FINANCING AND INSURANCE ASPECTS OF SPACECRAFT

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Introduction

As commercial activities in space continue to develop, financing of space activites becomes more and more diverse. In the beginning, the launching of satellites was only initiated and financed by a few states which were involved in space activities. With the increasing number of states developing satellites especially for telecommunications, and with the increasing influence of private commercial activities, financing of spacecraft has become a complicated issue.

1. First, the state itself may finance the space project. For instance, the Russian space station Mir had been financed by the former Soviet Union.

2. States may finance a space project by their cooperative endeavor, as is the case with the US-Canadian-European space station. In the construction of such a project, private companies could participate in production.

3. A private company may construct a satellite through its own means, either because the necessary financing is available, or because the private company is borrowing the money from a creditor with or without security, *e.g.*, by bank financing.

Additionally, a joint venture of firms is also possible. A recent example is the alliance formed to provide regional satellite services by six Asian firms. The participants are Philippines Long Distance Telephone Co., PT Indosat of Indonesia, Singapore Telecom and Telekom Malaysia, which have already signed the agreement, and the Communications Authority of Thailand and Jabatan Telekom Brunei, which are expected to join in the near future. The six companies are also members of the Association of South East Asian Nations (ASEAN).[1]

An actual example regarding private companies is Globalstar, for instance, which intends to launch its first satellites in 1997. Globalstar has a 56-satellite constellation scheduled to provide fixed and mobile telephone services worldwide. $250 million was financed by a bank for its global mobile telephone system. Now Globalstar needs to raise about $600 million for the $2 billion low-earth orbit satellite venture through external funding.[2]

4. Moreover a private company could ask the state to subsidize the project or to support it in another way.

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1 SPACE NEWS, No. 4, 1995.

2 *Id.* No. 2, 1996.

Finch[3] gives a very clear example. On 16 May 1983, the US President announced his Directive on Commercialisation of Expendable Launch Vehicles (ELV's). The Directive was to encourage the private sector development of commercial launch operations. The policy specified that 'While the government will not subsidize the commercialisation of ELV's it will price the use of its facilities, equipment and services consistent with the goal of encouraging viable commercial ELV launch activity.'

Also promotion of exports or removal of tax liabilities may be a means which the state could support. Mortgages are already in common use in maritime law and in air law. Thus, for instance, in Air Law, the Convention on the International Recognition of Rights in Aircraft, Geneva, 19 June 1948, is well known. During the preparatory discussions of this Geneva Convention, it was evident that the authors intended to create a means of financial support for the air carrier in the form of real security, and that the category of aircraft intended to be covered by the Convention is limited to aircraft intended for use in international air transport.

There is no doubt that this Convention has led to a consensus on a number of important points: the creditor's interests are now adequately safeguarded in all contracting states, priority claims have been defined, and their order of priority is determined by the law of the state in which they are registered. Nonetheless some gaps remain: to begin with, the precise moment when a right in a registered aircraft is validly created has not been fixed; moreover, the Convention only protects agreements between parties, not the obligations arising by virtue of law; finally, the Convention contains nothing on execution procedures or on registering an execution in the record of the contracting State of the aircraft's nationality. Furthermore only 53 states have ratified the Convention and uniform interpretation is also lacking.

Considering the background of the circumstances prevailing at the time when the Convention was concluded, no better result would likely have been achieved, and the Convention may certainly be regarded as an important first step towards establishing sufficient rules. The main principle of the Convention is the protection of the interests of the creditors.

Regarding space law, security rights are also of interest regarding space engines. No central registry exists for the filing of security interests in satellites or transponders. As Sterns and Tennen rightly state:[4] 'The rights of secured creditors are recognized and respected by national laws and international conventions, notwithstanding the fact that the collateral may move from state to state, and also traverse areas which are beyond the limits of national sovereignty. In this respect, the application of security interests to commercial space ventures would appear to be consistent with existing state practice. However, the essential element of a security interest is the right of the creditor to recover possession of and proceed

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[3] E.R. FINCH JR. AND A.L. MOORE, ASTROBUSINESS 57 (1985).

