

An Overview and Comparison of Aviation and Space Insurance

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An Overview and Comparison of Aviation and Space Insurance

JEANNE SUCHODOLSKI, J.D., L.L.M.*©

ABSTRACT

Commercial aviation and commercial space operations entail significant risk. The very nature of these operations means a mishap can result in significant financial losses. Insurance enables operators to reduce the magnitude of their exposure in a predictable and reliable way; and likely increases the willingness of businesses to participate in these industries. Insurance coverage also provides assurances that financial resources exist to cover any third-party liability claims resulting from accidents. For these reasons, the acquisition of insurance by industry participants can be desirable as a matter of public policy.

This paper examines the availability of insurance coverage for commercial aviation and commercial space operations, including a comparison of the types of risks

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Aviation and Space Insurance

covered and typical policy terms. The paper additionally surveys what, if any, national laws mandate that operators acquire coverage.

Research reveals that aviation insurance products remain readily available and much price competition exists. The low cost and availability of aviation insurance means air carriers are likely to obtain insurance coverage independent of explicit legislative mandates to do so. Space insurance costs, however, comprise the third largest space program cost, representing 10% of the overall cost. Spacecraft operators demonstrate a willingness to forgo insurance as a risk reduction strategy. National laws requiring insurance in the space industry are few and are primarily focused on indemnification of the state's liabilities under international treaties.

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INTRODUCTION

Insurance is a method for managing risk that allows one party to contractually transfer risk of loss or liability to another in exchange for consideration.¹ Via the insurance industry, the financial responsibility for such risks become distributed across many participants rather than a few, thereby making them more manageable.² In industries such as aviation and space operations, the risk of accidents may be high and/or their consequences disproportionately severe. Insurance permits the parties to reduce the magnitude of their exposure in a predictable and reliable way; and likely increases the willingness of businesses to participate in these industries. This paper provides an overview of insurance products for commercial aviation and space activities, including an analysis of when acquisition of such insurance is compulsory.

The aviation insurance market arose after the First World War, when aircraft began to be used commercially for transport of mail and passengers.³ In the United States, the McCarran-Ferguson Act of 1945 ceded regulation of the U.S. insurance markets, including the aviation insurance markets, to the individual states.⁴ Aviation activities, however, transcend state and national borders, necessitating coverage in multiple jurisdictions. As the air transport industry expanded with the benefit of post-World War II technological advances, the financial scope of aviation assets and potential harms also grew; akin and of comparable scale to maritime shipping. The McCarran-Ferguson Act, in

¹ KATHERINE POSNER, PHILIP CHRYSTAL & TIM MARLAND, MARGO ON AVIATION INSURANCE, 11 (LEXIS NEXIS, 4th ed. 2014) [hereinafter MARGO ON AVIATION INSURANCE].

² *Id.*

³ *Id.* at 1.

⁴ *Id.* at 4.

combination with antitrust laws made pooling of risk by underwriters difficult.⁵ Although an aviation insurance market exists in the United States, these difficulties, in concert with the contemporary existence of the maritime insurance industry in London, resulted in the emergence of the London market and Lloyd's in particular as the leading source of aviation insurance and expertise.⁶

The concentration of the aviation insurance market at a single, primary hub, yielded certain advantages. Over the course of nearly a century of writing such contracts, underwriting trade associations appeared which subsequently promulgated standardized sets of best practices and contractual terms.⁷ Lloyd's underwriters organized into a trade group as early as 1935, and the International Union of Aerospace Insurers was formed in London in 1934.⁸ In June 2005, two of the most significant of these trade associations, representing Lloyd's underwriters and aviation insurance industry corporations, cooperated to form the Aviation Insurance Clauses Group (AICG).⁹ The AICG committees establish standard wording, clauses, and variants for use in aviation and space insurance policies.¹⁰

No codifying insurance statute exists to govern the London aviation insurance market.¹¹ Aviation insurance contract disputes are governed by common law, and ordinary common law principles of insurance apply in the interpretation of aviation policies.¹² In this author's opinion, the creation of standard terms, as well as the existence of a dominant underwriter as a defendant in insurance litigation

⁵ *Id.*

⁶ MARGO ON AVIATION INSURANCE, *supra* note 1, at 4.

⁷ *Id.* at 53.

⁸ *Id.* at 50.

⁹ *Id.* at 52.

¹⁰ *Id.* at 53.

¹¹ *Id.* at 16.

¹² *Id.*

also contributed to the emergence of consistent legal interpretations of insurance provisions.

The launch of satellites in the 1960s created a new industry with a need for new, space-related insurance products. Aviation underwriters initially wrote these new policies.¹³ To the extent that spacecraft acquisition and operations resembled aircraft operations, spacecraft policy terms and conditions closely tracked standard clauses available in the aviation marketplace.¹⁴ In some respects, however, spacecraft operations are unique, one-at-a-time occurrences with individualized risks and hazards. Standardization of these spacecraft specific subset of terms and conditions continues to evolve.¹⁵

In the current era, London, while retaining its position as the dominant aerospace insurance market, increasingly competes for business with centers located in the United States, France, Germany, Bermuda, Switzerland, Japan, India, and Singapore.¹⁶ In part, these additional centers have emerged in response to a need to further pool and share risk via re-insurance vehicles.¹⁷ Nevertheless, the influence of the London market and underwriting trade associations on the drafting and interpretation of contract vehicles and clauses remains as a source of stability.

¹³ *Id.* at 411.

¹⁴ MARGO ON AVIATION INSURANCE, *supra* note 1, at 412.

¹⁵ *Id.*

¹⁶ *Id.* at 31.

¹⁷ *Id.*

I. AVAILABILITY OF AVIATION AND SPACE INSURANCE

The types of losses an aviation or space-faring business may incur fall into five major categories:

- i) **Political risk** such as loss of a license right, wars, embargoes or other government actions;
- ii) **Technical risk** such as engineering mistakes, materials failures, or other failures of design;
- iii) **Business risk** such as consequential damages from loss of a capability asset or business opportunity;
- iv) **Operational risk** such as those related to weather, or ordinary accidents; and
- v) **Third party liability** for bodily injury or property damage to another.

The aerospace insurance markets underwrite policies to cover each of these types of risks.

