
The international aviation insurance regime in times of industry uncertainty

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Abstract: The aviation industry has been hard hit in recent years. While there are numerous factors that have contributed to the industry's dilemma, rising and volatile insurance premiums – particularly after the events of 9/11 – have posed a particular problem for many airline managers. Despite a general trend for accident rates involving commercial passenger airplanes to decrease as aviation technology has advanced over the years and airplanes have become safer, the aviation insurance market has been far from stable. This paper provides an overview of how the aviation insurance industry works and how it has changed in recent years. The authors take a look at how the risk is spread between insurers, how insurers treat deliberate acts of violence and, lastly, how insurers price the risk. The authors' paper shows that the aviation insurance market has undergone considerable changes in recent years and that it has adjusted to the post 9/11 aviation insurance realities being reasonably ready to handle events of an even more catastrophic magnitude.

Keywords: aviation; accidents; insurance; risk; September 11, 2001; 9/11; aircraft.

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1 Introduction

Aviation accidents, although infrequent, have the potential to result in large property damages and a high number of fatalities. The extant academic literature includes several studies that examine the strategic and financial consequences of aviation accidents for the affected airlines. Chance and Ferris (1987), Davidson et al. (1987), Walker et al. (2005) and Pukthuanthong-Le et al. (2007), for example, study the stock price reaction of airlines following an accident announcement.¹ In addition, Carter and Simkins (2004) and Flouris and Walker (2005) take a detailed look at the airline industry's reaction to the events of September 11, 2001 (9/11).² Yet, despite a thorough examination of the airline industry's reaction to aviation accidents that is provided by these strands of literature, there have been comparatively few studies that consider how insurance companies – which ultimately pay the bills – are affected. The authors' study adds to the existing literature in this area by exploring how the insurance industry has reacted to the events of 9/11.³

In the first part of the authors' study, they aim to provide insights into the inner workings of the aviation insurance market. Specifically, the authors take a look at how the risk is spread between insurers, how insurers treat deliberate acts of violence and, lastly, how insurers price the risk. The statistics and related discussions presented have been developed through the cooperation with several industry insiders and should be of interest for both practitioners and academics alike. In the second part of the paper, the authors focus their attention on the events of 9/11 and examine how they have affected both insurers and insureds.

The authors document that the aviation insurance market has undergone considerable changes in recent years that included, among other things, the withdrawal of numerous insurance policies immediately following the events of 9/11, the departure of several insurers and re-insurers from the aviation insurance market, the creation of a new drafting

body for insurance clauses, the redrafting of several old insurance clauses to better address war and terrorism risks, the reformulation of previously designed disaster scenarios and an active discussion among airlines, insurers and governments about governments' role in insuring certain war risks. The authors will review and discuss each of these developments in detail in their paper; and while many of them are still ongoing, it is fair to say that the insurance market has already sufficiently adjusted to the post 9/11 aviation insurance realities so that if worst comes to worse, it would be reasonably ready to handle events of an even more catastrophic magnitude.

2 The aviation insurance market⁴

The fundamental principle of all forms of insurance is that 'the premiums of the many will pay the losses of the few'.⁵ As insurance businesses exist in the commercial realm, they use conventional business management principles applied in the way they operate. Insurance companies should cover the cost of running the business, expenses and commissions and, together with any investment income, provide a reasonable profit and return on the capital employed. Similarly, the insurance market works to spread the risk between a large number of insurers and re-insurers so that the amount any one insurer is exposed to is kept within acceptable limits. A decade ago, '(by) the time a major airline risk (had) been fully re-insured, hundreds or even thousands of insurers and re-insurers (would) have (had) a share. But, nowadays, with continuing consolidation in the market, the number of participants has fallen significantly, although in a typical deal, it is still over a hundred'.⁶

