial Human Space Flight.* The basis for the U.S. risk-sharing regime for third-party liability was developed in the original 1988 CSLA and remains in place today under the 2004 CSLAA.<sup>55</sup> Congress hoped that the risk-sharing regime established in the Act would alleviate a major threat to the viability of the nascent commercial launch industry.<sup>56</sup> Public comments to later proposed versions of the Act suggested that creating stability in both the insurance and indemnification regime was critical for the success of the U.S. launch industry.<sup>57</sup> Further, Congress hoped to level the

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52. See *infra* notes 81–89 and accompanying text (discussing the types of waivers required under the law).

53. 49 U.S.C. § 70105(b)(5) (2006) (providing the conditions under which a launch licensee may launch and return space tourists); see also 14 C.F.R. § 460.45 (2008) (detailing the requirements for informed consent that must be obtained before an operator makes an agreement to fly a space flight participant or receives payment for such a flight); Parsons, *supra* note 10, at 513 (discussing the victories for the industry in the 2004 CSLAA, including the informed consent provisions and the extension of indemnification for third-party liability).

54. See *infra* Part IV (recommending changes to the liability regime for space tourism).

55. J.A. VEDDA, CTR. FOR SPACE POLICY & STRATEGY, STUDY OF THE LIABILITY RISK-SHARING REGIME IN THE UNITED STATES FOR COMMERCIAL SPACE TRANSPORTATION 1 (2006), available at [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). Although FAA policy requires all vehicle operators to insure against third-party liability, spaceport operators are not required to carry this type of insurance. *Id.* at 20.

56. S. REP. NO. 100-593, at 4 (1988) (“A major source of uncertainty in the development of a commercial ELV industry has been the cost and availability of . . . liability insurance . . .”); see also H. REP. NO. 100-639, at 2 (1988) (stating that the general purpose of the legislation is “to facilitate commercial access to space”).

57. See LIABILITY RISK-SHARING REGIME, *supra* note 19, at ES-3 (summarizing the public views and recommendations obtained in 2001); see also VEDDA, *supra* note 55, at 5-6 (reviewing congressional motivations for pursuing the CSLA, including the creation of a stable liability insurance market that could provide full coverage for U.S. and foreign launch providers). See generally CONG. RESEARCH SERV., INSURANCE AND THE U.S.

playing field between U.S. industry and foreign launch providers who received similar or better indemnification against catastrophic loss.<sup>58</sup>

The indemnification regime has three tiers.<sup>59</sup> In Tier I, companies bear full responsibility for obtaining insurance up to the amount the FAA determines as the “maximum probable loss,” up to \$500 million, or “[t]he maximum liability insurance available on the world market at a reasonable cost.”<sup>60</sup> Under Tier II, the U.S. government provides indemnification for catastrophic losses in excess of the Tier I amounts, up to \$1.5 billion in 1988 dollars, which is approximately \$2 billion today.<sup>61</sup> However, the government will not indemnify against willful misconduct.<sup>62</sup> Finally, Tier III requires the private launch provider to pay for any liability in excess of the Tier II.<sup>63</sup>

In August 2006, the FAA completed an assessment of the CSLAA’s third-party liability risk-sharing regime.<sup>64</sup> The report focused on whether the U.S. government should maintain the current regime, in which the government shares the risk of low-probability but high-consequence third-party liability, or allow

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COMMERCIAL SPACE INDUSTRY (June 20, 1988) (identifying the issues facing the development of a stable insurance market for commercial launch providers).

58. See S. REP. NO. 100-593, at 3 (1988) (describing the disparate systems of indemnification among several launching nations); LIABILITY RISK-SHARING REGIME, *supra* note 19, at ES-3 (noting that the public believed that the sunset provision in the Act was “exploited by foreign competitors, who have no monetary caps [on indemnification] or expiration date, nor are they subject to [the same] appropriation concerns” faced by U.S. launch providers); VEDDA, *supra* note 55, at 7 (discussing U.S. national space policy goals in the context of the indemnification provisions of the CSLAA).

59. LIABILITY RISK-SHARING REGIME, *supra* note 19, at ES-2 (summarizing the components of the risk-sharing regime under the CSLAA).

60. See 14 C.F.R. § 440.9(c) (2008) (defining the requirements for third-party liability insurance for commercial human space flight launch providers). The FAA estimates that the chance of liability exceeding the maximum probable loss (MPL) figure is approximately 1 in 10 million. LIABILITY RISK-SHARING REGIME, *supra* note 19, at 3-2.

61. See 14 C.F.R. § 440.19(a) (2008) (providing the conditions under which the United States will pay claims in excess of the required insurance under CSLA); VEDDA, *supra* note 55, at 2 (describing Tier II liability).

62. 14 C.F.R. § 440.19(b) (2008); VEDDA, *supra* note 55, at 2.

63. See VEDDA, *supra* note 55, at 2 (“If a claim exceeds the combined amount of the licensee’s MPL insurance and the government’s indemnification, financial responsibility remains with the licensee or legally liable party.”). The U.S. system is “nearly comparable” to its foreign competitors with four significant exceptions: (1) most of the competing nations use a simpler, two-tier system, where the U.S. has a three-tier system; (2) the United States has a more complicated method for determining insurance requirements; (3) the U.S. regime has a sunset provision with the current indemnification provisions set to expire in 2009; and (4) U.S. government indemnification is subject to congressional appropriations and is therefore not fully guaranteed. LIABILITY RISK-SHARING REGIME, *supra* note 19, at ES-6.

64. VEDDA, *supra* note 55, at ix.

the provisions for indemnification to expire.<sup>65</sup> The report concluded that nearly two decades after the first legislative attempts to support the U.S. commercial space launch industry, private insurance markets remained unable to provide full coverage to commercial launch providers.<sup>66</sup> Since 2001, both aviation and space companies have faced challenges in obtaining affordable, appropriate insurance.<sup>67</sup> In the 1990s, insurers offered total coverage for the space industry of about \$1.3 billion; in 2001, it was as little as \$300 million.<sup>68</sup>

In part, the constriction in the market can be attributed to the peculiar nature of space launch insurance: it is a volatile market because space launch activities are by their nature high risk and there are relatively few launches among which insurers can spread their risk of liability.<sup>69</sup> As a result, one or two major failures, or several successes, can lead to a significant change in the market.<sup>70</sup> In fact, data from the insurance industry suggests that even a single maximum probable loss claim could paralyze the market.<sup>71</sup> If that happened, the Tier II indemnification by the U.S. government would be the only coverage available to keep commercial launches going until the insurance industry recovered.<sup>72</sup>

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65. *Id.* at x.