In the aviation insurance market, the nature and price of these products are well known. Insureds commonly procure policies from multiple underwriters, both to ensure a competitive price and to reduce the likelihood that any one insurer becomes insolvent and unable to pay out a claim.¹⁸ Despite industry losses in both 2014 and 2015 in excess of premiums, competition and investment capacity remain high, putting downward pressure on aviation premium costs.¹⁹ Hull and liability premium prices have fallen by 65% compared to 2001 prices.²⁰ Recent consolidation in the

¹⁸ *Id.* at 103.

¹⁹ AON Risk Solutions, *Airline Insurance Market Outlook 3* (2016), <http://www.aon.com/unitedkingdom/products-and-services/industry-expertise/attachments/aviation/Airline-Market-Outlook-2016.pdf>.

²⁰ *Id.* at 6, 8.

underwriting market, however, has again put upward pressure on aviation insurance premiums during 2018 and 2019.²¹

The space insurance industry has greater volatility. The space insurance market represents only 0.02% of the entire insurance market.²² Due to the small number of insureds, and high severity of losses, the available capacity to underwrite policies fluctuates, usually in response to a recent loss event.²³ In 2015, the space insurance industry paid out \$664 million in claims against \$727 million in premiums.²⁴ Gross premiums for 2017 were estimated at \$715 million against \$636 million in claims.²⁵ The downward trend in premium receipts continued in 2018. Gross premiums for 2018 were estimated at \$450 million with

²¹ Nigel Weyman, *Lead Lines: Q&A—The Aviation Market*, PLANE TALKING AVIATION NEWSLETTER, JLT SPECIALTY LTD. (Q4 2018), <https://www.jltspecialty.com/group/industry/aerospace-insurance/insights/latest-trends-in-the-aviation-insurance-market>.

²² See generally Paul Hayes, Triant Flouris, and Thomas Walker, *Recent Developments in the Aviation Insurance Industry* (2006) (manuscript on file with the University of Minnesota AgEcon Database for Research in Agricultural & Applied Economics), https://ageconsearch.umn.edu/bitstream/207945/2/2006_1A_StockPrice_paper.pdf (describing generally a complicated and sophisticated risk mitigation and financial risk sharing system and associated markets).

²³ Mary A. Weiss & Piotr Manikowski, *The Satellite Insurance Market and Underwriting Cycles*, AM. RISK & INS. ASS'N (Aug. 2007), <http://www.aria.org/meetings/2007papers/IIIB%20-%202%20%20Manikowski.pdf>.

²⁴ Christopher Kunstadter, *Space Insurance Update Part II*, WORLD SPACE RISK FORUM 20 (Nov. 4, 2016), [https://www.worldspaceriskforum.com/mg-stuff/admin/kcfinder/upload/files/26%20WSRF%202016_%20Space%20Market%20Update%20Part%202_Chris%20Kunstadter\(1\).pdf](https://www.worldspaceriskforum.com/mg-stuff/admin/kcfinder/upload/files/26%20WSRF%202016_%20Space%20Market%20Update%20Part%202_Chris%20Kunstadter(1).pdf).

²⁵ Jackie Wattles, *Why on Earth Would a Company Offer Insurance for Space Travel?*, CNN Business, Sept. 15, 2018, <https://money.cnn.com/2018/09/15/technology/business/space-insurance-industry/index.html>.

losses and claims estimated at \$350 million.²⁶ These margins make space insurance particularly expensive. Space insurance costs comprise the third largest space program cost, representing 10% of the overall total cost, behind expenses for satellite acquisition and launch services.²⁷ For these reasons, many space-faring entities forgo insurance. In 2015, 48% of the satellites in geosynchronous orbit were uninsured.²⁸ The continuing decline in space insurance net premiums indicate a receding appetite for coverage.²⁹ The recent surge in small satellites and satellites placed in low earth, rather than geosynchronous orbits, do have some analysts bullish, however, on the possibility for a resurgence of the space insurance market.³⁰

A. AVIATION

The aviation insurance industry is well established with stable insurance products; contracting terms; and known, previously litigated, contract interpretations.³¹ In the United

²⁶ David Todd, *Marsh Capture of JLT Adds to Job Worries in a Weak Space Insurance Market*, SERADATA (Oct. 17, 2018, last updated Mar. 15, 2019), <https://www.seradata.com/marsh-capture-of-jlt-adds-to-job-worries-in-a-weak-space-insurance-market/>.

²⁷ *Id.* at 23.

²⁸ *Id.* at 32.

²⁹ Todd, *supra* note 26 (noting that 2018 space insurance premiums were half of those from a decade earlier).

³⁰ Press Release, *Global Satellite Launch and Space Insurance Market 2018-2022: Growing Demand for Small Satellites to Boost Demand*, MARKETWATCH (Sept. 19, 2018), <https://www.marketwatch.com/press-release/global-satellite-launch-and-space-insurance-market-2018-2022-growing-demand-for-small-satellites-to-boost-demand-technavio-2018-09-19> (citing a recent industry report claiming the global satellite and space insurance market will grow during the forecast period). *See also* Wattles, *supra* note 25 (citing a Morgan Stanley estimate anticipating 14% growth).

³¹ *See generally* MARGO ON AVIATION INSURANCE, *supra* note 1 (describing the widespread use and development of standardized

States, insureds typically retain the services of a broker to assist with the procurement of the appropriate policies.³² Per US law, a broker acts as an agent of the insured; serving as an independent intermediary between the insured and agents for the insurer in the negotiation of policies and the presentation of any claims.³³ Under US law, “insurance agents” represent, and are the legal agents of, the insurance company(s) from whom coverage is obtained.³⁴

Table 1 lists the types of losses against which cover may be obtained in the aviation insurance market. A detailed analysis of each type of policy listed in Table 1, exceeds the scope of this paper. Certain coverages, however, merit some note.

Table 1: Aviation Insurance Products

Type of Liability/Risk	Coverage/Terms
Hull Insurance	Loss or damage to aircraft Loss of use (consequential damages)
Passenger Liability	Bodily injury to passenger Family assistance Search and Rescue
Third-Party Liability	Noise Pollution Bodily injury or damage to property caused by aircraft or objects falling therefrom

contracting terms); Paul Hayes, Triant Flouris, and Thomas Walker, Recent Developments in the Aviation Insurance Industry (2006) (manuscript on file with the University of Minnesota AgEcon Database for Research in Agricultural & Applied Economics), https://ageconsearch.umn.edu/bitstream/207945/2/2006_1A_StockPrice_paper.pdf (describing a complicated and sophisticated risk mitigation and financial risk sharing system and associated markets).