[4] P.M. Sterns and L.I. Tennen, *Security Interests and Creditors' Remedies in the Law of Outer Space*, 33 PROC. COLLOQ. L. OUTER SPACE 102-120, at 115 (1990).

against the debtor's collateral to apply towards satisfaction of an outstanding obligation which is in default.' I agree fully with their opinion that 'Space objects are distinct from other types of mobile collateral in that aircraft and maritime vessels routinely must enter the territory of states, and thereby are subject to attachment by local judicial process. Space objects may not be recoverable in the ordinary sense, or at least not at a cost which would justify the election of that remedy. Nevertheless, available property rights of a commercial space venture may supply adequate security to attract and protect potential creditors.'

An outstanding lawyer, the late John T. Stewart does not suggest any particular path to follow in addressing security interests in space launch vehicles. But he observes that perhaps a mortgage convention for space activity investors would be considered according to the example of the mortgage convention in aviation.[5] He mentions that 'Private capital will be forthcoming as it must support and seek profit from space activities. With such investment will come the concern traditionally associated with protecting "security interests." The desires to record such interests for the protection of the investor will be a natural result of the infusion of private capital into the space environment.' In my opinion it may be worthwhile to consider this proposal.

Moreover, insurance policies reducing the financial risks will make parties more willing to finance. Obtaining bank financing depends on the profits earned by use of the satellites. Financing has been requested for mobile and broadband satellite projects but also for direct broadcast television satellites, commercial Earth imaging spacecraft, and regional and international communications satellites.

For traditional geostationary communications satellite projects, it is not so difficult to get financing as this market has been established. But sometimes revenues will not be available for many years, and thus it is difficult to judge the value of projects. Also the increasing frequency of launching satellites and therefore the increased technical knowledge and experience make investing in satellites also more secure. Therefore the rules of the different contracts are very important; the more so, as leasing of satellites, just as leasing of ships and aircraft, becomes more and more frequent.

Sterns and Tennen[6] point out correctly that what is necessary is a proper registry which could clarify which law would be applied to a particular transaction. The Registration Convention fails on this point. They propose that the same provision as in maritime and air law could be applied in space, namely that the law of the state of registry of the object would control the rights and obligations of the parties to a secured transaction. In this manner, the parties to the transaction as well as third parties would not be subject to conflicting and confusing choice of law questions.

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[5] John T. Stewart, *Should there be a mortgage convention for space activity investors?*, 25 PROC. COLLOQ. L. OUTER SPACE 251-259, 257 (1982).

[6] *See* note 4, at 117.

In considering the Registration Convention, Nesgos[7] raises the question as to whether it is reasonable to impose registration obligations under the Convention on the provider of the launch vehicle or the component parts of the space object. Nesgos observes also that 'Many of the satellite and other space hardware projects that have been launched involved various types of financing. A number of national projects have been supported by export financing, such as Brazil's Brasilsat, Mexico's Morelos and Indonesia's Palapa telecommunications projects. Construction financing has been used for commercial projects such as Orion, SPACELAB, Asiasat and APT Satellite.'

Given the fact that the launching and the activity of a satellite is forming a greater risk than the activities of ships and aircraft, the insurance rules are of greater importance.

State responsibility according to the 1972 Liability Convention for damage caused on the surface of the earth was relevant to the Skylab which came down over Australia in July 1979, and the Cosmos 954 satellite which disintegrated over Canada in 1978.[8] A collision occurred when the Shuttle Challenger was hit by a tiny piece of paint, originating from a Delta rocket and measuring only 0.2 mm. in diameter.[9] State responsibility has not been invoked in connection with third party liability arising directly from a launch. Recently a Chinese rocket exploded wounding several third persons. The compensation for this damage will mostly be paid by insurers or the state of registration.