There are a number of features that set aviation insurance apart from other classes of insurance. Perhaps, the three most significant are the limited number of risks available to insure, the comparatively small size of the insurance class and the industry's exposure to catastrophic events.⁷ The main characteristic of the aviation insurance segment is that relatively few risks are available to insure. This is especially so if only airlines are considered. At the end of 2003, there were 765 airlines worldwide operating about 16,400 Western-built jet aircraft.⁸ At that time, the total fleet value of these airlines was estimated at around \$570 billion – a figure that, due to some contraction and subsequent stagnation in the aviation market following 9/11, was largely equal to the estimated total year-end fleet value of \$580 billion in 2000. After several more years of lacklustre growth at around 2.5% from 2003 to 2006 (which was well below the 8.2% average annual growth rate from 1992 to 2000), airline fleets have only recently exhibited some significant expansion, with growth rates in 2007 estimated at around 11% – bringing total insurable fleet values to approximately \$670 billion (Aon, 2007). However, despite these seemingly large figures, the actual number of individual risks is comparatively small since there are several airline groups where insurance is purchased on behalf of all the members of the group. In addition, the exposure, in terms of fleet value (or indeed size of fleet) is dominated by a few very large airlines or groups of airlines, with the 20 largest accounting for well over 50% of the total value at risk. The 100 largest airlines account for 90% of the exposure as measured either by value or passengers carried.

The aviation insurance market is very small in comparison to most other classes of non-life insurance. For the year 2007, the total gross annual premium for the entire aviation insurance market (including all airline, products and services, space, general

aviation and hull war policies) was approximately \$7.36 billion. These aviation premiums represent only about 0.1% of the worldwide insurance market and are considerably smaller than, for instance, the annual premiums for automobile insurance even in small countries. Examples of comparisons between aviation and other classes of business that illustrate how insignificant aviation is in the insurance world are often quoted – one such example points out that the cost of insuring all airlines around the world approximately equals the cost of insuring plate glass in New York State.⁹

Nevertheless, while aviation as a class has one of the smallest premium bases in the insurance industry, it has one of the highest exposures to potential catastrophes.¹⁰ Some new Boeing 747s are insured for over \$250 million and many wide-bodied jets will be insured for more than \$100 million each, while for liabilities (passengers and third party liabilities), a combined single limit of \$1.5 billion or \$2 billion will be bought.¹¹

One estimate of the total gross premium income received from airlines during the 2007 underwriting year is \$1.5 billion.¹² Thus, there is potential for the single loss of a wide-bodied aircraft to account for more than the total annual premium income for this class of insurance. In addition, there is, of course, always the very small chance of a collision between two such aircraft. So, how do aviation insurers plan for such possibilities?

Aside from in-house risk assessments performed by insurance firms themselves, much of the planning for such disasters is performed by Lloyd's of London. Often characterised as the most venerable aviation insurance institution in the world (cf. El-Kasaby et al., 2003), Lloyd's is a syndicate of underwriters who reinsure one another and are comprised of both corporations and individuals. Members of Lloyd's, including underwriters, agents and brokers, are self-regulated. One of Lloyd's requirements is that underwriters have to conduct their underwriting business only with Lloyd's brokers. In contrast, the insured in USA do not have to conduct their business through a broker and insurer's activities in USA, whether they are domestic or foreign, have to comply with the specific regulations of each state.¹³

In 1996, Lloyd's introduced a number of realistic disaster scenarios (RDS), which had been developed by their regulatory division. Lloyd's Syndicates have to demonstrate their capability to meet all their commitments, which might arise from these prescribed scenarios, if they are to continue to do business at Lloyd's. There is currently only one RDS, which specifically addresses aviation risks. This RDS, titled 'aviation collision' initially ran as follows 'assume a collision between 747s of the syndicate's two highest airline exposures occurring over a major USA city; assume liability loss of US\$1 billion per airline'.¹⁴ Amongst other changes, the assumed liability loss has, more recently, been increased to a total of \$4 billion.¹⁵ An actual occurrence of this scenario would produce a loss equivalent to more than 2.5 times the 2007 gross premium income of \$1.5 billion from all airline business worldwide (Aon, 2007).

With the exception of 9/11, where the currently estimated incurred loss falling on aviation policies is some \$4.6 billion for the insurance and reinsurance industry (cf. Hartwig, 2006), so far, there has been no aviation loss which has approached these levels. Nevertheless, in any one year, while there are relatively few total losses and/or fatal accidents, there is always the potential for a catastrophe. In the last 14 years, there have been 46 losses of over \$100 million (see Table 1).

