

LIABILITY AND INSURANCE FOR SUBORBITAL FLIGHTS

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ABSTRACT

This paper analyzes and compares liability and liability insurance in the fields of aviation and spaceflight in order to propose solutions for a liability regime and insurance options for suborbital flights. Suborbital flights can be said to take place in the grey zone between air and space, between air law and space law, as well as between aviation insurance and space insurance. In terms of liability, the paper discusses air law and space law provisions in the fields of second and third party liability for damage to passengers and ‘innocent bystanders’ respectively, touching upon international treaties, national law and EU law, and on insurance to cover those risks. Although the insurance market is currently not ready to provide tailor-made products for operators of suborbital flights, it is expected to adapt rapidly once such flights will become reality. A hybrid approach will provide the best solution in the medium term.

1. INTRODUCTION

Suborbital flight is about to happen. It is true that there have been delays, and dates have been pushed forward ever since the flight of SpaceShipOne winning the Ansari X-Prize in 2004. But progress is being made, passengers are signing up, and in a year or two, Virgin Galactic, XCOR Lynx or perhaps others will be able to bring private passengers and payloads to the edge of space. However, the legal ramifications still remain unclear, at least at the international level, and only one country has set the first steps towards regulating this new activity through national legislation [1]. This is not necessarily a problem because it is usually better for legal regulation to *follow* technological developments, rather than *anticipate* it. But considering that we are now at the edge of a new technological leap, making it possible for the (rich) man in the street to travel to space, and considering that this will happen in an area that bears resemblance to both aviation and spaceflight as we have known until now, it is becoming rather urgent to clarify the

legal implications, especially in terms of liability and insurance, to allow this new industry to operate within a clear legal framework where operators know what their potential liability exposure is and how (and at what cost) they can protect themselves.

It is beyond doubt that accidents with suborbital flights will occur; therefore it is important to have a clear understanding of the potential liability exposure, and of the risks for those involved. To that end, this paper addresses aviation and space law provisions regarding second and third party liability, as well as aviation and space insurance, and provides some recommendations on how to clear the way for a smooth takeoff of suborbital vehicles in the near future.

Although also interesting and relevant for suborbital flight, the paper will not address hull insurance or personal accident (PA) insurance that persons (passengers, tourists) might wish to purchase in order to protect themselves (or their families) against the risks inherent in aviation or spaceflight. These insurances are not mandatory or linked to specific liability risks, they rather relate to risks that an operator or a passenger may or may not want to insure.

2. SECOND PARTY LIABILITY IN AVIATION

Second party liability refers to liability of the carrier or operator for damage to passengers or cargo, i.e. it applies to cases where a *contractual* link between the parties exists; passengers bought a ticket which constitutes a contract for carriage, or consignors contracted to have cargo transported. This paper will only address liability vis-à-vis passengers, not cargo or payload.

An extensive system protecting passengers has developed over time, including interpretative case law. Interestingly, the nature of the liability has shifted as the aviation industry matured. In the early days, aviation was considered to be a new industry which necessitated protection of the market entrants, leading

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to a system of *limited* liability as enacted in the so-called Warsaw system, briefly discussed below. There was a desire to create equal conditions for competition in a new industry, to protect a weak (because new) industry, to maintain the public interest of the activity, and to make it easier to obtain insurance. But after several decades of activity, the industry was considered to have matured, and the time was ripe for moving towards a system of unlimited liability of the carriers, albeit with certain exceptions such as contributory negligence or willful misconduct by the passenger. Thus, by the time when the follow-up convention to the Warsaw Convention (the 1999 Montreal Convention, also discussed below) was negotiated, a two-tiered *unlimited* liability system became an achievable aim, even in terms of insurance. It was considered that unlimited liability actually encourages parties to settle their disputes, instead of going to court arguing for or against willful misconduct, trying to break the limits imposed under the Warsaw system. In the past, those limits were often considered as the starting point, as a minimum to be obtained, and to be increased by means of (expensive) litigation. Another problem with the limits was that they were constantly subject to inflation and hence regularly seen as insufficient. This development from *limited* to *unlimited* liability in aviation followed similar practice in the law of the sea. In turn, the aviation experience may serve as an example for other areas, such as suborbital flights.