More than one state may be involved in launching a space object according to Art. I of the Registration Convention of 1975, namely, the state that launches or procures the launching and the state from whose territory or facility a space object is launched.

The insurance policy could also cover the pre-launch activities, the launch activities and the activities of the satellite in orbit. Transponders could be insured separately but could also be insured as a part of the satellite.

Dr. Catalano Sgrosso gives an excellent survey about the main types of insurance policies:

> An insurance policy relevant to the pre-launch phase provides the coverage of all the risks which could happen from the beginning of the realisation of the space program right to the carrying out of the

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7 P.D. Nesgos, *Commercial Space Law: Practical Examples Relating to Contracts, Insurance and Finance*, UNCOPUOS/INTERNATIONAL INSTITUTE OF SPACE LAW, SYMPOSIUM ON COMMERCIAL ACTIVITIES IN SPACE, 37 PROC. COLLOQ. L. OUTER SPACE 305 (1995).

8 I.H.Ph. Diederiks-Verschoor, *Similarities with and differences between air and space law primarily in the field of private international law*, 172 R.C.A.D.I. 349, 350 (1982).

9 E. Vitt, *Die Gefahren der Weltraumtrümmer: neue Entwicklungen und Erkentnisse*, 36 ZLW 249-260 (1987). *See* also HE Qizhi, *Space Law and the Environment*, in SPACE LAW - DEVELOPMENT AND SCOPE 159-174 (N. Jasentuliyana, ed., 1992).

> launch. It particularly refers to possible accidents which may happen during the production of the satellite and of its systems and sub-systems, during the phase of storage -- which is rather long-lasting because of the problems which can affect the predisposition of the launch -- during the phase of transportation of the satellite from the place of production to the launch site and finally during the placing of the satellite on the launching vehicle.
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> The launch phase is without doubt the most delicate in the whole space program, and the gravity of the risks determines a higher premium level compared to the two other mentioned coverage forms: the phase lasts from three to six months. The relevant policy considers a variety of different risks: faults in the launching vehicle, trouble during the separation of the satellite from the various stages of the vehicle, the risk of the satellite not reaching its established orbit and finally the problems which may occur during the preparation for the operative life and the control of the satellite's efficiency. The launch policy may be divided into two completely separate parts: one concerning the risks prior to the separation of the satellite from the launching vehicle, and the second one concerning the risks subsequent to the separation.[10]

According to Article 1(b) of the Liability Convention of 1972 the term 'launching' includes attempted launching.[11]

Finally, the phase of life in orbit requires a specific coverage which represents insurance on the satellite's life. Sgrosso observes that it begins at the end of the phase for verifying the satellite's operative capacities and that the length of its duration may vary.[12]

As Nesgos observes,

> financial institutions lending to a satellite operator will almost invariably expect to be granted a security interest or mortgage in the satellite as long as their loan remains outstanding. Moreover, the interest expected is generally a first priority security interest superior to any other right in the satellite. This assignment entitles the financial institutions, upon the occurrence of a default under the terms of the loan agreement (such as failure to pay an installment of principal or other breach of covenant), to exercise an array of remedies, including constructive repossession of the

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[10] Dr. G. Catalano Sgrosso, *Insurance Implications about Commercial and Industrial Activities in Outer Space*, 36 PROC. COLLOQ. L. OUTER SPACE 187-205 (1993).

[11] For the meaning of launch activities, see Bin Cheng, *International Responsibility and Liability for Launch Activities*, 20 AIR & SPACE L. 297-310 (No. 6, 1995).

[12] *See* note 10.

collateral. This superior right conflicts with insurers' rights to salvage to the extent of any loss paid under the policy.[13]

It is of great importance that complete information is provided by the company or owner to the lender or insurer because it is not possible for them to know and to control all possible risks.