Table 1 Number of catastrophic losses between 1994 and 2007

> \$100 million	46
> \$200 million	22
> \$300 million	13
> \$400 million	8
> \$500 million	4

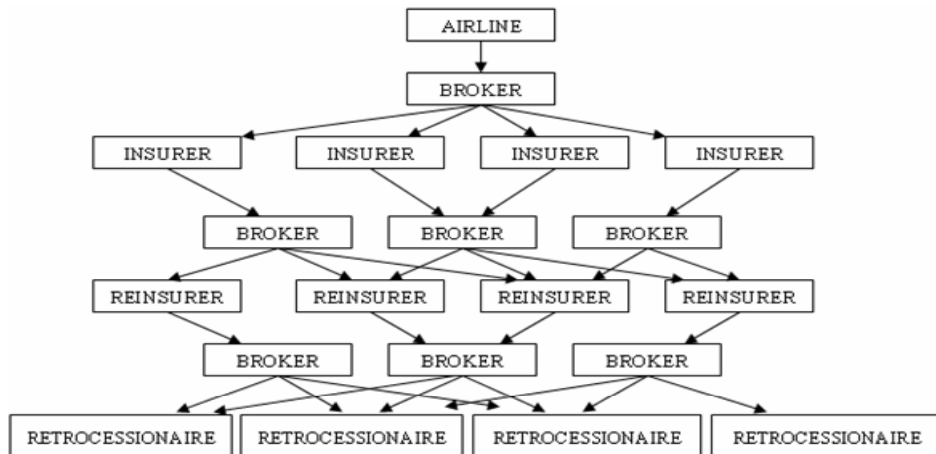
Note: Loss > \$100 million

Source: Ascend Worldwide Ltd. (cross-referenced with information retrieved from <http://www.nts.gov>, <http://www.aviation-safety.net>, <http://www.airdisaster.com> and <http://www.airdisasters.co.uk>)

On average, this amounted to about three per year, but of course, these events have not been evenly distributed. Consequently, with a small premium base and occasional catastrophic losses, the airline insurance market can be very volatile.

An airline’s various aviation risks are normally insured as a whole with one combined policy covering loss or damage to the aircraft in its fleet and its legal liability to passengers and third parties (see Figure 1). No single insurer has the financial resources to retain a risk of the size of a major airline or even a substantial proportion of such a risk. Except at the local level, which generally only applies in countries with a legal requirement to place insurance with insurers based in that country, and where insurers will retain none or very little of the risk, very many insurers/re-insurers will be participating in the risk at each step. Each step, each link in the chain, is brought together by a broker.

Figure 1 The insurance chain of airline risk



As Figure 1 shows, an airline’s risk will be insured by a number of co-insurers each of whom enters into a separate contract of insurance with the insured. One of the co-insurers will act as the leader for the risk and will negotiate the terms and conditions for the cover provided. This lead insurer will typically also be responsible for handling any claims that arise. The other insurers, known as the following underwriters, will normally conform to these conditions, as it would be impractical to have different ones for each participant.¹⁶

Once the leader has signed the slip, the broker will approach other underwriters at Lloyd's or insurance companies in London and elsewhere and invite them to take a part of the risk.¹⁷ Each underwriter (insurer) will then take a line (a percentage) of the risk. The insurance cover will be completed once underwriters accepting 100% of the risk have signed the slip.

Three of the largest aviation insurers, Global Aerospace, USAIG and La Reunion Aeriennne, are pools, each writing business on behalf of five or six different insurance companies. A smaller insurer, Aviabel, writes business on behalf of ten insurers.

For international (i.e., non-US) airline risk, the London market dominates as it accounts for nearly 60% of the competitive capacity and over 50% of the total capacity.¹⁸ The London capacity is split, roughly equally, between insurance companies and Lloyd's Syndicates. A long way behind London is Paris with an estimated 10% of the world's competitive capacity and 12% of the total capacity for international business.

The insurance cover for most non-US airlines is led off in London, either directly or as facultative re-insurance of a local insurer. The London insurers leading the airline business include such companies as Global, AIG, Allianz, Lloyd's Syndicates, ACE, Amlin and Wellington. In Paris, La Reunion Aeriennne leads an increasing number of international airlines.