66. *Id.* (summarizing the findings of the report). *But see* FED. AVIATION ADMIN, COMMERCIAL SPACE AND LAUNCH INSURANCE: CURRENT MARKET AND FUTURE OUTLOOK SR-1 (2d Quarter, 2006), available at [http://www.faa.gov/about/office\\_org/headquarters\\_offices/ast/media/2Q2006\\_QLR.pdf](http://www.faa.gov/about/office_org/headquarters_offices/ast/media/2Q2006_QLR.pdf) [hereinafter COMMERCIAL SPACE AND LAUNCH INSURANCE] (noting that in 2005 and 2006, the space insurance industry had experienced an increase in capacity, breaking the downward trend). Although the market for space tourism insurance is an entirely new one, the FAA restricted its comments to the empty observation that “[i]nsurance for commercial human space flight is an interesting new area to watch . . . .” *Id.* at SR-9; *see also supra* note 43 and accompanying text (reporting on FAA’s reluctance to engage in a full study of insurance for personal space travel at this time).

67. *See* Ruwantissa Abeyratne, *Synergies and Problems in Outer Space Insurance and Air Transport Insurance*, 30 *TRANSP. L.J.* 189, 190 (2003) (asserting that the effects of Sept. 11, 2001, created a crisis in aviation insurance and space insurance that “imposed a severe strain on companies that launch new spacecraft”).

68. *Id.*

69. *See* COMMERCIAL SPACE AND LAUNCH INSURANCE, *supra* note 66, at SR-4 (describing the elements of the space launch insurance market that lead to its volatility).

70. *See id.* at SR-5 (“This concentration of risk, coupled with the low frequency of launches, allows a few major launch failures to quickly change the nature of the market.”).

71. *See* VEDDA, *supra* note 55, at 41 (noting that the number of commercial space launches is still too low to allow insurers to sustain even a single maximum probable loss claim).

72. *See id.* at 44 (arguing that U.S. government indemnification is important as a backup to private insurance in the event the insurance industry is unable to sustain coverage for commercial launches).

The space launch insurance market, in the words of the FAA report, remains “fragile.”<sup>73</sup> The likelihood of a catastrophic failure or accident increases with the number of commercial launches and the duration of commercial missions. RLVs, which will be used for space tourism flights, will require insurance not only for launch, but also for reentry.<sup>74</sup> Permanent or semi-permanent commercial space stations, such as the one proposed by Bigelow, will also require third-party liability insurance to account for damage done when the stations must eventually be deorbited.<sup>75</sup>

The existing indemnification structure meets the needs of the industry for protection against catastrophic loss from third-party damage claims. However, as discussed in the next Section, in addition to third-party liability, commercial space operators face potentially enormous liability to their contractors, customers, crew, and passengers. It is not clear that the current system adequately addresses the risk from these liabilities, in large part because there is no federal requirement for waivers among space tourists and launch providers. This Comment argues that the system of voluntary waivers for crew and passengers creates problems for the industry by introducing unnecessary risk of excess liability despite the presence of waivers and informed consent.

3. *Individual Liability and Reciprocal Waivers.* The CSLAA creates a two-tiered system of waivers. Launch providers and operators are required under federal law to execute reciprocal waivers with their “customers,”<sup>76</sup> subcontractors, and the government.<sup>77</sup> The requirement for cross-waivers significantly limits liability among the operators of space vehicles and the licensing authority.<sup>78</sup> Although prior to the FAA’s Final Rule the effectiveness of the reciprocal waivers varied based on state law, the new Final Rule explicitly made federal law applicable, preempting conflicting state laws.<sup>79</sup> However, no clear precedent

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73. *Id.* at 40.

74. *Id.* at 43.

75. *See id.* (observing that large structures like habitation modules and space stations may not burn up completely on reentry, and might cause damage).

76. “Customers” do not include space tourists. 14 C.F.R. § 440.3(1) (2008) (defining a “customer” as any person “[w]ho procures launch or reentry services from a licensee or permittee . . . [w]ith rights in the payload . . . [w]ho has placed property on board the payload . . . or . . . [t]o whom the customer has transferred its rights”).

77. 14 C.F.R. § 440.17 (2008).

78. Final Rule, *supra* note 7, at 75,628 (noting that Congress used cross-waivers “to reduce litigation expenses by requiring launch participants to assume responsibility for their own losses”).

79. *Id.* (observing, in response to a public inquiry, that the waivers required by the

exists for federal law governing waivers between space tourists and commercial operators because the waivers are not currently required under federal law.<sup>80</sup>

In place of a reciprocal waiver requirement for space tourists, the CSLAA essentially legislates personal responsibility on the part of the space tourist.<sup>81</sup> The Act requires space flight participants to provide informed consent to all of the known risks of the space flight they undertake.<sup>82</sup> The law also requires the participants and crew to give up the right to sue the U.S. government for damages arising from the space flight.<sup>83</sup> Although the CSLAA does not require space flight participants and crews

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CSLA should be construed under federal rather than state law, preempting state tort laws).

80. *Id.* at 75,627; *see also* FED. AVIATION ADMIN., WAIVERS OF LIABILITY: ARE THEY ENOUGH FOR PERMITTEES AND LICENSEES? SR-1 (4th Quarter, 2006) *available at* [http://www.faa.gov/about/office\\_org/headquarters\\_offices/ast/media/4Q2006\\_QLR.pdf](http://www.faa.gov/about/office_org/headquarters_offices/ast/media/4Q2006_QLR.pdf) [hereinafter WAIVERS OF LIABILITY] (noting that reciprocal waivers are not required between space tourists and commercial operators and discussing the implications of inconsistent state law on voluntary waivers). However, space flight participants *are* required to sign reciprocal waivers with the U.S. government. *See* Final Rule, *supra* note 7, at 75,628 (discussing the requirements for space tourists and crew on commercial human space launches).

81. *See* Laura Montgomery, *Space Tourism and Informed Consent: To Knowingly Go*, FED. LAW., Jul. 2004, at 26, 26. (discussing the informed consent and reciprocal waiver provisions of the CSLA); *see also* APT RESEARCH, INC., STUDY ON INFORMED CONSENT FOR SPACEFLIGHT PARTICIPANTS 3 (2008) [hereinafter STUDY ON INFORMED CONSENT], *available at* [http://www.faa.gov/about/office\\_org/headquarters\\_offices/ast/reports\\_studies/media/Informed%20Consent%20Report.doc](http://www.faa.gov/about/office_org/headquarters_offices/ast/reports_studies/media/Informed%20Consent%20Report.doc) (examining for the FAA “what a commercial space flight operator will need to do to satisfy the regulatory requirements of 14 CFR Part 460”); Weeber et al., *supra* note 51, at 1730 (analyzing the relatively limited protections afforded by FAA regulations to space tourists).