The financing of spacecraft is very much linked to insurance. According to Gangloff[14] only 50% of the satellites costs are insured. The average value of the satellites is 75 million dollars, whereas the annual premia are not more than 65 million dollars. Gangloff mentions that from 1980 to 1994 the insurance of spacecraft presented a credit balance of 240 million dollars. It is well-known that 1994 was a very bad year for space activities because of several accidents with satellites. The insurers had to pay 769 million dollars whereas the premia were only 534 million dollars.

According to the journal "Space News", space insurance premiums have been declining since the mid-1980s, when they shot up from less than 10 percent to around 25 percent following a string of launch failures. For the past three years, insurance rates have been relatively stable, hovering around 17 percent, depending on the rocket and the satellite seeking coverage.[15]

After suffering heavy losses in 1994, the space insurance industry bounced back strongly in 1995 and now is substantially in the black, space insurance officials say.

Riding a wave of successful launches and trouble-free in-orbit operation of insured satellites, insurers took in a record $786 million from premiums in 1995 and paid out about $238 million in claims.

The space insurance industry has netted an average between $800 million and $850 million over the past 13 years when premiums collected are matched against the claims paid out.

The health of the space insurance industry is directly dependent on the health of the most active commercial launch vehicles. In 1995, Lockheed Martin's Atlas and Arianespace's Ariane rockets each had record years -- Atlas posted 12 and Ariane 11 successful launches and no failures.

For 1996, space insurers are bracing for another active launch year and forecast that total insurance premia may approach $1 billion. Ariane has scheduled 12 launches, and Atlas is forecasting eight or nine launches.

An interesting case is the following. The satellite of Korea Telecom of Seoul was placed some 6,350 kilometers short of its intended orbit after

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13 P.D. Nesgos, *Trends in the Acquisition and Financing of Space Projects: Insurance Implications*, 8TH ASSICURAZIONO GENERALI INTERNATIONAL CONFERENCE ON SPACE INSURANCE (Venice, 1995).

14 J. Gangloff, *L'Assurance aviation et spatiale situation vue en 1995*, *in* 3 MÉLANGES PIERRE VELLAS, RECHERCHES ET RÉALISATIONS 665-668 (1995).

15 SPACE NEWS, No. 23, 1994.

a 5 August 1995 launch aboard a McDonnell Douglas Delta 2 rocket whose strap-on booster failed to separate from the body of the rocket.

The satellite's owners were forced to use on-board fuel to place the spacecraft in geostationary transfer orbit. The fuel was supposed to have been used to stabilize the satellite in its orbital position. As a result, Koreasat 1's intended 10-year orbital life has been cut in half, to about five years, according to Korea Telecom and insurance officials.

Under the $104 million insurance policy signed with a group of insurers in Britain, Germany, Italy and elsewhere, Korea Telecom would be entitled to receive the full $104 million if the satellite's capacity is cut by more than 50 percent. In Koreasat 1's case, the insurance policy was for a period of 9' years of in-orbit performance.

Insurance underwriters have argued that Koreasat 1 should not be declared a total loss because it still has five years of service potential.

They are threatening to take possession of the orbiting Koreasat 1 satellite and then sell it to the highest bidder unless its owner, Korea Telecom, drops its demand for payment of the full $104 million insurance claim.[16]

Thus this was one of the cases in which partial loss occurred. The comment of Nesgos, expert in space financing on such cases is interesting. He observes:

> The issue becomes more complicated in the event of a partial loss. In this case, the financial institutions could still claim a superior right to the collateral and, in the event of a default under the credit facility exercise their rights to the entire satellite. Perhaps the best way to address the potential conflict that could arise would be for the insurers to require that the financial institutions partially release their security interest in that portion of the satellite for which a partial loss has been paid, thereby enabling the insurers to recover maximum salvage value with respect to that portion of the satellite.[17]

The destruction of the Apstar 2 satellite on a Chinese Long March rocket is expected to cause insurance for the upcoming launch of AsiaSat 2 on the same rocket to be significantly more expensive. The disaster also caused a shortage of satellite capacity for television broadcasters in the Asia Pacific region.[18]

The Washington-based International Telecommunications Satellite Organization (Intelsat) stated that it had purchased about $2 billion in coverage for 10 satellite launches between 1995 and 1997. Intelsat asserted that it was paying about $185 million in premiums to cover the launch of the satellites.