The US market dominates the insurance of US-based airlines. London and, indeed, other international markets take a share of US airline risk, but they are nearly all led by US-based insurance operations, which will also take a significant percentage of the risk. Major US aviation insurance operations are USAIG, Global (Short Hills) and AIG (Atlanta).¹⁹

Currently, US-based aviation insurers generally do not write non-US airline business, although there is a notable exception, Houston Casualty Company, which will write difficult risks in Africa, South America, the Commonwealth of Independent States (CIS) and elsewhere. There is a saying in the insurance market that there is no such thing as a bad risk, only a bad rate, i.e., everything is insurable for the right price. However, the price is high – 20% for some African risks and, although not necessarily aviation-related, 30% for some space risks. Major airlines in Europe generally will be paying less than 1% and closer to 0.1%. At the time of writing, one major UK airline had a rate of 0.088% for its hull cover and \$0.256 per 1,000 revenue passenger kilometres (RPKs) for liability (based on the data provided by Airclaims Ltd.).

There are not more than about 50 insurers writing airline business worldwide and this number includes some who will only write risks based in certain countries or who are niche players.

3 Re-insurance

Aviation and, in particular, airline insurance cannot provide insurers with a balanced portfolio because of the small number of risks.²⁰ Therefore, direct insurers rely on re-insurance to help smooth out the effects of random fluctuations in losses and reduce the impact of catastrophic losses.

The direct insurers on a risk will seek to limit their exposure to any loss by purchasing re-insurance. Re-insurance can be divided into two areas: proportional, which includes quota share and surplus, and non-proportional, which includes excess loss and stop-loss.²¹

4 The cover

Although, following an airline accident, there are a number of different covers (insurance policies) which will ultimately respond, in the context of this study, the authors will limit their review to the covers bought by airlines, specifically hull insurance, which provides cover against loss of or damage to the aircraft itself and passenger and third party liability insurance.^{22, 23} Cover for the airline's liability will normally be arranged alongside the hull cover in a single policy with the same insurers insuring both the hull and liability risk.²⁴

Hull cover is affected on a so-called all-risk rather than a named-peril basis with, broadly, the policy responding to the loss of or damage to the aircraft as the result of any accident. Similarly, passenger/third party liability insurance will provide cover for all sums (up to the policy limit) the airline is legally liable to pay for damages arising from bodily injury (or death) or property damage to passengers or third parties caused by an occurrence and arising out of or in connection with the insured's operations.²⁵ An occurrence is frequently defined in airline policies as an accident, which results in bodily injury. There has been considerable case law over the exact definition of an accident and bodily injury, but for the authors' purposes, it will suffice to take these words at face value.

5 War exclusion

As stated above, there are no restrictions on what circumstances leading to an accident are covered – an accident need only occur. However, specific exclusion clauses are always added to aviation policies, which introduce limits to what circumstances or events they will actually respond to.

When the events of 9/11 unfolded in September 2001, most aviation policies included clause AVN48B, the war, hi-jacking and other perils exclusion clause (aviation). Very briefly, the clause states that the insurance policy does not cover claims caused by deliberate acts of violence, hi-jacking, seizure, etc.

In respect of the aircraft's hull, part of the cover excluded by AVN48B was regained – written back into the policy – by the incorporation of clause AVN51, extended coverage endorsement (Aircraft Hulls). However, this clause was normally only used for general aviation and was usually not included in an airline policy. Although AVN51 did reinstate cover for damage resulting from hi-jacking or any unlawful seizure of the aircraft, it did not reinstate cover for all of the war risk perils excluded under AVN48 and therefore did not provide airlines with the cover they needed.

Cover for full war risks needed by airlines could be affected under the Aviation Hull War and Allied Perils Policy (LSW555B) written in the London war market, i.e., generally by a different set of insurers. LSW555B provided cover for loss of or damage to the aircraft '...against claims excluded from the insured's hull all-risks policy...' by AVN48B except for any hostile detonation of any weapon of war employing atomic or nuclear fission and/or fusion or other like reaction or radioactive force or matter. LSW555B also excluded losses, damages or expenses resulting from war amongst the great powers – the UK, the USA, France, the Russian Federation and the People's

Republic of China – unless the aircraft was in the air at the outbreak of war, in which case, it was covered until it had completed its first landing.

Hull war risk policies usually have a fleet aggregate limit. In 2001, for large international airlines, this limit lied in the vicinity of \$600 million to \$1 billion. This was equivalent to the total loss of approximately ten wide-bodied aircraft, but would not cover the whole or a significant part of a large airline's fleet if it were to be caught on the ground in one place, e.g., the Iraqi invasion of Kuwait. For such cases, excess aggregate war risk cover was available. Some war policies also provided for reinstatement at an agreed further premium, but this generally did not increase the policy limit for any one loss.