³² MARGO ON AVIATION INSURANCE, *supra* note 1, at 96.

³³ *Id.* at 97.

³⁴ *Id.* at 96.

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Air Cargo	Cargo and Mail
Products Liability	Accident causation Grounding
Loss of License	Cover in the event an aircraft or operator's permits are rescinded
War, Allied Perils, and Terrorism	War, hijacking, and sabotage
Airport Operations Liability	Premises Hangarkeepers' liability Third party service providers' liability Ground handlers' liability Airshow insurance

Most aviation policies contain certain common exclusions. One very common exclusion is the “Noise and Pollution and Other Perils Clause,” which specifically excludes coverage for third party damages arising out of nuisances such as noise, pollution, or other environmental hazards.³⁵ Other common policy exclusions include claims for bodily injury to officers and employees while engaged in their duties.³⁶ Additional policies or riders must be purchased to cover such losses.³⁷

The events of September 11, 2001 also brought about major changes to existing aviation coverages, especially those regarding the underwriting of losses for war and terrorism.³⁸ Prior to these events, most aviation policies specifically excluded war and hijacking risks from every hull and liability policy.³⁹ Insureds, many of whom were required by aircraft leasing terms or licensing/tariff requirements, could purchase such additional coverage for extra cost.⁴⁰ After September 11, insurers sought to claw back these coverages

³⁵ *Id.* at 273–74.

³⁶ *Id.* at 274.

³⁷ *Id.* at 275.

³⁸ MARGO ON AVIATION INSURANCE, *supra* note 1, at 353.

³⁹ *Id.* at 353–54.

⁴⁰ *Id.* at 354–56.

with resulting unacceptable consequences including the grounding of aircraft due to a lack of the required insurance.⁴¹

Governments responded by initially stepping in as temporary insurers until the industry could offer viable products.⁴² In the current aviation insurance market, these exclusions remain commonplace, but there has emerged a specialist insurance market providing coverage against war and terrorism risks.⁴³ The United States implemented a legislative solution. The Terrorism Risk Insurance Act requires insurers to provide coverage for losses resulting from terrorism, while simultaneously capping air carrier liability for third party damages resulting from such acts at \$1 billion.⁴⁴

B. SPACE

As with aviation insurance, insureds in the U.S. desiring coverage for space-related risks typically procure coverage via a broker. Table 2 lists the types of losses against which policies are written in the space insurance market. While most of the coverages listed are straightforward in scope and meaning, a few warrant additional explanation or detail.

⁴¹ *Id.* at 356.

⁴² *Id.* at 357.

⁴³ *Id.* at 357–58.

⁴⁴ Terrorism Risk Insurance Program Reauthorization Act of 2015, Pub. L. 114-1, 129 Stat. 3 (2015) (extending the Terrorism Risk Insurance Act of 2002, Pub. L. 107-297, 116 Stat. 2322 (2002) expiration date to December 31, 2020).

Table 2: Traditional Space Insurance Policies⁴⁵

Activity Phase or Type of Liability	Coverage and Terms
Pre- Launch	Transportation of Vehicle/Satellite Launch site testing Fueling Encapsulation
Engine Test	Failure on test stand Replacement engine Repair of test stand
Launch	Launch/Attempt to Launch Ascent/Separation Deployments Orbit raising and transfer On-orbit testing
Launch Replacement	Replacement launcher in event of failure
In Orbit	One year at a time coverage Lifetime of satellite coverage Wear out/break down External factors
Third-Party Liability	Damage to other satellites Damage to terrestrial property Bodily injury or harm prior to or during launch; or during reentry Damage to aircraft
Business Risk	Loss of Revenue
Spaceport Insurance	Evolving products to accommodate transition from dedicated resources to shared resources and services for hire

Traditional space-faring operations involved a limited number of parties, each with dedicated resources and individual risk profiles. For example, in traditional models, a

⁴⁵ Table 2 has been compiled from the following references: David Wade, Spaceport UK, Royal Aeronautical Society: Insurance for Spaceflight (Feb. 3, 2016), https://www.aerosociety.com/Assets/Docs/Events/Conferences/2016/803/David_Wade.pdf; MARGO ON AVIATION INSURANCE, *supra* note 1, at 409–23.

satellite owner/operator would procure construction of a satellite from the manufacturer, who would then in turn also be responsible for procuring the launch and integrating the satellite into the launch vehicle. With this commonplace model, risks and the allocation of those risks amongst the parties were well defined. In the United States, direct participants must also exchange cross waivers of liability with the remaining parties.⁴⁶ These industry conditions gave rise to fairly standard insurance products for each party with established terms and conditions.

Three significant developments are bringing change to the space insurance industry. First, the increasing private investment and commercial activity of the next generation space economy has given rise to a new class of industry participant.⁴⁷ These new participants are not themselves the spacecraft operator or launch provider, but function as middlemen or brokers of needed services to those who are. Examples include: providers of ground communications services in lieu of operator owned facilities; and launch services brokers such as Spaceflight, Inc., who procure launch vehicle services on behalf of others.⁴⁸ Second, spaceport facilities continue to grow in number.⁴⁹ These facilities are in some measure analogous to airports, but in reality also provide a mechanism for services and infrastructure to be shared amongst multiple space-faring operators. The consequence of these developments for

⁴⁶ 51 U.S.C. § 50914 (2017).

⁴⁷ *See, e.g.*, SPACEFLIGHT INDUSTRIES, <http://www.spaceflight.com/> (last visited Feb. 14, 2019); SPACE EXPLORATION TECHNOLOGIES CORP., <https://www.spacex.com/> (last visited Feb. 14, 2019); BLUE ORIGIN, <https://www.blueorigin.com/> (last visited Feb. 14, 2019).

⁴⁸ *See supra* note 47 (referencing Spaceflight, SpaceX, and Blue Origin).