2.1. Warsaw Convention

The Warsaw Convention [2] has more than 150 states parties, and provides for a complex system spelling out the liability of the carrier vis-à-vis the passengers. It has been adapted various times, often to adjust the limits of liability.

One of the core issues in the carrier liability regime was the *limitation* of the liability of the carrier. In return, under Article 17, passengers were granted reversal of the burden of proof. This implies that the carrier is presumed to be liable unless he can prove that he has taken all measures to avoid the damage, or that it was impossible for him to take such measures (Article 20). For the carrier to be liable, there must have been an ‘accident’ under Article 17 of the Convention. In that case, the carrier must compensate damages sustained in the event of death, wounding or “any other bodily injury sustained by the passenger”. The term “bodily injury” has been interpreted in many court cases around the world.

It must be noted that the provisions of the Warsaw system only apply between states that are parties and

only to cases involving international flights. National law governs national flights.

2.2. Montreal Convention

The Warsaw system did not meet the requirements of the new era in which airlines were operating more independently from governments. Several initiatives were developed to take better care of the interests of passengers, but this resulted in a large number of differing instruments. In 1999 a new convention was adopted, the Montreal Convention [3]. Its aim was to modernize and consolidate the Warsaw system. It was necessary to strike a better balance between the interests of the carriers and those of the passengers; this balance actually had to be restored in favour of the consumer, now that the industry had matured.

A two-tiered *unlimited* liability towards passengers was introduced. This was considered both desirable and feasible, also for obtaining insurance (which was made mandatory). The fault of the carrier is presumed, unless he proves that no negligence on his part was involved (e.g. force majeure) or that the damage was ‘solely’ due to the negligence of a third party, which in practice will be very hard to prove. Mental injury was not included, despite many discussions, and punitive damages were also excluded. The obligation to make advance payments to victims was introduced to meet immediate economic needs.

All EU states as well as the EU itself are parties to the Montreal Convention, which currently has around 100 states parties. Again, the Convention only applies to cases involving international flights. National law governs national flights.

2.3. National law, EU law

In the field of aviation, the EU has ‘taken over’ many of the sovereign responsibilities of the member states, and thus EU law has superseded national laws. Council Regulation (EC) No 2027/97 regulates air carrier liability in the event of accidents [4]. The Regulation abolished all monetary limits of liability, imposed strict liability upon the carrier for claims up to 100,000 SDRs (Special Drawing Rights, financial assets of the International Monetary Fund) and introduced prompt advance payments to be made by the carrier to the passenger or persons who are entitled to claim on his or her behalf. In 2002, a new Regulation 889/2002 was adopted to better align the liability regimes of EU airlines with the Montreal Convention [5].

3. THIRD PARTY LIABILITY IN AVIATION

Third party liability is liability of the carrier towards persons and property on the ground. This means parties with whom the carrier does *not* have a contract, contrary to passengers. This liability is addressed by the 1952 Rome Convention (which replaced the earlier Rome Convention of 1933), and the 1978 Montreal Protocol that amended it [6]. Liability under the convention is *limited*, there are liability limits per event and per person killed or injured. The earlier remarks about applicability of treaties to international flights also apply here.

In practice however, *national* law governs the settlement of third party liability in aviation cases, because the limits included in the treaties are too low, and as a consequence the Rome Convention and Montreal Protocol have very few parties (about 50 and 10 respectively).

Perhaps treaty law might regain more relevance after the entry into force of the ‘General Risks’ Convention adopted in 2009, introducing liability principles similar to those of the 1999 Montreal Convention [7]. However the convention is not yet in force and will not be further addressed in this paper.