While war risk cover for aircraft hulls could be purchased in the war market, this market did not insure liabilities. Cover for an airline's legal liability to passengers and third parties had to be obtained by writing it back into the all-risk policy by incorporating Clause AVN52 'extended coverage endorsement (aviation liabilities)', in consideration of an additional premium. However, prior to 9/11, this liability write-back was given away by all-risk insurers. Having excluded this cover by including Clause AVN48B in the policy, they then re-instated the cover in respect of liabilities free of charge or cheaply by including AVN52.

Insurers attribute the previous giving away of AVN52 cover to the past weak aviation market. The additional premium for AVN52 was typically charged at around 25% of the premium. This then dwindled down to 10% and, in many cases, disappeared. It is thought that as AVN52 was always included, the amounts originally shown as a specific additional premium became just an allocation of part of the premium. Then, in the periodical weak market conditions that aviation (airline) insurance goes through, any allowance for AVN52 dwindled away to nothing and was lost.

Prior to 9/11, AVN52 (AVN52C) reinstated (wrote-back) the full combined single limit stipulated in the policy for both passengers and third parties. But, following this catastrophic loss, the coverage afforded by this write-back was limited going forward. Although it continued to re-instate the full all-risk limits in respect of the aircraft's passengers, initially, it was limited to just \$50 million with respect to third parties. After 9/11, this limit was increased to \$150 million or in some cases \$250 million, but was still generally far below the coverage that airlines required.

In summary, prior to 9/11, an airline's fleet and its legal liability to passengers and third parties in the event of an accident was covered by a combined hull and liability policy for all risks. However, any loss as the result of deliberate acts of violence was excluded by the standard inclusion of Clause AVN48B. In the case of a loss resulting from an act of violence, cover for the aircraft was provided by a war-risk policy (LSW555B), while liability cover for the passengers and third parties was written back into the all-risk policy by the standard inclusion of Clause AVN52.²⁶

6 Changes after 9/11

The events of 9/11 were catastrophic and, although the expected loss falling on aviation policies amounted to only around \$4.6 billion, which was less than 13% of the estimated total insured loss of \$35.9 billion (Hartwig, 2006), in comparison with the premium generated by this class of business, it was by far the worst impacted by the event.

9/11, in which airliners were, in effect, used as weapons, resulting in a huge loss of life, also changed the industry's views on this type of risk. Aviation insurers began to realise that the impact of some forms of terrorism was unquantifiable and therefore uninsurable while their capital providers realised that the magnitude of the potential exposure they had in aviation was out of proportion to the small premium income that it generated. Capital providers ceased to see aviation simply as a small residual market they could move surplus money into and out of depending upon the attractiveness of the returns in their main property/casualty business and were suddenly confronted with the realisation that aviation could hurt them.

While the events of 9/11 were shocking in the true sense of the word and it was recognised, even in the first hours, as the largest loss ever sustained by the insurance industry, there seems to have been little or no concern amongst insurers that they would not be able to meet the financial demands arising from the event.

However, the impact on the aviation insurance market was such that insurers had to act quickly to protect their business going forward and re-inflate the market. Insurers quickly took action to limit their exposure to this type of event in the future and to generate large amounts of additional income through the introduction of surcharges. Other reactions included, for example:

- immediately all outstanding quotes were withdrawn
- effective 23:59 GMT on September 17, 2001, insurers gave notice of the cancellation of AVN52C
- on October 1, 2001, special surcharges for passenger and cargo airlines and hull war cover were introduced; drafting of a new AVN48 began.

The aviation insurance market's first act after the attacks was to withdraw all outstanding airline all-risk and hull war quotes, which had not been accepted. Underwriters needed time to assess their position; this was of 'paramount importance'.²⁷

In the first week, meetings were held in London between representatives of Lloyd's Aviation Syndicates and the insurance companies to review the cover and terms of AVN52C. According to Willis, '(they were) determined to be in a position to be able to maintain coverage for the world's airline communities, albeit on a more restricted basis'.²⁸ As a result of these meetings, it was decided to give notice of the cancellation of the coverage afforded by AVN52C to all aviation risks, as this was the only way that insurers could give notice of a review of its coverage. Letters were sent to all insureds giving them the required seven days notice of the cancellation with effect from 23:59 GMT of the date of the letter. The notice given to US domiciled insureds was extended by an additional 48 hours to allow it to be made by recorded delivery.