⁴⁹ NASA, REVIEW OF U.S. HUMAN SPACEFLIGHT PLANS COMMITTEE: SEEKING A HUMAN SPACEFLIGHT PROGRAM WORTHY OF A GREAT NATION 9 (2009).

underwriters and their clients is the introduction of additional contracting parties with an associated increase in the complexity and uncertainty of risk allocation; as well as greater opportunity for failures from diffuse oversight and errors in communication.⁵⁰

The third significant development is the carriage of persons in space for hire. A brief search did not reveal any specific insurance products related to carriage of space flight participants. In the United States, recent national legislation specifically exempts space flight participants from the definition of a “third party” to whom certain liabilities might otherwise be applicable.⁵¹ The status of space flight participants in compulsory indemnification and insurance practices is discussed more fully below.

II. IS INSURANCE REQUIRED? COMPULSORY INSURANCE PROVISIONS IN NATIONAL LAW

While procuring insurance coverage for the liabilities and potential losses identified above may be good business practice, the acquisition of insurance in both the aviation and space industries is seldom mandatory. Strictly speaking, the failure of a business because that business failed to protect against loss might be regrettable, but states seem willing to allow businesses to exercise their judgment to balance the risks of loss against the cost of insurance. Alternatives to insurance contracts include posting a bond or similar formal guarantee, or simply retaining enough capital on hand to cover possible losses. States appear to become motivated to

⁵⁰ David Wade, Spaceport UK, Royal Aeronautical Society: Insurance for Spaceflight (Feb. 3, 2016), https://www.aerosociety.com/Assets/Docs/Events/Conferences/2016/803/David_Wade.pdf.

⁵¹ 51 U.S.C. § 50902(24)(e) (2015) (as amended by U.S. Commercial Space Launch Competitiveness Act, Pub. L. 114-119, 130 Stat. 15 (2015)).

compel the acquisition of insurance in two primary circumstances. First, when the state itself may become liable to other states for claims of damages. Second, to protect innocent third parties from significant harms resulting from space or aircraft operations.

A. AVIATION

Surprisingly few states require aircraft owners and operators to procure liability insurance. The Warsaw Convention of 1929 produced international consensus on certain types of liabilities arising from air carrier operations but left open the question of compelling insurance for same.⁵² The Rome Convention of 1952, as subsequently modified by the Montreal Protocol of 1978, governs the liability for damage to persons and property on the ground.⁵³ These latter Conventions do require guarantees that the operator can satisfy the financial obligations arising from those liabilities defined in the Convention, but while the Rome Convention requires insurance, the Montreal Convention of 1978 softens this requirement to state that this guarantee need not be in the form of insurance.⁵⁴ Only 51 states have ratified the Rome Convention⁵⁵ and only twelve have ratified the

⁵² MARGO ON AVIATION INSURANCE, *supra* note 1, at 17.

⁵³ Convention on Damage Caused by Foreign Aircraft to Third Parties on the Surface, Oct. 7, 1952, 310 U.N.T.S. 181; Protocol to Amend The Convention on Damage Caused by Foreign Aircraft to Third Parties on the Surface, Signed at Rome on 7 October 1952, Sept. 23, 1978, ICAO Doc. 9247 (entered into force July 25, 2002) (hereinafter Montreal Protocol 1978).

⁵⁴ Montreal Protocol 1978, *supra* note 53, at art. 7.

⁵⁵ ICAO Secretariat, Legal Affairs and External Relations Bureau, Current List of Parties to Multilateral Air Law Treaties, http://www.icao.int/secretariat/legal/List%20of%20Parties/Rome1952_EN.pdf (last visited Mar. 5, 2019).

subsequent Montreal Protocol of 1978.⁵⁶ The United States is not a party to the Rome and Montreal Conventions.⁵⁷

Thus, for the entirety of the twentieth century, nations dealt with the financial capability of carriers and aircraft owners to satisfy their liability obligations through a series of direct negotiations. Financial guarantees typically formed part of the bi-lateral agreements granting the air carrier(s) of one nation, overfly or landing rights in a second. As such, there existed no universal international scheme for compulsory aircraft insurance given these requirements were addressed on an individual basis.

The beginning of the twenty-first century saw the adoption of compulsory insurance for air carriers. The Montreal Convention of 1999, which came into force on November 4, 2003, imposes an obligation on contracting states requiring their air carriers to maintain insurance coverage sufficient to cover liabilities under the Convention.⁵⁸ As of this writing, 136 of the 192 member states of ICAO, or 71%, have adopted the Montreal Convention, including the United States.⁵⁹ Therefore, not all nations have mandated insurance for air carriers in international carriage.

⁵⁶ ICAO Secretariat, Legal Affairs and External Relations Bureau, Current List of Parties to Multilateral Air Law Treaties, http://www.icao.int/secretariat/legal/List%20of%20Parties/Mtlpr78_EN.pdf (last visited Mar. 5, 2019).

⁵⁷ *See generally* U.S. Dep't of State, Bureau of Democracy, H.R. and Lab., Treaties in Force: A List of Treaties and Other International Agreements of the United States in Force on January 1, 2018 (2018) (showing that the United States is not a party to either the Rome or Montreal Conventions).

⁵⁸ International Civil Aviation Organization, Convention for the Unification of Certain Rules for International Carriage by Air, May 28, 1999, T.I.A.S. No. 13038.

⁵⁹ ICAO Secretariat, Legal Affairs and External Relations Bureau, Current List of Parties to Multilateral Air Law Treaties, http://www.icao.int/secretariat/legal/List%20of%20Parties/Mtl99_EN.pdf (last visited Mar. 5, 2019). *See also supra* note 52.

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Several nations, do, however require insurance and proof thereof as a condition for obtaining a license to operate aircraft or air service within their borders. Table 3 on the following page contains a list of these nations, to whom the requirement applies, and the extent of the coverage required.