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16 *Id.* No. 46, 1995.

17 *See* note 13.

18 SPACE NEWS (No. 6, 1995).

Intelsat's insurance package covers only the period beginning with ignition of the launch vehicle and ends with the separation of the satellite from the rocket's upper stage. The consortium is thus insuring an event that lasts about 20 minutes per launch.[19]

It is interesting to note that in this last contract the time of the launching has been mentioned exactly. Different opinions exist on the exact starting point, and it is desirable to mention the time of the launching in the contract.

The 6 December 1995 launch of the French Telecom 2C and India's Insat. 2C spacecraft aboard an Ariane 44L rocket from the Guiana Space Center was insured for about $420 million, making it the largest gamble on a single launch in space insurance history.[20]

Just as for ships and in aviation, leasing of spacecraft is becoming more and more common. There is even news that Kazakhstan will lease its mammoth Baikonur cosmodrome to Russia. A Western delegation has judged it to be in fairly good condition.

Leasing of satellites started in the United States in the 1980's. Investment tax credits made leases particularly attractive. Nowadays, also commission foreign sales corporation leases are popular.

The equipment is very costly and with the increasing need for satellites for commercial use leasing is a good economical solution. As in aviation [21] an agreement between the State of Registry of an aircraft and the State of the operator could be concluded.

Nesgos states that there is a difference between lease financing of transponders versus the entire satellite.[22] Every lease financing of communication satellites in the USA has involved one or more transponders, even in the case of all transponders on a single satellite. Ownership of a transponder includes dedicated components and shared ownership of other components of the satellite. Satellites have been financed on a transponder-by-transponder basis for regulatory, economic and financial reasons.

The difference of leasing of satellites and aircraft is that leasing of satellites is less frequent and that satellites are a greater risk, also in view of the time of activity.

The lease contract in itself being a financial agreement will not differ much from the usual lease contract. However as mentioned before a difference will be made between the lease of the satellite itself and the lease of transponders.

Brumberg is of the opinion that in view of financing space activities a broader definition of space law will be needed, including more than just those international and domestic laws that directly affect space activities.

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19 *Id.* No. 2, 1995.

20 *Id.* No. 47, 1995.

21 *Cf.* Art. 83 bis of the Chicago Convention.

22 Peter D. Nesgos, *Commission FSC's on the Final Frontier: Special Considerations for Satellites and Transponders*, THE FSC/DISC TAX ASSOCIATION, 5TH ANNUAL FSC CROSS-BORDER LEASING CONFERENCE 1-2 (New York, April 21, 1994).

Companies involved in space activities are concerned with a number of legal areas. In his article he discusses the law of business finance for start-up companies in the US.[23]

A State that avails of the possibility of leasing of transponders is Columbia. Columbia's lease of the NASA transponders runs until 1997, with an option for a four-year extension.[24]

Columbia has licensed 15 satellite receiving facilities in four countries, including 12 in the United States and one each in Korea, Japan and England. The newest teleport that will receive and transmit signals via Columbia's transponders, is located near London.

In case of breakdowns of transponders, the liability of the satellite operator is always precluded. The lessee can only derive his rights to assure the functioning of his satellite communication system, from the provisions laid down in his transponder lease contract.[25]

When seeking optimal protection against breakdowns, one should lease a non-preemptible protected or restorable transponder. In this case, the user cannot be preempted by others, and in case of a transponder failure, the satellite operator ensures the functioning of the system by placing an assigned restoration transponder at his disposal. The satellite operator provides him with another transponder from the reserve capacity or if not available, a preemptible transponder. In the latter case the lessee of a preemptible transponder is preempted from use of his transponder and has to stop transmitting to the satellite within an indicated amount of time. So the lessee of a protected or restorable transponder will be ensured of the functioning of his system.