4. LIABILITY FOR SPACE ACTIVITIES

Liability for space activities is mainly regulated in the 1967 Outer Space Treaty [8] and the 1972 Liability Convention [9], which will both be addressed below. The situation with regard to liability for space activities is very different from the aviation situation as described above. One might say that the system somewhat resembles that of the early days of aviation in terms of the absence of caps on liability, i.e. it is characterized by the principle of *unlimited* liability, but in addition to that, the unique feature of space liability is that it is a *state*-based system – there is no direct liability of operators for space activities. In addition to that, liability towards passengers is not regulated. The provisions in the treaties concern third parties, i.e. non-contractual liability only. They contain no reference to personnel on board, crew, or passengers, only to ‘astronauts’ as ‘envoys of mankind in outer space’ or to ‘personnel’. Moreover, nationals of the launching state or visitors are not protected (Article VII of the Liability Convention), and, as mentioned above, only states can present a claim, not the victims themselves. Furthermore there is regrettably no case law (yet) to interpret the, sometimes, vague treaty provisions. In any case, as for any treaty, these rules only apply as between state parties to the Treaty, and only to international flights, otherwise national law applies.

It should be noted that although liability under the abovementioned treaties is *unlimited*, in some cases national law does provide for caps or limits, often in combination with obligatory insurance. This implies that the state will assume any risks beyond those limits, as it, under the treaties, is subject to unlimited liability.

4.1 Outer Space Treaty and Liability Convention

Article VII of the 1967 Outer Space Treaty provides that the launching state is internationally liable for damage caused by its space object or its component parts, on earth, in air or in space, to another state party or its natural or legal persons. There is no reference to liability vis-à-vis passengers. The 1972 Liability Convention confirms this third party liability, i.e. the launching state is internationally liable for damage caused to another state party. The compensable damages are loss of life, personal injury or other impairment of health; or loss of, or damage to public or private property (Article I). Liability is absolute if it occurs to aircraft in flight or on earth (Article II) and fault-based if it occurs elsewhere than on the surface of the earth (Article III). An international element has to be involved, i.e. the Convention would not apply to an American tourist carried on a US space object, it would only apply to damage caused by that object to persons or property on board a space object of *another* state. Matters are further complicated by the fact that the treaties do not contain a definition of the term ‘space object’. The liability is *unlimited*, i.e. there is no cap under the treaties.

4.2. National law, EU law

As mentioned above, more and more states are adopting national space legislation in order to implement their obligations under the space treaties, in light of the increasing privatization of space activities. These legislations sometimes put a cap, or limit, on the liability, often requiring private entities to obtain insurance before they can obtain a license [10]. This means a private entity applying for a license has the benefit of limited liability, whereas the state will still be liable to any excess liability as it is subject to unlimited liability under the space treaties.

As far as EU law is concerned, it is still virtually non-existent in this respect, and will probably not evolve anytime soon, as the 2009 TFEU (Treaty on the Functioning of the EU, or Lisbon Treaty) in its Article 189 explicitly excludes harmonization of national space legislation from the EU space competence.

5. AVIATION LIABILITY INSURANCE

Insurance serves to pass risk to another party for a fee. For insurers to accept taking over a risk for a fee, there has to be an incentive for profit. To assess this, insurers will create a so-called ‘risk map’, where they set out the *severity* of an occurrence against the *probability* of it to happen.

Aviation insurance is marked by a large amount of statistics, stemming from long history. A carrier usually buys insurance for multiple takeoffs and landings over a certain period, e.g. a year of operations. The market is characterized by fierce competition and many offers, which in turn leads to reasonable rates. Insurers benefit from clear liability rules, which makes it relatively easy for them to assess the risks they are insuring.

Insurance for second or third party liability can be mandatory under treaty law, national law and/or EU law, and these will be briefly addressed below.