Table 3: States with Compulsory Insurance Requirements for Licensed Aviation Operations

	US	EU	Canada	Australia	Hong Kong	China	Singapore
Legal Basis	14 C.F.R. §205	European Union Regulation EC 785/2004 ⁱ	Canada Transportation Act ⁱⁱ	Civil Aviation Act ⁱⁱⁱ	Civil Aviation Insurance Order 2000 ^{iv}	Civil Aviation Law ^v	Civil Aviation Authority Regulations ^{vi}
Applies to:	All US and foreign air carriers engaging in domestic or international transportation under license ^{vii}	All carriers and aircraft operators flying within, into, or over member states ^{viii}	Domestic service Scheduled International Non-scheduled International	Any commercial transport operations	All types of civil aircraft taking off or landing in Hong Kong	Operators of civil aircraft	All scheduled operators flying into and out of Singapore
Insured for:	All sums legally obligated to pay for bodily injury or death; damage to property of others ^x Cargo liability insurance not compulsory Exclusions prohibited and allowed as specified ^x	Passenger, baggage, and cargo to limits of Montreal Convention Third-party liability Acts of terrorism, war, hijacking, sabotage, unlawful seizure, and civil commotion	Risk of injury or death to passengers up to amounts prescribed by regulation ^{xi} General comprehensive public liability ^{xii}	Not less than \$500,000 per passenger domestic Not less than 260,000 SDRs for other carriage ^{xiii} Specific additional insurance terms and permissible exclusions ^{xiv}	Third party risks Death or injury to passengers Destruction or loss of cargo carried aboard Destruction or loss of mail carried aboard ^{xv} Specific limits of liability by aircraft weight ^{xvi}	Law requires insurance or a guarantee but only for third party liability on the ground No requirement of coverage for: passenger liability; baggage, cargo, or mail. ^{xvii}	Does not apply to ground operations

B. SPACE

As in aviation, very few states require compulsory insurance for spacecraft and launch vehicles as a matter of national law. States remain liable under the Outer Space Treaty Articles VI, VII, and the Liability Convention for damages resulting from the acts of their nationals in the launch of spacecraft or for activities in space.⁶¹ As in similar liability treaties in commercial aviation, substantial international consensus exists on liability and responsibility for space activities. Over 100 countries are signatories to the Outer Space Treaty and the Liability Convention; and the liability and responsibility obligations of states specified therein.⁶²

The rise of private, commercial space activity undertaken without direct government or IGO oversight or involvement remains a relatively recent activity. As a result, only 40 states, or approximately 20% of United Nations members currently have laws establishing space agencies or laws regulating space activities in some manner.⁶³ As of this writing, the following states have enacted national space legislation: Algeria, Argentina, Australia, Austria, Bangladesh, Belgium, Belarus, Brazil, Canada, Chile, China, Columbia, Denmark, Finland, France, Germany, Hong Kong,

⁶¹ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, N. Ir.-U.K.-U.S.-U.S.S.R., Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347; Convention on International Liability for Damage Caused by Space Objects, N. Ir.-U.K.-U.S.-U.S.S.R., Mar. 29, 1972, 24 U.S.T. 2390, T.I.A.S. No. 7762.

⁶² Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, N. Ir.-U.K.-U.S.-U.S.S.R., Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347.

⁶³ Paul Stephen Dempsey, *National Laws Governing Commercial Space Activities: Legislation, Regulation, & Enforcement*, 36 NW. J. INT'L L. & BUS. 1, 15-16 (2016).

India, Indonesia, Iran, Ireland, Italy, Japan, Kazakhstan, Luxembourg, Mexico, Netherlands, New Zealand, Nigeria, Norway, Portugal, Russian Federation, South Africa, South Korea, Spain, Sweden, Ukraine, United Kingdom, United States, and Venezuela.⁶⁴

In many of these states, for example, Argentina, this national legislation is limited to establishing a national space agency tasked with promoting and representing the national state interest. In other states, for example, Chile, the legislation establishing the space agency also assigns the authority to promulgate further regulations, but the nation has yet to do so.⁶⁵ In such circumstances, as in aviation, the imposition of insurance requirements on private space participants, if any, are a matter for bilateral agreements in the context of specific planned activities involving the nationals of the relevant states.

National space legislation in the remaining states seek to impose a license or permission requirement over their nationals wherever located; and/or those conducting space activities from within their territory. The corresponding insurance obligations vary widely. Table 4 provides a summary of national space legislation insurance requirements.

⁶⁴ *Id.* at 16–19.

⁶⁵ Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifty-Third Session, U.N. Doc. A/AC.105/C.2 at 4 (Mar. 17, 2014), http://www.unoosa.org/pdf/limited/c2/AC105_C2_2014_CRP05E.pdf.

Table 4: Compulsory Indemnification and Insurance Requirements per National Space Laws

	Insurance Requirement at Discretion of Government	Greater of Max Amount or Maximum Probable Loss (no Liability Cap)	Up to Maximum Probable Loss with Cap
Indemnification of State	Austria, Belgium, ^{xviii} Denmark, ^{xix} Kazakhstan, Norway, Sweden, South Africa, ^{xx} (Ukraine) ^{xxi}	Australia, ^{xxii} China, Hong Kong, Indonesia, ^{xxiii} Netherlands, S. Korea, New Zealand, ^{xxiv} United Kingdom (for certain operations)	(France), ^{xxv} Finland, ^{xxvi} Portugal, ^{xxvii} United Kingdom (for certain operations), United States ^{xxviii}
Third Party Liability	Denmark, ^{xxix} Finland, ^{xxx} New Zealand, ^{xxxi} Portugal, ^{xxxii} South Africa, (Ukraine)	Australia, Indonesia, ^{xxxiii} Luxembourg, ^{xxxiv} Netherlands, ^{xxxv} United Kingdom, Japan, ^{xxxvi} Russian Federation ^{xxxvii}	(France), United States ^{xxxviii}

Many early national statutes, such as those in Norway and Sweden, require only that the entity to whom the law applies reimburse the state for amounts disbursed in accordance with a claim for damages and imposes no limit of liability.⁶⁶ The law in Sweden and Norway leaves any

⁶⁶ See Lag om Rymdverksamhet [Law on Space Activities] 1982:963 (Swed.), [http://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspace law/index.html](http://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspace%20law/index.html) (unofficial English translation); Förordning om rymdverksamhet [Ordinance on Space Activities] 1982:1069 (Swed.), <http://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/index.html> (unofficial English translation); Lov om elektronisk kommunikasjon (ekomloven) [Electronic Communications Act] 2003, c. 6, § 7 (Nor.), as amended by Act of 14 June 2013 No. 54, https://lovdata.no/dokument/NL/lov/2003-07-04-83/KAPITTEL_6#KAPITTEL_6. No official English language text of this statute exists. The translation relied upon

requirement of a guarantee and the form of that guarantee, either bond or insurance, up to the discretion of the regulatory agency, on a case by case basis. Kazakhstan national space law similarly requires indemnification of the government but imposes no insurance or guarantee obligation.⁶⁷

Certain states, in addition to requiring indemnification of the government, require the acquisition of cover up to the maximum allowable amount which can be obtained on the market. South Korea,⁶⁸ Hong Kong,⁶⁹

here was obtained using an on-line translation engine to translate the official government text of the Act into English. The English language translation of the relevant Section states: § 6-7. Regressansvar for damage caused by space objects:

To the extent that Norway in accordance with international agreements has paid compensation for damage caused by space objects, the authority may require recourse to responsible business.