82. *See* 14 C.F.R. § 460.45(a) (2008) (“Before receiving compensation or making an agreement to fly a space flight participant, an operator must . . . inform each space flight participant in writing about the risks of the launch and reentry . . .”). In addition, the operator must disclose each known hazard, the possibility of unknown hazards, and that the participant may suffer “death, serious injury, or total or partial loss of physical or mental function.” 14 C.F.R. § 460.45(a)(1)–(3). Further, the operator must inform each participant of the safety record of all human space flights, including the total number of people who have flown in space and the total number who have died or suffered serious injury; the total number of catastrophic failures; and the safety record of the particular vehicle being flown. 14 C.F.R. §§ 460.45(c), (d). Finally, the operator must obtain written informed consent from each participant indicating the participant’s understanding of the risk and his or her voluntary participation in the mission. 14 C.F.R. § 460.45(f). *See generally* STUDY ON INFORMED CONSENT, *supra* note 81, at 3 (summarizing informed consent requirements); Weeber et al., *supra* note 51, at 1731–34 (discussing informed consent and adequate risk communication in space tourism). Although Weeber and colleagues identify risks that this Author finds unlikely, including “encounters with extraterrestrials” and black holes, the paper raises some interesting questions about informed consent as mandated by the FAA. *Id.* at 1725–28.

83. 14 C.F.R. § 440.17 (2008); *see also* Final Rule, *supra* note 7, at 75,627 (discussing the required waivers between participants, the crew, and the U.S. government during launch, flight, and reentry). The FAA Final Rule provides a model agreement between space flight participants and the FAA. 14 C.F.R. § 440 App. E (2008).

to execute waivers with launch providers, neither does it prevent them from doing so.<sup>84</sup> In effect, the Act makes space tourists “informed consumers.”<sup>85</sup>

Reciprocal waivers reduce the risk of tort liability, thus reducing insurance premiums for launch operators.<sup>86</sup> Waivers allow each tourist to self-insure for whatever amount he or she feels is appropriate.<sup>87</sup> In practice, however, because the waivers are not governed by federal law, it is not clear when and to what extent they would be enforced by state courts.<sup>88</sup> The result is a great deal of uncertainty concerning the extent of potential liability to which launch operators might be exposed—even when they are voluntarily released from liability by the space flight participant.<sup>89</sup>

4. *Reciprocal Waivers in the Courts.* The law on reciprocal waivers evolved following the passage of amendments to the first CSLA in 1988.<sup>90</sup> The following year, the California Court of Appeals upheld a waiver of liability between Western Union and McDonnell Douglas.<sup>91</sup> The California court found that in the particular context of the space launch industry, reciprocal waivers were an appropriate means of assigning liability.<sup>92</sup> The

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84. See Final Rule, *supra* note 7, at 75,627 (explaining that the CSLAA and the FDA regulations do not require space tourists or crews to waive claims against an operator, though they must waive claims against the U.S. government).

85. See Montgomery, *supra* note 81, at 27 (discussing the informed consent and waiver requirements of the CSLAA); see also Jeff Foust, *RLV Regulation: Licensing vs. Certification*, SPACE REV., Apr. 28, 2003, <http://www.thespacereview.com/article/18/1> (crediting Peter Diamandis with developing the “accredited passenger” concept for spaceflight, based on the accredited investor category of investors, in which sophisticated consumers are allowed to take on more personal risk than uninformed consumers).

86. Kim B. Watson, *Have the Courts Grounded the Space Launch Industry? Reciprocal Waivers and the Commercial Space Launch Act*, 39 JURIMETRICS J. 45, 53 (1998).

87. *Id.*

88. See WAIVERS OF LIABILITY, *supra* note 80, at SR-1 (discussing the issues facing launch providers seeking to create enforceable waivers with space tourists).

89. See *id.* (discussing the ways in which voluntary waivers could be voided).

90. See Watson, *supra* note 86, at 48–51.

91. *Appalachian Ins. Co. v. McDonnell Douglas Corp.*, 262 Cal. Rptr. 716, 731 (Cal. Ct. App. 1989).

92. *Id.* The court stated:

In this context, of a highly specialized, risky new technology, it was not commercially unreasonable for the parties to agree Western Union would obtain insurance to protect it against the risk of loss rather than to have McDonnell Douglas warrant performance of the upper stage rocket. As a practical matter, it was a question of whether Western Union wanted to directly pay for insurance by obtaining insurance itself or indirectly pay for insurance by requiring McDonnell Douglas obtain the insurance and give a warranty.

same year, Martin Marietta successfully defended a suit by Intelsat claiming that Martin Marietta had been tortiously negligent for the failure of its Titan III rocket to place Intelsat's satellite into the proper orbit.<sup>93</sup> Intelsat argued that the reciprocal waiver did not apply to gross negligence.<sup>94</sup> The court, relying on the new provisions in the 1988 Amendments, rejected Intelsat's interpretation of the limits of the reciprocal waiver provisions.<sup>95</sup> The revised Act, and the report that accompanied it, made it clear that the goal of the legislation's requirement for reciprocal waivers was to limit potential liability and the accompanying need for insurance.<sup>96</sup> As a result, the usual exemption for gross negligence did not apply.<sup>97</sup>

The Fourth Circuit reversed the district court, relying on Maryland state law that a party cannot waive liability for gross negligence.<sup>98</sup> The Fourth Circuit's decision created an apparent conflict with the language of the Senate report.<sup>99</sup> However, in the context of ordinary negligence, the Fourth Circuit explicitly agreed with the district court's reasoning that parties of equal sophistication who allocate risk to insurance or each other should be held to the terms of the contract rather than to the tort duties found in state law.<sup>100</sup> The result was a murky precedent for the question of whether gross negligence is exempt from claims under a reciprocal waiver and a suggestion that the answer would vary from state to state.<sup>101</sup>

The FAA addressed the problem of federal preemption and inconsistent state law in its 2006 Final Rule.<sup>102</sup> The rule makes

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*Id.*

93. *Martin Marietta Corp. v. Int'l Telecomms. Satellite Org.*, 763 F. Supp. 1327, 1334 (D. Md. 1991), *aff'd in part, rev'd in part*, 991 F.2d 94 (4th Cir. 1992).

94. *Martin Marietta*, 763 F. Supp. at 1333.

95. *Id.* (remarking that this represented a "rare instance" where Congress explicitly required parties to allocate their own risk of loss).

96. *Id.* at 1333–34.

97. *Id.* at 1333.

98. *Martin Marietta*, 991 F.2d at 99–100 (applying Maryland law to hold that "a waiver of a right to sue . . . is ineffective to shift the risk of a party's own willful, wanton, reckless, or gross conduct." (quoting *Boucher v. Riner*, 514 A.2d 485, 488 (Md. Ct. Spec. App. 1986))).

99. *See id.* at 100 ("[N]either the language of the [CSLAA] Amendments nor their legislative history reflects a Congressional intent to protect parties from liability for their own gross negligence."). *But see* *Watson*, *supra* note 86, at 57 (discussing the Fourth Circuit's reasoning and asserting that it is in conflict with the plain language of the Senate Report).

100. *Martin Marietta*, 991 F.2d at 98 (quoting 763 F. Supp. at 1332–33).

101. *See* *Watson*, *supra* note 86, at 58 (observing the Fourth Circuit case's weaknesses in light of the language of the CSLAA).