AVN52C was subsequently replaced by AVN52D (also, in due course, by AVN52E for non-airline risks). AVN52D was almost identical to AVN52C except, most importantly, it introduced a much lower sub-limit as far as cover for an airline's legal liability to third parties was concerned – \$50 million – for any one occurrence and in the aggregate.

On October 1, 2001, special surcharges were introduced to re-flate (sic) the market. These included:

- A \$1.25 charge per passenger for each departure applicable to any airline operating any one aircraft with a seating capacity in excess of 15 passenger seats.
- A 10% surcharge on the composite hull and liability all-risks premium paid by cargo airlines.
- For hull war, a one-year special charge of 0.05% based on the declared average fleet values at risk for all airlines. This was payable pro rata up to the expiry of the then existing policies and then going forward on renewal pro rata until October 1, 2002.

The most significant of these measures was the reduction of AVN52 cover for third parties to \$50 million. This would have grounded the world's airlines since they operate subject to various contractual agreements, requirements and conditions of use, which normally stipulate considerably higher levels of cover. Fortunately, the world's governments stepped in and provided other forms of government sponsored insurance or gave indemnities to allow the airlines to continue operating [for a detailed discussion of insurance covers provided by the various governments around the world post 9/11, see Carpenter (2007)].

Initially, no commercial insurance cover for third party legal liabilities above \$50 million was available, but in due course, a number of insurers began to provide separate policies with higher limits – terms and limits differed, but generally, up to \$1 billion (i.e., \$950 million in excess of \$50 million) plus, where appropriate, a second layer up to \$2 billion (\$1 billion in excess of \$1 billion).

Five companies – AIG, Allianz, Axis, Berkshire Hathaway and GE Frankona – with subscribing markets following the excess third party liability market, provided this excess third party legal liability cover.

Prior to 9/11, market estimates for the 2001 premium income for the airline business was \$1.66 billion for all-risk and \$190 million for hull war, for a total of \$1.85 billion. It is estimated that, after 9/11, the surcharges and excess third party legal liability cover cost the airlines an additional \$3.08 billion in the year for a total cost of \$4.93 billion – more than two and a half times what had earlier been expected (based on the data provided by Airclaims Ltd.).

In the years since 2001, several changes have taken place. The \$1.25 per passenger and 0.05% hull war surcharges were 'easing by the third quarter of 2002 with a trend to blend both into the base rates... in real terms, the \$1.25 reduced to \$1.00 in most cases (and less in some) and hull war was down to 0.0375%'.²⁹ Reductions have continued since then. Meanwhile, the commercial third party legal liability market was said to be 'softening their quotes'³⁰ and the third party liability limit in AVN52 has begun to edge up. In August 2004, for example, Monarch Airlines' cover was renewed with an increased primary AVN52 limit of \$250 million. Since then, even more favourable renewals have taken place in what Aon (2007) describes as a continued soft market for aviation insurance in recent years.

Most of the standard aviation insurance clauses were originally defined in London by Lloyd's Aviation Underwriters' Association (LAUA) in association with its company market counterpart, the Aviation Insurance Officers' Association (AIOA). More recently, this activity has been taken over by a market working party, the Aviation Insurance Clauses Group (AICG) (see http://www.aicg.co.uk/aicg_public/default.asp).³¹

In August 2006, AICG published a series of new aviation liability clauses to address exclusions and write-back issues relating to the use of weapons of mass destruction

(WMD). As envisaged in the aftermath of 9/11, the main difference between the clauses is the inclusion of new perils including the hostile use of radioactive contamination (RADCON) or matter, electromagnetic pulse (EMP) or chemical or biological materials for political or terrorist purposes and the expansion of the definition of hi-jacking to bring it into line with the wording of the 1970 Hague Convention for the Suppression of Unlawful Seizure of Aircraft.³²

These new aviation liability clauses include AVN48C and AVN48D. Both of these clauses follow the familiar format of AVN48B, but introduced particularised (alternate form) exclusions for war perils. AVN48C is typically combined with AVN52H (aircraft operators) and AVN52J (service providers), while AVN48D works with AVN52K (aircraft operators) and AVN52L (service providers). In each case, the companion clauses write back some of the risks excluded by AVN48C and AVN48D (Hughes, 2006).