Whoever directly requesting the launch of space objects must provide security through insurance or guarantee compensation obligation as the Norwegian State may incur by international agreements to which Norway has acceded).

⁶⁷ Закон Республики Казахстан от 6 января 2012 года [Law of the Republic of Kazakhstan on Space Activities], № 528-IV, http://www.unoosa.org/documents/pdf/spacelaw/national/kazakhstan/528-IV_2012-01-06E.pdf (unofficial English translation).

⁶⁸ Minebob [Civil Act], Act on Compensation for Damage Caused by Space Objects, Act. No. 8714, Dec. 21, 2007, *amended by* Act No. 8852, Feb. 29, 2008, art. 4 (S. Kor.), *translated in* Korea Legislation Research Institute online database, http://elaw.klri.re.kr/eng_mobile/viewer.do?hseq=17043&type=sogan&key=2.

⁶⁹ Hong Kong Outer Space Ordinance, (2005) Cap. 523, § 6(2)(f) (H.K.).

China,⁷⁰ and the Netherlands⁷¹ each provide examples of such provisions.

States which enacted or updated national space legislation at later dates, appear more willing to allocate liability obligations between the state and the private operator as a matter of innovation policy; and to be more specific about the form of any required indemnification. Austria, for example, permits insurance requirements to be waived entirely if in the national interests.⁷² Many of the remaining statutes utilize the concept of requiring indemnification only up to the amount of the maximum probable loss anticipated by the space operation. One example of such a statute is that enacted by the United Kingdom (UK). The UK was the third country to pass national space legislation, enacting the UK Space Act in 1986.⁷³ Recently, the UK articulated the express goal of

⁷⁰ Kongjian Wuti Dengji Guanli Banfa (空间物体登记管理办法) [Measures for the Administration of Registration Space Objects] (promulgated by PRC Nat'l Def. Sci. & Tech. Indus. Comm. and PRC Ministry of Foreign Affairs, Feb. 8, 2001, effective immediately) (China); [Interim Measures on the Administration of Permits for Civil Space Launch Projects] (promulgated by PRC Nat'l Def. Sci. & Tech. Indus. Comm., Nov. 21, 2001, effective Dec. 21, 2002), (China). *See also* Interim measures on Administration of Mitigation of and Protection against Space Debris (promulgated by PRC Nat'l Def. Sci. & Tech. Indus. Comm., effective Jan. 1, 2010).

⁷¹ PAUL STEPHEN DEMPSEY, SPACE LAW § 26:1 (2011) (containing rules governing license applications for the performance of space activities and the registration of space objects in the Netherlands).

⁷² Bundesgesetz über die Genehmigung von Weltraumaktivitäten und die Einrichtung eines Weltraumregisters (Weltraumgesetz) [Austrian Federal Law on the Authorisation of Space Activities and the Establishment of a National Registry (Austrian Outer Space Act)] BUNDESGESETZBLATT [BGBL] No. 132/2011, https://www.ris.bka.gv.at/Dokumente/Erv/ERV_2011_1_132/ERV_2011_1_132.pdf.

⁷³ Outer Space Act 1986, c. 38 (Eng.), <http://www.legislation.gov.uk/ukpga/1986/38/contents>.

growing its domestic commercial space sector to capture 10% of the global market by 2030.⁷⁴ In support of this strategy, the UK amended the original 1986 UK Space Act via the Deregulation Act of 2015⁷⁵ and the Space Industry Act of 2018.⁷⁶

These UK laws require foreign entities launching or operating a satellite from the UK, and all UK entities who procure a launch or operate a satellite from any location to procure a license. In their application, this body of law also caps the indemnification requirement for UK entities procuring an overseas launch or operating a satellite from overseas at €60 million, but otherwise defers to future regulation an indemnification cap on launches and operations conducted within the UK.⁷⁷ These laws additionally require licensees to demonstrate they hold sufficient third party liability insurance for the activities undertaken.⁷⁸ As of this writing, the UK Government does not intend to make regulations that permit forms of cover other than traditional insurance policies, nor to enact any reinsurance schemes or government supplemental

⁷⁴ Sarah Spickernell & Billy Ehrenberg, *UK Space Industry Heads for the Stars with Tim Peake Mission and New National Space Policy*, CITY A.M. (Dec. 15, 2015, 3:01pm), <http://www.cityam.com/230918/uk-space-industry-heads-for-the-stars-with-tim-peake-mission-and-new-national-space-policy>.

⁷⁵ Deregulation Act 2015, c. 20 (Eng.), <http://www.legislation.gov.uk/ukpga/2015/20/contents>.

⁷⁶ Space Industry Act 2018, c. 5 (Eng.), http://www.legislation.gov.uk/ukpga/2018/5/pdfs/ukpga_20180005_en.pdf.

⁷⁷ *Understanding the Space Industry Act*, GOV.UK PUBL'G SERV. 3, 20, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/777686/190208_Understanding_the_SIA_-_Final_For_Publication_-_Legal_Cleared_-_Initial_Publication.pdf (last visited Apr. 16, 2019).

⁷⁸ *Id.* at 22.

guarantees to assist with meeting the insurance requirement.⁷⁹

The United States exists as a special case in the realm of compulsory licensing for space related activities as it has one of the most comprehensive set of statutes and regulations. The United States requires parties engaging in launch or reentry activities to obtain a license and enter into reciprocal cross waivers of claims with contractors, subcontractors, customers, and the contractors and subcontractors of customers.⁸⁰ These provisions have also recently been extended to require cross waivers from space flight participants engaged in personal travel aboard commercial spacecraft.⁸¹ The effect of such cross waivers makes each party responsible for their own losses resulting from the licensed space activity; with a corresponding simplification of the liability and insurance landscape.⁸²

The United States has also established three tiers of liability for damages related to licensed space activities. Under the first tier, the maximum amount of liability coverage equals the maximum probable loss up to a cap of \$100 million for government property and \$500 million for third party liabilities.⁸³ These indemnification obligations can be satisfied by either a demonstration of financial responsibility or by acquisition of an insurance policy.⁸⁴ Current US law further states that lower limits are possible

⁷⁹ *Id.*

⁸⁰ 51 U.S.C. § 50914(b)(1) (2015).