102. *See* Final Rule, *supra* note 7, at 75,628 (clarifying the waiver requirements in

clear that the *required* waivers between operators, customers, and contractors and the U.S. government are to be construed under federal law rather than state law.<sup>103</sup> Had the Final Rule been in place in 1992, the Fourth Circuit would have probably found that the waiver also covered gross negligence.<sup>104</sup>

Waivers between space tourists and commercial operators raise a different set of issues than waivers between two companies. Because the law does not require waivers between tourists and commercial operators, there is no clear basis for federal preemption of state law governing tort liability.<sup>105</sup> In addition, the relationship among the parties is different and potentially more unbalanced than in the case of two commercial entities.

The *Martin Marietta* court noted that the law may impose a duty of care independent of the contractual relationship in order to protect a vulnerable party in a commercial transaction.<sup>106</sup> In such cases, “an unsophisticated consumer, unfamiliar with the subject matter of the contract, who relied on the representations of someone holding himself or herself out as possessing special expertise” might not be in an equal bargaining position with a space launch provider.<sup>107</sup> A consumer could therefore potentially bring a claim for negligent misrepresentation.

As a result, whether contractual limits on liability would be enforced in consumer contracts between space launch operators and space tourists is an open question.<sup>108</sup> The FAA addressed this issue in a special report in late 2006.<sup>109</sup> The FAA noted that operators should take heed of state law in constructing their waivers, thus requiring an overview of the applicable law in those jurisdictions where space tourist operations were underway

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the CSLAA).

103. *Id.* (“Congress required crew and space flight participants to sign waivers of claims against the U.S. government. Accordingly, in order to avoid conflicts with any state law to the contrary, federal law must apply.”). Note that the term “customers” as used in the CSLAA does not include space tourists. *See supra* note 76 and accompanying text.

104. Although this clarification was contained in the FAA Final Rule, it does not apply to optional waivers between space tourists and commercial operators. *See* Final Rule, *supra* note 7, at 75,627.

105. *See supra* notes 76–80 and accompanying text (discussing the recently clarified status of waivers required under the CSLAA as construed under federal law).

106. *See* *Martin Marietta Corp. v. Int’l Telecomms. Satellite Org.*, 991 F.2d 94, 98 (4th Cir. 1992) (noting, however, that the present case did not present such a situation).

107. *Id.*

108. *See* WAIVERS OF LIABILITY, *supra* note 80, at SR-2 to -4 (discussing the differences among states in the enforcement of contractual waivers between launch providers and space tourists).

109. *See id.* at SR-4 (advocating the creation of a system of waivers to address liability with regard to space tourists).

or contemplated.<sup>110</sup> The FAA report further asserted that waivers will not protect operators from liability for intentional torts, willful misconduct, or gross negligence, but gave no authority for this assertion aside from the definition of gross negligence found in *Black's Law Dictionary*.<sup>111</sup> As a result, it is still unclear what types of claims may be effectively waived. What the report did make clear is that the law varies greatly among states and that the enforceability of waivers between participants and operators is by no means certain.<sup>112</sup>

Despite the variability among states, the generally accepted view seems to be that space tourists are a sophisticated group with extensive resources who understand and knowingly assume the risk of space travel.<sup>113</sup> In *Martin Marietta*, the district court upheld the reciprocal waiver after finding that both parties were sophisticated and had the ability to fairly allocate risks between themselves.<sup>114</sup> Similarly, reciprocal waivers of liability between sophisticated space tourists and space travel providers would probably be enforceable, provided the parties observe the varying strictures imposed by state laws.<sup>115</sup> However, in the absence of a clear precedent or any statutorily imposed limit on liability, uncertainty in liability means increased risk exposure for operators, and thus higher insurance costs.

Although the potential cost of these risks individually pales in comparison to the risk of third-party liability, the uncertainty in the law and the potential for multiple claims from a single

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110. *Id.* at SR-2 to -4.

111. *Id.* at SR-1 n.8.

112. *See id.* at SR-2 (“Judicial tolerance of liability waivers for recreational activities varies by jurisdiction.”). The report provides examples of the local peculiarities of enforceability for waivers in various states. In Alaska, the word “negligence” must be used in the waiver; in California, waivers must distinguish between harm arising from negligence and harm arising from inherent risks; in New Mexico, there is a strong public policy favoring freedom to contract (and thus enforceability of waivers); in Oklahoma, gross negligence claims cannot be waived; in Texas, it is unclear whether gross negligence can be waived, and potential derivative claims include loss of consortium and wrongful death; in Virginia, public policy strictly and universally forbids waivers of liability for negligent personal injury; in Washington, only those risks contemplated by the client can be waived; and in Wisconsin, each waiver is adjudicated under a strict scrutiny standard. *Id.* at SR-2 to -3. The FAA’s recommendation is that the space launch industry lobby state governments to enact state legislation to provide liability protection. *Id.* at SR-4.

113. Freeland, *supra* note 24, at 2, 18 (discussing the nature of the space tourist industry and the risk involved).

114. *Martin Marietta Corp. v. Int’l Telecomms. Satellite Org.*, 763 F. Supp. 1327, 1332 (D. Md. 1991); *see also* Watson, *supra* note 86, at 54 (reviewing the district court’s decision).

115. *See, e.g., Willis v. Willoughby*, 202 S.W.3d 450, 453 (Tex. App.—Amarillo 2006, pet. denied) (applying “the contractual doctrine of assumed risk” to relieve the defendant of liability for foreseeable injury).

launch or mission failure make this a significant threat to the financial health of the space tourism industry.<sup>116</sup> It is a threat that the U.S. government can cure simply by adopting a federal limit on liability for space tourists. Such a limit is not without precedent, and one need look no further for an example than to the immediate predecessor of the space tourism industry: commercial aviation.<sup>117</sup>

### III. DEVELOPMENT OF A LIMITED LIABILITY REGIME FOR AVIATION

In January 2008, Burt Rutan, the innovator behind Scaled Composites, told reporters that commercial suborbital flights on Virgin Galactic's SpaceShipTwo would be "at least as safe as air travel in the 1920s."<sup>118</sup> It is a fitting comparison. The early days of commercial aviation bear a striking resemblance to commercial human spaceflight today.<sup>119</sup> Additionally, the pioneers of the aviation industry faced similar liability challenges.<sup>120</sup>

In the decades following the Wright Brothers' first successful flight in 1903 and the establishment of regular commercial flights in 1918,<sup>121</sup> the commercial aviation industry was unregulated.<sup>122</sup> The rate of fatal accidents was high: approximately 45 deaths per million miles flown, the modern equivalent of nearly 250,000 deaths a year from aviation

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116. See Watson, *supra* note 86, at 58 (observing that the potential liability for first-party harm from gross negligence, if not waivable, could cripple the industry).

117. In 2005, the FAA Administrator compared the current state of space tourism with early aviation, asserting in her testimony to Congress that "the environment we are in is similar to the barnstorming days of early aviation. Those early fliers took great risk as part of the deal. People who flew with the pioneers also flew because they loved the thrill, and it opened up a whole new world." *Commercial Space Transportation Hearing*, *supra* note 8, at 8.