Aviation insurers determine their rates based on the following risk rating factors [11]:

- The critical nature of the product (for instance for a seat it is low, but for an engine it is very high);
- The area of operation (there are certain geographical areas where statistically more accidents occur, e.g. in Africa);
- The jurisdiction concerned (for instance the USA is a high-risk jurisdiction, because of the jury system, lawyers practicing on the basis of ‘no win, no fee’, the frequent allocation of high punitive damages, victims typically seeking to chase jurisdictions with ‘deep pockets’, as well as ‘ambulance chasing’ by litigators or the high number of web-literate claimants);
- The type of aircraft involved (this determines the number of seats and thus the potential number of casualties, but also the value of the aircraft plays a role, for instance a new A380 typically carries a much higher risk than a smaller, older aircraft);
- The volume of turnover in the company (with higher turnover there will be more exposure to risk);
- The company’s attitude to quality control (if an airline has an adequate quality control system, the risks of accidents occurring will be lower);

- Contractual obligations (e.g. waivers) can also influence the risk exposure;
- Claims experience (previous claims handling or long term client relations may further influence the rates applied);
- Lastly, market conditions influence insurance rates (i.e. if the total capacity of the market is high, rates will be lower, and vice versa).

Insurance is sold to carriers through insurance brokers, and the risk is usually spread throughout the market by reinsurers.

5.1. Second party liability insurance

The Warsaw Convention does not impose a compulsory insurance upon the carrier or the operator of the airline. The Montreal Convention does, in Article 50. The idea behind this was to ensure that claimants were sufficiently protected against bankruptcy of the carrier and similar situations, so that they could enforce the rights afforded to them. Safety considerations were also taken into account.

In the EU, Regulation 2407/92 on air carrier licensing refers to insurance requirements to be imposed by the licensing member states [12]. Its Article 7 states: “An air carrier shall be insured to cover liability in case of accidents, in particular in respect of passengers, luggage, cargo, mail and third parties”, so this Regulation is a legal basis for insurance for both second- and third party liability.

EU Regulation 889/2002 specifically addresses second party liability, as it imposes an insurance obligation on EU air carriers with regard to passengers [see 5].

Regulation (EC) No 785/2004 on insurance requirements for air carriers and aircraft operators, as amended by Regulation (EC) No 1137/2008, sets the specific requirements in terms of insured amounts for second and third party liability [13].

Rates for insurance to protect against claims from passengers (second party liability) depend on the type of aircraft used, the flight duration, applicable liability regime(s), etc. The kind of damage that may occur varies from (fatal) injury to passengers to spilt coffee; from lost luggage to costs for search and rescue.

5.2. Third party liability insurance

The Treaty of Rome of 1952 stipulates in Article 15 that contracting states are entitled to require that the

operator of an aircraft registered in another contracting state is insured against the damages mentioned before, and gives substantive provisions as to the insurance policy itself.

In bilateral air relations, states may impose insurance conditions on foreign airlines designated by the bilateral partner. National legislation may also contain insurance provisions. EU law also contains provisions regarding third party liability insurance, as outlined in the paragraph above.

Insurance for carriers against liability for damage to third parties (innocent bystanders, but also public or private property on the ground) is readily available at reasonable cost terms.

6. SPACE INSURANCE

The insurance industry began providing services to space operators in the mid-1960s. At that time these risks were still covered by the traditional aviation market. The space insurance sector has to work with much less practice than aviation insurance, with fewer customers, and less statistics. In addition, it is difficult if not impossible to access or repair an asset that has been insured once it is in outer space. Coverage in space insurance has to be obtained for each single launch, not for a number of launches over a certain time. Moreover, the severity as well as the frequency of losses is high, putting space activities often at the far right of the risk map. This in turn leads to high insurance rates, which are moreover very volatile and extremely reactive to the occurrence of major losses. Part of the reason lies in the fact that there is not much certainty about the exact extent of potential liability exposure, due to the vague rules and absence of court interpretations.

Space insurance has some unique features that strongly influence the market rates, such as the following [14]:

- The usual practice of insurance, consisting of 'spreading the risk', meaning that the premiums paid by the many pay for the claims of the few, is hard to realize in space projects, due to the limited number of clients and the high premiums;
- Risks are characterized by high severity and high frequency of events;
- The insured assets are usually inaccessible, hence repair and recovery options are very limited;
- The legal environment is very different from other areas such as aviation, and contains many vague

notions which have not been tested or interpreted in court;

- There are very few statistics on which rates can be based.