⁸¹ 51 U.S.C. § 50914(b)(1)(B)(iii) (2015).

⁸² 51 U.S.C. § 50914(b)(1)(A) (2015). *See also* 14 C.F.R. § 1266 (2008) (discussing cross-waiver of liability regarding activities relating to the International Space Station as well as activities unrelated to the international space station).

⁸³ 51 U.S.C. § 50914(b)(1)(B)(iii) (2015).

⁸⁴ 51 U.S.C. § 50914(a) (2015).

if insurance cannot be procured on the open market on reasonable terms.⁸⁵

For claims in excess of the amount covered by insurance under the first tier, the United States government will cover the loss up to a maximum of \$1.5 billion as adjusted for inflation.⁸⁶ Payment of damages in excess of the amounts in the second tier must be authorized by Congress or will otherwise revert to the legally responsible party.⁸⁷

CONCLUSIONS

Insurance products can be readily acquired in the aviation and space markets for those who wish to acquire coverage. Contract terms and their legal interpretations are fairly standardized.

Surprisingly few national laws exist explicitly requiring the purchase of coverage. Legal requirements for insurance coverage more probably exist within bilateral agreements between states authorizing common carriage or spacecraft operations.

The low cost and availability of aviation insurance means air carriers are likely to have insurance coverage even in the absence of explicit legislative mandates. In contrast, spacecraft operators demonstrate an increased willingness to forgo insurance as a risk reduction strategy. National laws requiring insurance are few and are primarily focused on indemnification of the state's liabilities under international treaties.

⁸⁵ 51 U.S.C. § 50914(a)(3)(B) (2015).

⁸⁶ 51 U.S.C. § 50915(a)(1) (2015).

⁸⁷ 51 U.S.C. § 50915(d) (2015).

Sources Cited in Tables

- ⁱ See Regulation 785/2004 of the European Parliament and of the Council of 21 April 2004 on Insurance Requirements for Air Carriers and Aircraft Operators, 2004 O.J. (L 138/1) 1, 1. See also MARGO ON AVIATION INSURANCE, *supra* note 1 at 20 n.1.
- ⁱⁱ Canada Transportation Act, S.C. 1996, c. 10 (Can.).
- ⁱⁱⁱ *Civil Aviation (Carriers' Liability) Act 1959* (Cth) pt. IVA div. 2 § 41E (Austl.).
- ^{iv} Civil Aviation (Insurance) Order, (2000) Cap. 448F, 4, § 6 (H.K.).
- ^v Zhonghua renmin gongheguo minyong hangkong fa (中华人民共和国民用航空法) [Civil Aviation Law of the People's Republic of China] (promulgated by the Standing Comm. Nat'l People's Cong., Oct. 30, 1995, effective Mar. 1, 1996), art. 166, 1995 STANDING COMM. NAT'L PEOPLE'S CONG. GAZ. 1, 52 (China).
- ^{vi} MARGO ON AVIATION INSURANCE, *supra* note 1, at 29. But see *Civil Aviation Authority of Singapore Act (Chapter 41)*, CIVIL AVIATION AUTHORITY OF SINGAPORE (May 31, 2014), <http://www.caas.gov.sg/docs/default-source/pdf/caas-act07fbecbb3903666590f0ff000087c682.pdf> (last visited Mar. 5, 2019) (indicating that no compulsory insurance regulation has been adopted).
- ^{vii} 14 C.F.R. § 205.5 (2016) (defining liability limits based on number of passenger seats and/or aircraft gross weight).
- ^{viii} Regulation 785/2004 of the European Parliament and of the Council of 21 April 2004 on Insurance Requirements for Air Carriers and Aircraft Operators, 2004 O.J. (L 138) 1, 3 (EC) amended by Commission Regulation 285/2010, 2010 O.J. (L 87) 19 (EU).
- ^{ix} 14 C.F.R. § 205.5 (a) (2016).
- ^x 14 C.F.R. § 205.6 (2016).
- ^{xi} Air Transportation Regulations, SOR/1988-58 (Can.) (prescribing liability limits of 300,000 CAN times the number of passenger seats on the aircraft).
- ^{xii} *Id.* (prescribing limits of liability based on maximum takeoff weight ["MTOW"], with \$1 million CAN for aircrafts with MTOW of 7,500 lbs. or less; \$2 million CAN for aircrafts having MTOW between 7,500 lbs. and 18,000 lbs.; and \$2 million CAN plus \$150 CAN/lb. in excess of 18,000 lbs. MTOW. Private aircraft's must also carry liability insurance as prescribed by this same regulation).
- ^{xiii} *Supra* note iii, at div. 1 § 41C, paras. 3(a) and (b) (Austl.).

^{xiv} *Civil Aviation (Carriers' Liability) Regulation 1991* (Cth) reg 9(2)(c) (Austl.). The insurance contract may contain exclusions for war, hijacking and other perils.

^{xv} Civil Aviation (Insurance) Order, (2000) Cap. 448F, 4, § 6 (H.K.).

^{xvi} *Id.* at § 6(4) (prescribing liability limits by the greater of ramp or taxi weight, with a lower limit of \$15 million US for aircraft up to 5,700 kg and an upper limit of \$1 billion US for aircraft in excess of 170,000 kg).

^{xvii} *See supra* note 59 at arts. 166, 168.

^{xviii} Loi du 17 septembre 2005 relative aux activités de lancement, d'opération de vol ou de guidage d'objets spatiaux [Law of 17 September 2005 on the Activities of Launching, Flight Operation or Guidance of Space Objects] of Sept. 17, 2005, MONITEUR BELGE [M.B.] [Official Gazzette of Belgium], Nov. 16, 2005, 48,818.

^{xix} The Danish Outer Space Act (English translation), Lov nr. 409 af 11.5.2016 at pt. 6, <https://ufm.dk/en/legislation/prevaling-laws-and-regulations/outer-space/outer-space-act.pdf> (prescribing a discretionary insurance requirement under § 13, though also stating that the operator may be responsible under § 12 to reimburse the state for claims paid out by the state under certain conditions).