118. Steve Creedy, *Out-of-This-World Trips Will Shrink the Globe*, AUSTRALIAN, Feb. 1, 2008, at 36 (describing the publicity surrounding Virgin Galactic's unveiling of SpaceShipTwo, which will provide suborbital flights for about \$200,000 per person).

119. See *Commercial Space Transportation Hearing*, *supra* note 8, at 8 (statement of FAA Administrator Marion C. Blakey) (comparing the current state of space tourism to the early "barnstorming" days of aviation); Ryabinkin, *supra* note 4, at 106 (noting that like early aviation, space flight is "uncharted territory" for most passengers).

120. See *infra* Part III.A (describing the development of a limited liability regime to support the nascent commercial aviation industry).

121. Ryabinkin, *supra* note 4, at 104 ("By 1918, air mail flights were well established. Regularly scheduled commercial passenger service began the following year." (internal footnote omitted)).

122. See Spencer H. Bromberg, *Public Space Travel—2005: A Legal Odyssey into the Current Regulatory Environment for United States Space Adventurers Pioneering the Final Frontier*, 70 J. AIR L. & COM. 639, 648 (2005) (arguing that limited regulation was critical for the success of the early commercial aviation industry).

accidents.<sup>123</sup> The high number of deaths led to public outcry, which in turn led to government action.<sup>124</sup> In 1938, Congress passed the Civil Aeronautics Act.<sup>125</sup> By the late 1950s, commercial air travel increased, as did mid-air collisions.<sup>126</sup> Congress responded by passing the Federal Aviation Act, which established the FAA.<sup>127</sup> Nearly forty years after Congress established the Agency, the FAA assumed responsibility for the regulation of commercial space launches.<sup>128</sup>

Although the commercial human space flight industry that exists today is not seeking to recreate the freewheeling experimentation that characterized the Wright Brothers' early aviation exploits, the new industry does need a regulatory and liability regime that allows it to balance risk, safety, and innovation.<sup>129</sup> The international community developed just such a regime for commercial aviation in the 1920s.

#### A. *Liability Limits in International Air Travel: The Warsaw Convention*

Presaging the surge of multilateralism that emerged after World War II,<sup>130</sup> the international community responded more quickly to the needs of the nascent aviation industry than the U.S. government. In 1929, twenty-three countries signed a "radical" multilateral agreement: the Convention for the Unification of Certain Rules Relating to International Carriage by Air, popularly known as the Warsaw Convention.<sup>131</sup>

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123. Ryabinkin, *supra* note 4, at 104 & n.7.

124. *See id.* ("Despite the hazards posed by early air travel—or perhaps because of them—representatives of the world's developed nations gathered in 1929 to develop a forward-looking international aviation regime.")

125. Civil Aeronautics Act, 49 U.S.C. §§ 401–681 (Supp. IV 1938); *see also* Cabranes, *supra* note 21 at 665–66 (providing a discussion of the liability concerns and rules from the Warsaw and Rome Conventions).

126. *See* Bromberg, *supra* note 122, at 648–49.

127. 49 U.S.C. § 1341 (1958); *see also* Bromberg, *supra* note 122, at 648–49 ("As the jet age approached, midair collisions increased, prompting the passage of the Federal Aviation Act of 1958[,] . . . which established the [FAA].").

128. *See* Bromberg, *supra* note 122, at 649 (noting the evolution of FAA responsibility).

129. *See* Parsons, *supra* note 10, at 525 (arguing that Congress should adopt "a hands-off approach" to regulating the space tourism industry).

130. *See* Christopher J. Borgen, *Whose Public, Whose Order? Imperium, Region, and Normative Friction*, 32 YALE J. INT'L L. 331, 339 (2007) ("The period immediately following World War II was one of international institution building like few other times in history.")

131. Warsaw Convention, Oct. 12, 1929, 49 Stat. 3000, 137 L.N.T.S. 11; *see also* Ryabinkin, *supra* note 4, at 104–05 (arguing that the Convention was a "forward-looking" attempt to bolster the early aviation industry through limiting liability). The Warsaw

The Warsaw Convention provided an international regulatory structure for the commercial transportation of people and goods via airplanes.<sup>132</sup> Its objectives were, among others, to standardize liability across the international aviation industry and to avoid conflicts of laws among states.<sup>133</sup> The Warsaw Convention's most significant impact on the fledgling aviation industry was to limit the liability of aviation companies to their passengers.<sup>134</sup> Air carriers agreed to strict liability in return for a cap on liability at 125,000 francs per person per accident.<sup>135</sup> The limits could only be overcome in the event of willful misconduct or mutual agreement between passenger and carrier.<sup>136</sup> As a result, "capital was freed to invest in technological improvements and to expand into new international markets[] and . . . the airlines were able to reach out to insurers to minimize risk."<sup>137</sup>

Although later modifications to the Warsaw Convention gradually raised the liability cap,<sup>138</sup> in practice, the Convention shifted the financial risk associated with flight from airlines to passengers. Those who supported this limited liability approach

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Convention went into effect in 1933. Tory A. Weigand, *The Modernization of the Warsaw Convention and the New Liability Scheme for Claims Arising out of International Flight*, 84 MASS. L. REV. 175, 175 n.2 (2000).

132. See Bromberg, *supra* note 122, at 649 (describing the characteristics of the Warsaw Convention's liability provisions).

133. See Weigand, *supra* note 131, at 175 (observing that the Convention grew out of conflicting national rules on liability for air transport accidents). Another liability framework for international aviation was proposed at the Rome Convention of 1952. Cabranes, *supra* note 21, at 662. The Rome Convention was the aviation analog to Outer Space's Liability Convention. Notably, the recognition of the concept of enterprise liability was what distinguished the Rome Convention from the Warsaw Convention. *Id.* at 678.

134. See Bromberg, *supra* note 122, at 649 (noting the positive effects of the Warsaw Convention's limited liability provisions); see also *Domangue v. E. Air Lines, Inc.*, 722 F.2d 256, 261 (5th Cir. 1984) ("We find it clear that the dominant objective [of the Warsaw Convention] was to permit the growth of an infant industry by setting limits of liability. Such limits would make affordable insurance to protect air carriers. It would also subsequently decrease the cost of transporting passengers.")

135. Warsaw Convention, *supra* note 131, arts. 17, 22; see Weigand, *supra* note 131, at 176 (noting that the liability limit was approximately \$8,300). In 1999, the U.S. Supreme Court held that the Warsaw Convention, despite its silence on the issue, provided the exclusive remedy in those incidents where it applied. *El Al Israel Airlines, Ltd. v. Tseng*, 525 U.S. 155, 172, 176 (1999) (holding that the plaintiff could not use state or federal remedies even when the incidents on the international flight were not "accidents" under the Warsaw Convention).