AVN48C, AVN52H and AVN52J are underwriter-sponsored clauses originally written upon request of Lloyd's and the London Company Aviation Underwriter Associations. These three clauses effectively exclude (without any write-back) all cover for the hostile use of WMD, namely nuclear, RADCON, bio/chemical (BIO/CHEM) and EMP devices or materials.

AVN48D, AVN52K and AVN52L are sponsored by Marsh, IATA, and AEA and are available since November 2005. Contrary to AVN48C and its companion clauses, these three clauses are aimed to provide limited WMD cover for RADCON, BIO/CHEM and EMP devices or materials, particularly when these are employed only on board of a single aircraft. There is, however, no cover for nuclear or atomic detonations.³³

Many insurers are currently making further changes in policy wordings as the possible implications of modern terrorism are more fully thought through. Yet, there is a very strong belief that commercial concerns, insurers and their customers should not bear the cost of what could be described as state risks and that governments should take over responsibility for indemnifying victims of terrorist attacks. This already happens in certain circumstances in certain countries.³⁴

7 Conclusions

In this study, the authors provide an overview of how the airline insurance industry works and what developments it has undergone in recent years. To insure airlines against accidents and deliberate acts of violence – both of which are fortunately rare, but have potentially catastrophic consequences – the airline insurance market employs an intricate and highly sophisticated system through which risk is spread among a large number of insurers.

Clearly, the industry was put to a test on 9/11, but although the events that unfolded on that day ultimately cost the insurance industry billions of dollars, no insurance company was in serious danger of failing as a result. While some insurance companies have withdrawn from the aviation sector as they perceive the risk-reward trade-off to be unattractive, the insurance companies that remain have rewritten their policies and have changed a number of significant clauses to protect themselves from adverse eventualities and to be able to cover even larger potential catastrophes in the future.

Although airlines can continue to insure themselves against most risks, the cost of doing so has clearly increased and has put insurance premiums on the front of airline

managers' minds – potentially outweighed by only few factors such as concerns about rising fuel prices. Whether, say, a potential political stabilisation in the Middle East or a hopeful reduction in terrorist threats will ultimately reduce the industry's overall risk exposure remains to be seen, but in the long-term, airline managers can rest assured that competition among insurers is sure to result in a fair equilibrium rate for their risk profile. After all, airline insurance is a good and there are numerous firms that are willing to provide it – albeit at the right price.

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Notes

- 1 For related research on the reputational consequences and legal repercussions of aviation disasters for airlines and airplane manufacturers, see also Chalk (1986, 1987), Borenstein and Zimmerman (1988), Mitchell and Maloney (1989), Rose (1992) and Bosch et al. (1998).
- 2 The hi-jacking of four aircrafts and their subsequent deliberate crashing into the World Trade Center and the Pentagon, as well as the crash in rural Pennsylvania on 11 September 2001 is in short often referred to as '9/11'.
- 3 For other studies that examine changes in the aviation insurance market after 9/11, see Margo (2002, 2003), Abeyratne (2002, 2005), Kunreuther and Michel-Kerjan (2004), Caplan (2005a, 2005b, 2006) and Hughes (2006).
- 4 The authors use the term 'aviation insurance market' loosely to refer to the group of insurers writing risks in the commercial aviation sector. For a detailed overview of the different types of aviation insurance available, see Margo (1996).
- 5 Viccars (2001, p.13).
- 6 Based on the comments of an insurance underwriter who wishes to remain anonymous.
- 7 The word risk is used in this context to mean something which is insured, e.g., an airline fleet. This is common usage in the insurance market, but of course, it can lead to confusion with the more conventional use of the word.
- 8 (2004) *Jet Operator Statistics*, Airclaims Ltd., No. 1.
- 9 See Viccars (2001) who notes that 'it was said that the annual premiums for the (aviation) class were less than the annual plate glass insurance premium for the state of New York'.
- 10 Viccars (2001, p.16).