^{xx} Space Affairs Act 84 of 1993 § 14 (S. Afr.), http://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/south_africa/space_affairs_act_1993E.html (last visited Mar. 6, 2019).

^{xxi} *Ordinance of the Supreme Soviet of Ukraine, On Space Activity Law of Ukraine of 15 November 1996 (VVRU, 1997, p. 2)*, UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS (Dec. 20, 1996), http://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/ukraine/ordinance_on_space_activity_1996E.html#sect04 (providing for compulsory insurance to be mandated per subsequent regulation and legislation). If such subsequent legislation has been enacted, English language copies could not be located.

^{xxii} *Space Activities Act 1998* (Cth) pt III div 7 s 48 (Austl.).

^{xxiii} Law of the Republic of Indonesia on Space Activities, No. 21 of 2013, art. 35(2), [https://lapan.go.id/files_arsip/UU_no.21-2013_keantariksaan_\(English-Version\).pdf](https://lapan.go.id/files_arsip/UU_no.21-2013_keantariksaan_(English-Version).pdf) (requiring indemnification of the Indonesian government for launches carried on outside of Indonesian territory for launches and payloads over which the Act applies).

^{xxiv} Outer Space and High-Altitude Activities Act 2017, ss 10(3), 26(3), 41(2) (N.Z.), <http://www.legislation.govt.nz/act/public/2017/0029/39.0/096be8ed815e3b58.pdf> (stating that the Minister may require indemnification when granting a launch or facility license). A review of

the subsequently enacted regulations governing license applications did not reveal any explicit requirement for indemnification or guarantee as part of the license application process. *See* Outer Space and High-Altitude Activities Licences and Permits Regulations 2017 (N.Z.), <http://www.legislation.govt.nz/regulation/public/2017/0250/latest/DLM7364101.html>.

^{xxv} FRANZ VON DER DUNK, HANDBOOK OF SPACE LAW 157-160 (Franz von der Dunk & Fabio Tronchetti eds., 2015) (interpreting Art. 6 of the French Law on Space Operations as requiring indemnification up to a specified cap, but allowing guarantees other than insurance in some cases).

^{xxvi} 63/2018 Act on Space Activities at § 7, <http://finlex.fi/en/laki/kaannokset/2018/en20180063.pdf> (capping the state's right of recourse at 60 million euros).

^{xxvii} Presidency of the Council of Ministers, Decree Law no. 16/2019 (Jan. 22, 2019) at art. 18(2), <https://www.ptspace.pt/wp-content/uploads/2019/03/space-law.pdf> (stating that operators are liable for damages and the state has a right of recourse for any amounts paid out and allowing the government to establish caps on the government's right of recourse against the operator, subject to the limitations specified in art. 18(3)).

^{xxviii} 51 U.S.C. §§ 50914–50915 (2012).

^{xxix} Executive Order on requirements in connection with approval of activities in outer space, etc. (English Translation) at § 13. https://ufm.dk/en/legislation/prevailing-laws-and-regulations/outer-space/executive-order-on-requirements-in-connection-with-approval-of-activities-in-outer-space-etc-_final.pdf (capping the operator's liability at DKK 450 million).

^{xxx} Act on Space Activities, *supra* note xxvi, at § 8.

^{xxxi} Outer Space and High-Altitude Activities Act 2017, ss 10(2), 18(2), 26(2), 34(2) (N.Z.), <http://www.legislation.govt.nz/act/public/2017/0029/39.0/096be8ed815e3b58.pdf> (permitting the Minister to require insurance when granting a launch or payload license). A review of the subsequently enacted regulations governing license applications did not reveal any explicit requirement for insurance as part of the license application process. *See* Outer Space and High-Altitude Activities Licences and Permits Regulations 2017 (N.Z.), <http://www.legislation.govt.nz/regulation/public/2017/0250/latest/DLM7364101.html>.

^{xxxii} Presidency of the Council of Ministers, Decree Law no. 16/2019 (Jan. 22, 2019) at art. 19(3), <https://www.ptspace.pt/wp-content/uploads/2019/03/space-law.pdf> (making procurement of insurance mandatory, but allowing for waiver for various types of operations or under the conditions specified). The English language of the text requires “civil liability

insurance.” It is unclear from the translation whether this phrase is meant to address third-party civil claims or simply commercially procured insurance. The author is inclined to believe the former when Article 19 is read in conjunction with Article 18.

^{xxxiii} Law of the Republic of Indonesia on Space Activities, No. 21 of 2013, art. 35(1), [https://lapan.go.id/files_arsip/UU_no.21-2013_keantariksaan_\(English-Version\).pdf](https://lapan.go.id/files_arsip/UU_no.21-2013_keantariksaan_(English-Version).pdf) (requiring either a financial guarantee or insurance for launches over which the Act applies).

^{xxxiv} Law of 20 July 2017 on the Exploration and Use of Space Resources art. 11 (English translation), <https://spaceresources.public.lu/content/dam/spaceresources/news/Translation%20Of%20The%20Draft%20Law.pdf> (requiring cover for risks of harm which may be in the form of insurance or other financial guarantee).

^{xxxv} Order by the Minister of Economic Affairs, no. WJZ/15055654 (June 2015) (amending regulations governing license applications to require documentation of a liability insurance policy), http://www.unoosa.org/documents/pdf/spacelaw/national/Netherlands_BZ116174B.pdf.

^{xxxvi} Uchūkai hatsujigyōdan ni kansuru hōritsu [Law Concerning the National Space Development Agency of Japan], Law No. 50 of 1969, art. 24-2 (UNOOSA), http://www.unoosa.org/osa/en/ourwork/spacelaw/nationalspacelaw/japan/nasda_1969E.html (Japan) (applying only to satellites launched by or on behalf of the government agency and does not appear to anticipate purely private activity).

^{xxxvii} FRANZ VON DER DUNK, *supra* note xxv, at 147 (explaining certain types of third-party liability insurance are compulsory under the law of the Russian Federation: health and life of cosmonauts, space infrastructure personnel, and injury to life, health or property of third parties. Insurance for the spacecraft is voluntary). Federal'nyi Zakon RF o Kosmicheskoy Deyatel'nosti [Federal Law of the Russian Federal on Space Activities] [World Trade Organization] Aug. 20, 1993, No. 5663-1. (Russ.).

^{xxxviii} 51 U.S.C. § 50914 (a)(1)(A) (2015).