136. See Warsaw Convention, *supra* note 131, art. 22(1) (providing that carriers and passengers may agree on higher liability limits); *id.* art. 25(1) (stating that the limits do not apply in cases of harm where the carrier had an intent to cause damage or knowledge that his reckless behavior would cause damage); see also Weigand, *supra* note 131, at 179 (describing the exceptions to the liability limits).

137. Bromberg, *supra* note 122, at 649.

138. See Weigand, *supra* note 131, at 180–82 (describing the actual and attempted modifications to the Warsaw Convention between 1955 and 1999).

argued that “the consumer, as a beneficiary of the enterprise, might properly be made to share the risk of air transportation” by self-insuring.<sup>139</sup> This argument is very similar to one made by contemporary observers about space tourism: space tourists voluntarily accept the risks of space flight and therefore their assumption of risk should limit the liability of the space launch providers.<sup>140</sup>

Under the Warsaw Convention, airlines had two defenses against strict liability: (1) that the passenger was contributorily negligent; and (2) that the carrier used “all necessary measures” to avoid the accident.<sup>141</sup> Also significant for space tourism, the U.S. Supreme Court defined the term “accident” under the Convention to exclude injury resulting from a passenger’s individual response to the normal conditions and operations of the aircraft.<sup>142</sup> This would suggest that under a Warsaw-like regime for commercial human space flight, normal, expected responses to space flight (such as pressurization sickness, radiation exposure, bone loss, etc.) would not be compensable accidents. The Supreme Court also determined that the Warsaw Convention requirement of “bodily injury” excludes recovery for a purely mental or psychological injury.<sup>143</sup>

The United States criticized the low limits that the Warsaw Convention placed on recovery.<sup>144</sup> Accordingly, the United States failed to adopt a 1955 Hague Protocol that doubled the limits, but

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139. Cabranes, *supra* note 21, at 671–72.

140. Freeland, *supra* note 24, at 18.

141. See Weigand, *supra* note 131, at 176 (discussing application of the Convention).

142. See *Air France v. Saks*, 470 U.S. 392, 404–06 (1985) (holding that a passenger on an Air France flight that became deaf due to normal cabin depressurization had no basis for recovery under the Warsaw Convention because no “accident” had occurred as defined by the Convention). In this decision, the Court distinguished the use of the term “accident” in the Convention from the “accident or occurrence” use common in insurance policies, and determined that the *cause* of the injury had to be accidental, not the injury itself. *Id.* at 398–99; see also Weigand, *supra* note 131, at 177–78 (noting that “significant debate remains” about the definition of “accident” under the Convention, and in particular, whether there must be “some connection to the *abnormal operation* of the aircraft; whether it includes actions or conduct of fellow passengers; whether it includes medical emergencies involving a passenger’s preexisting medical condition” and other issues).

143. *E. Airlines, Inc. v. Floyd*, 499 U.S. 530, 552 (1991) (“We conclude that an air carrier cannot be held liable under [the Warsaw Convention] when an accident has not caused a passenger to suffer death, physical injury, or physical manifestation of injury.”); see also Weigand, *supra* note 131, at 178 (noting that the Court left unresolved the issue of whether “mental injuries which are accompanied by physical injuries” are compensable).

144. Weigand, *supra* note 131, at 180–81 (noting the United States’ continued dissatisfaction with the low liability limits).

only to the equivalent of about \$16,000.<sup>145</sup> Ten years later, the United States, frustrated by its futile attempts to raise the liability limits to \$100,000, filed a notice of its intent to denounce the Warsaw Convention.<sup>146</sup> The result was the compromise Montreal Interim Agreement that had limited applicability and raised liability limits to \$75,000.<sup>147</sup> Although it was not appropriate for the mature commercial aviation industry, the limited liability regime of the Warsaw Convention provides an excellent model for a similar regime for space tourism while the industry is in its infancy.

*B. Limiting Liability in U.S. General Aviation: The General Aviation Revitalization Act (GARA)*

Limiting liability for space tourism has precedent in the more recent past as well. During the 1990s, the United States acted to preserve the foundering general aviation industry by creating a different kind of limited liability regime. Long after the commercial aviation industry was mature enough to no longer require strict limits on liability, the general aviation sector of the industry was in serious trouble.<sup>148</sup> From 1978 to 1994, annual sales of piston-engine planes fell from 14,000 to 555 planes.<sup>149</sup> In the same period, the number of lawsuits against aircraft manufacturers increased and annual product liability costs rose from \$24 million to \$200 million.<sup>150</sup> As litigation surged, manufacturers had trouble obtaining liability insurance.<sup>151</sup> Flight school operators and independent flight instructors faced similar challenges: as insurance carriers pulled out of the market, flight schools were forced to close their doors.<sup>152</sup> Insurance carriers,

145. *Warsaw Convention Is Denounced by U.S.*, N.Y. TIMES, Nov. 15, 1965, at xx12.

146. Weigand, *supra* note 131, at 180.

147. *See id.* at 180–81 (noting that the 1966 Montreal Interim Agreement increased the liability limit and waived the “all necessary measures” defense, but only applies to flights that begin, stop, or end in the United States); *see also* 14 C.F.R. §§ 203.3–203.4 (1999) (making all carriers operating to and from the United States parties to the Montreal Interim Agreement).

148. *See* James F. Rodriguez, Note, *Tort Reform & GARA: Is Repose Incompatible with Safety?*, 47 ARIZ. L. REV. 577, 578 (2005) (“In the decade and a half leading up to [the General Aviation Revitalization Act], the general aviation industry saw a marked decline. From 1978 to 1994, annual sales of all general aviation aircraft fell from approximately 18,000 to 928.”). General aviation includes all aircraft that seat less than twenty people and are not used for scheduled passenger flights. *Id.* at 584. Most often, this means “piston-powered, single-engine airplanes,” but it also includes “helicopters, gyroplanes, gliders, airships, balloons, and any other craft designed to fly.” *Id.*

149. *Id.* at 578.

150. *Id.* at 578–79.

151. *Id.* at 579.

152. *See* Nathan A. Ferguson, *Surviving an Industry Nightmare: The Commercial*

though “prepared to insure the risks of aviation,” were unprepared to insure “the risks of the American legal system.”<sup>153</sup>

During the 1980s and early 1990s, the cost of products liability litigation added between \$70,000 and \$100,000 to the cost of *each* new airplane sold and caused several manufacturers to shut their doors.<sup>154</sup> The result was nearly 100,000 jobs lost and a billion-dollar shift in the balance of aviation trade to the benefit of foreign competitors.<sup>155</sup> Congress responded by passing the General Aviation Revitalization Act (GARA), an eighteen-year statute of repose for suits against the industry.<sup>156</sup>

GARA resulted not only in an increase in the manufacture and sale of general aviation aircraft in the United States, but an improvement in safety and technology as well.<sup>157</sup> These improvements were the result of capital investment in the industry that would have been impossible prior to the limits on liability provided in GARA.<sup>158</sup> Contrary to the fears of GARA’s critics, the general aviation industry’s safety record has continued to improve since the passage of the legislation.<sup>159</sup> It

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*Insurance Crisis Hits Home*, 44 AOPA PILOT 78, 78–80 (2001), available at <http://www.aopa.org/pilot/features/2001/feat0103.html> (describing the effect of the General Aviation insurance crisis on Pauline Glasson, the 89-year old owner of a flight school in Corpus Christi, Texas, and other aircraft owners and operators).