- 11 Based on the data provided by Airclaims Ltd.
- 12 Reuters/Business Wire (2008) ‘\$300m hole in aviation insurance cover – industry experts warn premiums will have to rise’.
- 13 Wells and Chadbourne (2000).
- 14 Lloyd’s of London, Regulatory Bulletin Annex 1 (February 1997).
- 15 Lloyd’s Realistic Disaster Scenarios: Scenario Specification (April 2006).
- 16 Please note that in order to keep the authors’ graphical illustration comprehensible, they make no attempt at differentiating between lead insurers and following underwriters in Figure 1.
- 17 A ‘slip’ is a document, prepared by a broker, which sets out, in abbreviated form, a proposal to an underwriter (insurer) for insurance. See Margo (2000, p.6.11).
- 18 Based on the data provided by Airclaims Ltd.
- 19 Global is based in London, but mainly writes US airline risks through its US operation, while AIG, which is a US insurer, writes international, i.e., non-US business, in London and only US business in the USA.
- 20 The basis of insurance is the law of large numbers, first described around 1700 by Jakob Bernoulli. For any individual risk, it is impossible to predict the exact moment when fate will strike or the extent of the loss that will be incurred. But if insurers are covering very many similar risks, then statistical methods are used to predict future trends. The fate of any individual risk is still not known, but it is known how many losses of a certain type occur over a given time in a large population of risks. As such, a large motor insurer providing cover for several hundred thousand cars would be considered to have a balanced portfolio. Examples of portfolios with extremely poor balance, on the other hand, include nuclear power and aviation where a potentially huge exposure arises from a relatively small number of objects insured (Swiss Re, 2002).
- 21 Margo (2000, pp.27.07–27.08).
- 22 Other covers, which ultimately respond, particularly in any accident involving death or serious injury, are liability covers for product manufacturers (e.g., aircraft manufacturers, subcontractors, etc.) and service providers (e.g., air traffic management providers or air traffic control).
- 23 Although, in some instances, an airline liability policy contains separate clauses providing cover for passengers and third parties, it is now generally the case that a single comprehensive clause will include both. The majority of airline liability covers are placed on a combined single limit basis providing one limit for all passengers and third party liability claims arising out of an accident. Typically, for an airline operating wide-bodied aircraft, this will be \$1.5 billion or \$2 billion.
- 24 Viccars (2001, p.22).
- 25 Margo (2000, p.12.01).
- 26 Note that both an airline’s hull and liability all-risk policy and its hull war-risk policy are policies of indemnity, i.e., subject to any limits set out in the policies. If the claim is valid, insurers will indemnify the insured for the loss so that it is as if the loss had not occurred. Being policies of indemnity, insurers and indeed re-insurers have the right of subrogation – ‘once the insurers have indemnified the insured under the policy, they step into his shoes in relation to any rights of recovery which may be available to the insured against third parties’. See Margo (2000, p.23.61).
- 27 (2001) *Willis Global Aviation Bulletin*, No. 48.
- 28 Ibid.
- 29 (2002) *The Heath Lambert Report on Airline Insurance*, No. 13.
- 30 Ibid.

- 31 Specifically, from 1961 to 2005, standard wordings for aviation insurance contracts (particularly those resulting in the so-called AVN and LSW series) were elaborated by the Joint Technical & Clauses Committee (JTCC), which consisted of members from LAUA and AIOA. While these clauses were non-binding, they became the norm for almost all insurance contracts. Following allegations of anti-competitive behaviour by aviation insurers in the aftermath of 9/11 and a number of related investigations by the European Union, the JTCC was dissolved and was replaced by the AICG on June 24, 2005. Although the AICG continues to draft standardised clauses under the AVN series, it provides more transparency as it allows third parties such as re-insurers, brokers and clients to get involved in the drafting process. See Caplan (2006) for a detailed overview of the AICG.
- 32 Lloyd's Aviation Underwriters Association (LAUA) Letter (May 2004).
- 33 For a detailed discussion of the expected consequences these insurance clauses will have for both insurers and insureds, please refer to Hughes (2006) and Caplan (2006).
- 34 Note that in the years following 9/11, there has been considerable debate among airlines, insurance firms and various governmental bodies (particularly in the European Union) regarding governments' role in indemnifying airlines against any liabilities that may arise from terrorist attacks in which airplanes are used weapons and which are intended to harm a country or its citizens rather than the airline whose plane(s) are used. See Abeyratne (2005) and Caplan (2005a) for a detailed discussion of recent developments in this area.