In order to avoid the regulatory impediments that may arise regarding the lease financing of an entire satellite, the transaction should be structured based on individual transponders. Nesgos observes that 'it is important that the Lease Agreement includes express provisions obliging the lessee to use the transponders in compliance with the Transponder Purchase and Service Agreements and applicable law including any authorization relating to the transponder issued by any governmental authority having jurisdiction over the transponder, the satellite and the lessee.'[26]

Where the transponders on the satellite are financed in a single transaction, particular care must be taken in drafting the remedy which

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[23] Bruce S. Brumberg, *Financing Space Activities,* 28 PROC. COLLOQ. L. OUTER SPACE 215-219 (1985).

[24] SPACE NEWS, No. 6, 1994.

[25] *Cf.* Van der Heyden, Tuinder, De Vries, *A Typical Transponder Lease; Peremptory Rights; Liability of Satellite Operators for Breakdowns,* INTERNATIONAL BAR ASSOCIATION, (COMMITTEE Z), 8TH CONFERENCE OF THE SECTION ON BUSINESS LAW'S COMMITTEE ON OUTER SPACE (London, 1987). For a definition of transponder, see also P.D. Nesgos, *Commission FSCs on the Final Frontier: Special Considerations for Satellites and Transponders,* FSC/DISC TAX ASSOCIATION, 5TH FSC CROSS-BORDER LEASING CONFERENCE (New York, 1994).

[26] P.D. NESGOS, EQUIPMENT LEASING (SATELLITES AND TRANSPONDERS, ch. 29, at 13) (preliminary draft, Matthew Bender & Co., 1992).

entitles the lessor to control and operate the satellite. If this remedy is to be exercised, the lessee must be required to assist the lessor in obtaining any necessary regulatory approvals. As regards the condition of the satellite, representations and warranties should be made by the lessee as to the compliance with transponder performance specifications, the orbital position of the satellite and the amount of onboard station-keeping fuel.

It is unlikely that a lessee would carry liability insurance for satellite transponders. Once positioned in space, a geostationary satellite will remain in orbit indefinitely (hundreds of years) as it will be moved to a higher orbit after the end of its useful life. Therefore, the likelihood of a satellite impacting the earth is remote. Nevertheless we have to keep in mind the Soviet Cosmos Satellite 954, which crashed in Canada on 18 December 1978, causing damage not to individual persons but to the environment, the Skylab, which came down over Australia in July 1979 and the Chinese Satellite Fanhui Shi Weixing-1 (FSW-1) which came down on 11 March 1996 into the southern part of the waters of the Atlantic Ocean.[27]

Less remote, but still quite unlikely, is a satellite's collision with a neighbouring satellite. While liability for damage resulting from electromagnetic or radiofrequency interference caused by transponders may be of some concern, such liability is excluded in space insurance policies.[28]

Regarding transponder financing, Nesgos concludes that three factors have contributed to the deviation from the usual practice in equipment lease financing which expects and requires full insurance namely:

1. the remote possibility of third party liability and the reliability of satellites and transponders once in-orbit.

2. the traditional high cost of in-orbit insurance which is low relative to launch insurance, as it has not reflected actual loss experience.

3. most transponder financing has involved lessees with generally strong credit standings.[29]

The ability of the lessee to pay in the event of a catastrophic loss not covered by insurance is important.

In conclusion, it could be stated that the financing of spacecraft will be supported by the insurance companies through leasing contracts for satellites and transponders. Because of the great risks associated with space launches, it will be necessary for the insurance companies to cooperate and be informed timely about scientific developments. Developing practice will assist reaching equilibrium between the insurance premium and the compensation paid for such damage.

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27 I.H.Ph. Diederiks-Verschoor, *Similarities with and differences between air and space law primarily in the field of private international law*, 172 R.C.A.D.I. 349-350 (1982).

28 *See* note 26.

29 *Id.*