In the field of space activity, we can generally distinguish four different kinds of insurance, covering different kinds of risks: pre-launch insurance, launch insurance, in orbit insurance and third party liability. The first three concern the hull, the spacecraft itself, and will not be discussed here.

6.2. Second party liability insurance

Second party insurance for operators of space objects currently does not exist, due to the lack of 'passengers' with a contractual link to the operators up to now, and due to the absence of space passenger liability rules.

6.3. Third party liability insurance

Third party liability insurance covers property damage and personal injury claims from third parties brought against the entity responsible for the launch and/or the launching state. It protects the satellite operator against the financial consequences of a prejudice (bodily injury/ property damage) caused to a third party during the launch phase or the in-orbit operations. Such damage could occur on the ground during the initial lift-off phase, because of a collision with another spacecraft once in orbit, or because of a collision with third parties on ground at re-entry.

Third party liability is sometimes obligatory as a condition accompanying capped or *limited* liability as provided in several national space legislations.

This kind of insurance is usually relatively cheap. Governments can be included as joint assureds under these policies, as is sometimes required by national law.

7. LIABILITY FOR SUBORBITAL FLIGHTS

There are no specific liability rules for suborbital flights. These flights do not fit perfectly within either the aviation or space activity categories, so it would seem that ideally a *sui generis* regime should be developed. But, at least as far as a new treaty or EU law is concerned, this would take a very long time. The treaty-making process in the UN has come to a complete stop since the Moon Agreement was adopted in 1979. Nowadays agreement is only reached on guidelines and similar formats. As for EU law, we have already indicated that the EU space competence

excludes harmonization of national laws.

The development of new rules will therefore in the first place happen at the *national* level. Over time, and if there is a degree of consistency, these laws may evolve into customary rules of international law, which are binding on all states. For the time being, several national space laws have been adopted. But as mentioned before, only the USA adopted provisions on private human spaceflight applicable to suborbital flights. The USA adopted a so-called ‘light touch’ approach, meaning that the requirements imposed on the operators have been kept to a minimum, and mainly serve to safeguard public safety of third parties and public property. As regards the passengers, the ‘second parties’, i.e. those who have concluded a contract of carriage with the operator, they are required to sign an agreement of ‘informed consent’ that says that they understand the risks involved with the activity they are about to undertake, and accept those risks, and will not hold the carrier or the state liable for any damage that might occur. It amounts to a sort of waiver of liability. In Europe, the European Aviation Safety Agency (EASA) was preparing since 2008 to accommodate the certification of suborbital vehicles by defining them as ‘suborbital *aircraft*’ [15], but in the Fall of 2011 these efforts were put on hold for reasons of budgetary priorities, putting the matter back on the agenda of the member states. Of the six EU states that currently have national space legislation, including the latest newcomer, Austria, which adopted its space act in December 2011, none addresses suborbital flights or private human spaceflight in general. It seems that some lobbying may be called for, to try to come to an appropriate and coordinated legal framework to accommodate suborbital flights, so that Europe will be an attractive location for this new industry to develop, alongside other regions such as the USA, Asia or the Middle East.

8. LIABILITY INSURANCE FOR SUBORBITAL FLIGHTS

It will be quite important for a healthy suborbital market to have tailored insurance options available for operators. It is clear from discussions with insurers and brokers that they see suborbital flights as *spaceflight* rather than as aviation. Even though in some cases the takeoff and/or landing are horizontal, and there may be other aircraft-like features in suborbital flights, they still consider this as ‘rocket technology’, requiring space-related insurance solutions. This implies taking into account for instance the high probability and high severity of risk, as well as the (at least in the first stages) limited number of flights and statistical data and other characteristics of suborbital flights.

Interestingly, insurers and brokers would find it easier to insure suborbital flights using vertical take off, as these represent a ‘known quantity’ in their experience (and by the way, they would definitely insure those in the space market).