153. Rodriguez, *supra* note 148, at 579 (quoting Robert Martin, *General Aviation Manufacturing: An Industry Under Siege*, in THE LIABILITY MAZE: THE IMPACT OF LIABILITY LAW ON SAFETY AND INNOVATION 478, 484 (1991)).

154. *Id.* at 580.

155. *See id.* (stating that the trade was \$340 million in 1978 and the trade deficit was \$800 million in 1992).

156. General Aviation Revitalization Act of 1994 (GARA), Pub. L. No. 103-298, 108 Stat. 1552, 1552–53 (1994). A statute of repose provides “a legislatively mandated limitation which reflects a policy determination that a point in time arrives beyond which a potential defendant should be immune from liability for past conduct.” *Bell v. Schell*, 101 P.3d 465, 472 (Wyo. 2004) (citation omitted). In short, statutes of repose rest on the assumption that

after a reasonable period of operating without injury or accident, the law deems a product *carefully designed and manufactured*. . . [A] product’s performance during the repose period is evidence the manufacturer has met its “duty to make [the product] carefully.” Therefore, public policy dictates a manufacturer should not be subject to litigation burdens for design or manufacturing defects after the requisite period has passed.

Rodriguez, *supra* note 148, at 581 (quoting *MacPherson v. Buick Motor Co.*, 111 N.E. 1050, 1053 (N.Y. 1916)) (internal footnotes omitted).

157. *See* Rodriguez, *supra* note 148, at 593 (asserting that the pre-GARA business environment harmed the industry and threatened safety and providing the example of Unison Industries, which reentered the general aviation market after passage of GARA and made significant investments in new technology—including electronic ignition systems—that improved performance and safety).

158. *See id.* (citing Unison Industries’ claim that they “emphatically” would not have made investments in technology development and equipment without GARA).

159. *Id.* at 604.

appears that the reduction in liability exposure allowed an “influx of new aircraft and new technology,” which, as a result, increased safety.<sup>160</sup>

Like the early aviation industry, the space tourism industry would benefit from a legal regime that limits the potential liability of commercial launch providers to space tourists who knowingly assume the risks of space flight. The following Part makes a recommendation for how the United States might implement such a limited liability regime.

#### IV. RECOMMENDATION FOR A LIABILITY REGIME FOR SPACE TOURISTS

Existing law is insufficient to meet the challenges of a global space tourism industry.<sup>161</sup> Requiring states to be responsible for the activities of both private and public actors launching from their territory is not a viable model for a future in which large numbers of independent commercial operators will send humans into space on a regular basis.<sup>162</sup> Neither does it provide a stable framework for commercial investment.<sup>163</sup> As a result, a new multilateral regime should be established to supplement the existing international law of outer space; the treaty should govern the liability of private actors conducting space operations generally, and specifically address the liability of those operators providing space tourism services.<sup>164</sup> A detailed recommendation for a new international regime, however, is beyond the scope of this Comment, which focuses on the United States’ liability regime.

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160. *Id.* But see Nathan J. Rice, Comment, *The General Aviation Revitalization Act of 1994: A Ten-Year Retrospective*, 2004 WIS. L. REV. 945, 971 (2004) (arguing that GARA should be repealed because the industry has recovered since the passage of the legislation and GARA’s liability limitations have been “grossly unfair” to airplane crash victims).

161. See Freeland, *supra* note 24, at 15 (arguing that “a system of responsibility and liability must be established at the international level . . . to regulate circumstances where a space tourist suffers injury, loss, or damage” and that “existing international space law is inadequate”).

162. See *id.* at 17 (noting the need for “a uniform and comprehensive regime for passenger liability arising from space tourism activities”).

163. See Easter, *supra* note 24, at 382 (asserting that without significant change to the existing liability regime, “[c]ompanies and nations will not be willing to expand the commercial uses of space”).

164. See Freeland, *supra* note 24, at 18; see also Easter, *supra* note 24, at 381 (“Individual states must no longer be the only parties liable for outer space activity. Private companies . . . must also have guidelines addressing their international liability for damage caused . . . .” (internal footnote omitted)); Rankin, *supra* note 3, at 714 (“The international community would benefit from the development of a commercial liability treaty, similar to the Warsaw Convention, for commercial space travel.”).

The United States should take the following steps to clarify the liability regime for space tourism and protect the burgeoning domestic space tourism industry: (1) remove the sunset provision ending the existing third-party indemnification regime in 2009; (2) amend the FAA final rule to require reciprocal waivers between space flight participants and space launch providers; and (3) codify statutory limits on liability among space tourists and launch providers until the industry is sufficiently established.

*A. Extend Third-Party Liability Indemnification*

Congress has considered removing the threat of an early end to the third-party indemnification regime, recognizing that such indemnification may be “critical to the viability and global competitiveness of U.S. space launch providers.”<sup>165</sup> Without the indemnification scheme currently in place, even a single significant accident could threaten the availability of insurance for the entire commercial space market, and by implication, the industry itself. Congress should eliminate the sunset provision in the CSLAA that allows the indemnification scheme to expire in 2009.

*B. Require Reciprocal Waivers Between Commercial Space Flight Operators and Participants*

Rep. Sherwood L. Boehlert, Chairman of the Committee on Science, stated that the space tourism industry is still “at the stage when it is the preserve of visionaries and daredevils and adventurers. These are people who will fly at their own risk . . . [and] who do not expect and should not expect to be protected by the government. Such protection would only stifle innovation.”<sup>166</sup> This approach is embodied in the current CSLAA, but it should be extended to ensure that space tourists and space launch providers understand the potential liabilities and can consciously choose to apportion risk differently if they wish.

Accordingly, Congress should revise the FAA Final Rule to *require* reciprocal waivers among space tourists and commercial space operators. This would align the enforcement of reciprocal waivers among operators, contractors, customers, and the government with those between tourists and operators. A federal requirement for reciprocal waivers between tourists and

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165. S. REP. NO. 108-111, at 4 (2003) (quoting COMSTAC Chairman Livingston L. Holder, Jr.).

166. 150 CONG. REC. H10,049 (daily ed. Nov. 19, 2004) (statement of Rep. Boehlert).

operators would ensure that the purpose of the CSLAA—to limit liability in the nascent commercial space flight industry—is observed despite the inconsistencies in state law. Harmonizing the law among the states would reduce uncertainty in enforceability of the waivers of liability and make it easier for commercial space operators to obtain reasonable insurance, eliminating one barrier to the expansion of the space tourism industry.