The main problem in insurers’ eyes is the assessment of risks based on statistical market information, as this information is obviously lacking. In addition, since typically new launch vehicles suffer a considerable number of failures in the beginning of their operation, rates can be expected to be on the high side. By means of comparison, rates for aviation insurance lie in the range of 0.5%, but can be around 10% for space insurance. On top of that, as mentioned above, space insurance is usually bought per flight, and not, as in the case of aviation, at an annual rate. Insurers generally agree that *second* party liability, or the suborbital flight operator’s liability towards its passengers is the most complex issue, and that third party liability should not pose any insurmountable problems.

The question in the end is whether to address insurance for suborbital flights as aviation or as spaceflight, or more specifically, whether to place the risk on the aviation market or on the space market – or perhaps a *combination* of both.

Should it be decided that suborbital flight is *aviation*, insurance to cover second party liability is mandatory under the Montreal Convention (but not under the Warsaw Convention). As far as third party liability insurance is concerned, this is obliged under the Rome Convention and under the General Risks Convention. Many national laws also require such insurance, as does EU law.

Should it be decided that suborbital flight is *spaceflight*, there is no international treaty law imposing any mandatory second or third party liability insurance on the operator. Under US national law, there is no obligation to insure against liability for damage to or loss of life of passengers, but passengers must sign ‘informed consent’ forms. It is however obligatory to insure for third party liability. In Europe too, there is no obligation to insure against second party liability, because the laws simply do not address private human spaceflight (and when they will, it is not certain whether second party liability insurance will become obligatory or whether states will follow the US example and make travel conditional on passengers signing informed consent forms). Insurance for third party liability is mandatory in most national laws and usually serves as a prerequisite for obtaining a license

The above means that as far as *third* party liability in concerned, suborbital flight operators will have to obtain insurance regardless of whether their operations are considered as aviation or spaceflight. Such insurance is moreover readily available on both the aviation and space markets.

Looking at *second* party liability insurance, so far such insurance seems to be optional if operations are considered as space activity, but obligatory if seen as aviation, at least for states parties to the Montreal Convention. But there only is experience with second party liability insurance in the aviation market, so if an operator wants to obtain, or becomes obliged to purchase insurance to cover this risk, it is likely to be placed in the aviation market. However, it is far from certain that similar rates and conditions will apply as for aviation, since the risk involved may be considered much higher.

9. CONCLUSIONS

The *aviation* liability rules are better suited to address the liability issues that may arise and should be taken as the model for a new *sui generis* regime for suborbital flights. There will be many passengers, multiple operators, and clear rules outlining the rights and obligations of operators and passengers in a direct manner are essential. Not only are the aviation rules more complete by addressing both second and third party liability, they also provide direct liability of the operator in stead of the not very user-friendly state-based liability system contained in the UN space treaties. It would be ridiculous if each passenger would have to depend on a state-to-state procedure for a lost luggage claim, for instance

Although in the early phases liability could be limited as in the early days of shipping and aviation, so that the new industry can develop and mature, over time it should evolve into a liability system based on unlimited liability of the operator.

The evolution of the liability regime for suborbital flight is key to finding long-term stable insurance solutions. It is generally felt that the market will adapt to demand, and that ultimately a mixed solution will be adopted, borrowing elements from both markets.

Insurance for operators' liability vis-à-vis passengers (second-party liability) will likely be placed on the aviation market, which has vast experience in this field, of course with necessary adaptations. Insurance for operators' liability vis-à-vis third parties could be placed on either the space or the aviation insurance market, as both markets have experience and capacity

in this field. Similarly, hull risks and personal accident insurance will be developed, using the experience of both markets (actually an innovative insurance for 'space tourists' was announced by Allianz Global in November 2011, to protect future passengers of Virgin Galactic and similar flights against various events such as flight cancellations or medical problems before or after the flight).

Ultimately, a typical suborbital insurance market will emerge – just as the space insurance market eventually arose alongside the aviation insurance market, which had placed the first space risks.

It confirms once again that law will adapt to the facts – *ex facto sequitur lex*.

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