C. *Establish Statutory Limits on Liability to Space Flight Participants*

As a corollary to the requirement for reciprocal waivers, Congress should establish a statutory limit on liability of space operators to their passengers, except in cases of willful misconduct.<sup>167</sup> The liability regime for space tourism should be modeled after that developed for the fledgling aviation industry, and where appropriate, the maritime industry.<sup>168</sup> The Warsaw Convention, which worked so well to foster the nascent aviation industry, is a good model for the development of a liability regime for space tourism.<sup>169</sup>

The Warsaw Convention provided a clear definition of the liability that can arise from loss covered under the Convention. In *Bayer Corp. v. British Airways*, the Fourth Circuit held that liability under the Convention could only arise from willful misconduct, defined as an intent to cause damage, or reckless

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167. *But see* Van C. Ernest, Note, *Third Party Liability of the Private Space Industry: To Pay What No One Has Paid Before*, 41 CASE W. RES. L. REV. 503, 528–30 (1991) (asserting that the federal government should impose a strict liability regime that would preempt state causes of action). Arguments in favor of a strict liability regime include: protection of the interests of those harmed by space operations; a lighter burden of proof for injured parties; the ability of operators to spread the costs of liability with insurance; and greater predictability in third-party liability by capping damages. *Id.* The statutory cap on damages is an excellent measure, but its implementation does not require the imposition of a strict liability regime. The FAA's study of the risk-sharing regime currently in place contains an extensive, well-reasoned discussion of strict liability and ultra-hazardous activities. *See* LIABILITY RISK-SHARING REGIME, *supra* note 19, at 5-1 to -4.

168. *See* Elizabeth A. Pucciarelli, Note, *The Case for a Federal Common Law of Space*, 33 N.Y.L. SCH. L. REV. 509, 528 (1988) (observing that space law is analogous to maritime law and suggesting that the latter is a good model for the development of a federal common law for outer space); *see also* Kendra Webb, Comment, *To Infinity and Beyond: The Adequacy of Current Space Law to Cover Torts Committed in Outer Space*, 16 TUL. J. INT'L & COMP. L. 295, 309–10 (2007) (comparing admiralty law on torts to proposed laws of outer space). A past example of limited liability in maritime law was the Limitation of Vessel Owner's Liability Act, codified at 46 U.S.C. app. §§ 181–196 (2000) (repealed 2006).

169. *See* Ernest, *supra* note 167, at 536–37 (suggesting that the Warsaw Convention provides a good model for a modern liability regime because it allows recovery for negligence but severely limits liability).

conduct accompanied by subjective knowledge that damage was probable.<sup>170</sup> If widely adopted, this interpretation would quiet any ongoing questions about the enforceability of reciprocal waivers of liability in cases of negligence or even gross negligence.<sup>171</sup>

Space tourists, at least for the foreseeable future, will be few in number and, through the FAA's informed consent requirements, easily made aware of the risks that they voluntarily assume. Similar to other private explorers and adventurers, they are capable of responsibly assuming the risk of their actions and should be self-insured.<sup>172</sup>

## V. CONCLUSION

A reduction in the protections afforded to consumers can only be justified by some public good achieved through the limits.<sup>173</sup> In this case, the national interest in expanding exploration of space is sufficient to justify the risk of limiting tort liability for space tourists.<sup>174</sup> Martin Rees, a prominent astronomer, observed that privatizing long-duration space flight, while not removing the risks, may make the inevitable failures easier for nations to accept: "To reach Mars and points beyond will require a certain ruthlessness of spirit, and swashbuckling individuals possess this quality much more so than civilized nations do."<sup>175</sup> In fact, U.S. policy supporting commercial space

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170. See *Bayer Corp. v. British Airways, LLC*, 210 F.3d 236, 238 (4th Cir. 2000). The court stated unequivocally that for liability to attach under the convention, "[n]egligence will not suffice, nor even recklessness judged objectively." *Id.*

171. See *Saba v. Compagnie Nationale Air France*, 78 F.3d 664, 667–71 (1996) (holding that even gross negligence does not meet the high standard for willful misconduct embodied in the Convention).

172. See Montgomery, *supra* note 81, at 27 (quoting the testimony of Michael S. Kelly, an executive at Northrop-Grumman, to Congress regarding the Commercial Space Act of 2003, H.R. 3245, 108th Cong. (2003)); see also DANIEL O'NEIL, NAT'L AERONAUTICS & SPACE ADMIN., 1 GENERAL PUBLIC SPACE TRAVEL AND TOURISM 10 (1998), available at <http://purl.access.gpo.gov/GPO/LPS49291> (recommending that the space tourist industry apply liability "[p]ractices similar to those employed on other so-called 'adventure travel' trips, such as mountain climbing in the Himalayas where tourists sign a waiver of liability and proceed at their own risk").

173. See generally Peter Cane, *Justice and Justifications for Tort Liability*, 2 OXFORD J.L. STUD. 30 (1982) (discussing the circumstances in which limiting liability is appropriate).

174. See 49 U.S.C. § 70101 (2006) (detailing the importance and benefits of commercial space exploration for the nation).

175. Martin Rees, *Mars Needs Millionaires: Why Future Space Exploration Should Be Left to Rich Thrill Seekers*, FOREIGN POL'Y, July–Aug. 2003, at 90, 91 (positing that "[w]hen nations send people to space, space disasters become national traumas").

activities expanded following both the *Challenger* and the *Columbia* accidents.<sup>176</sup>

The potential importance of space tourism and commercial space exploration was eloquently expressed by the Administrator of the FAA in testimony before Congress:

What might now be viewed as adventure or sport for the barnstormer and the risk-taker is what leads to yet one more giant step for mankind.

The advent of greater access to space, more efficient travel, greater opportunities for exploration, and the chance at expanding the limits of human experience are there for the taking. What is more, we are realizing that they are well within our grasp. And that, history tells us, means it is going to happen much sooner than we think.<sup>177</sup>

The United States is poised to lead the next great leap into space through private efforts. We owe it to the pioneers that will lead us there to create a regulatory environment that supports their path-breaking efforts instead of exposing them to the uncertainty and risk of excessive liability. Such risk will increase costs and reduce the ability of commercial launch providers to invest in technological improvements that will expand access to space, and ultimately, enhance the safety of the passengers that choose to embark on the ultimate trip: leaving the bounds of Earth.

*Rebekah Davis Reed, Ph.D.*

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176. LIABILITY RISK-SHARING REGIME, *supra* note 19, at 1–4 (noting that in 1986, following the *Challenger* accident, the U.S. government prohibited launch of commercial and foreign payloads on the Shuttle, creating a “more favorable climate for launch commercialization”). The subsequent amendments to the CLSA created the current risk-sharing regime. Following the *Columbia* accident in 2003, Congress once again strengthened the legislative context for commercial space flight with the 2004 CLSAA. *See supra* note 38 and accompanying text.

177. *Commercial Space Transportation Hearing*, *supra* note 8, at 10 (Testimony of The Honorable Marion C. Blakey, Administrator, FAA).