

B. Climate change and insurance

German insurers as the German public in general have long been aware of the catastrophic prospects created by climate change, and have been and are very environmentally aware since, at the very latest, the mid 1980s. Such may be demonstrated by the words chosen by Klaus Conrad, then member of the board of directors of the Munich Re, at an insurance conference in 1990 – thus well before Hurricane Andrew demonstrated to the global insurance community the importance of looking more closely to the cause and effect of natural disasters: “I want to conclude these remarks on the risk of climate change with a general call for reason. For the Munich Re the looming climate change may bring about very interesting market opportunities, for humanity as a whole it [i.e. the climate change] is such a dangerous experiment, that we as citizens and enterprises should do all in our power to, at the very least, slow down the process.”¹

1. Which are the lines of insurance that could be affected?

Germany being a central European country, thus situated in a temperate zone, with only limited coastlines will most likely be less effected then many other countries in the medium term. Nevertheless natural disasters may take a tremendous toll on Germany and its insurance industry also, be it in the immediate future or already. As such some have voiced the opinion that the flooding of the river Elbe in 2002 was linked to climate change (cp. Bruns/Grobenski, in: idem (eds.), *Die Versicherung von Umweltrisiken*, Karlsruhe 2007, p. XIII). Whether this so-called *Jahrhunderthochwasser* (hundred year flood) was in fact causally related to climate change or was rather, as the name suggests, an extreme flooding as they periodically occur, is difficult to establish. Suffice it to say that this flood of the Elbe, with a total of insured losses of € 1.74 bn. significantly contributed to 2002 being the most insurance-loss-intensive year in

¹ Conrad [1990] VW 1032 at 1036: “Mit einem allgemeinen Aufruf zur Vernunft möchte ich auch diese Ausführungen zum Risiko der Klimaänderung beschließen. Für die ‘Münchener Rück’ kann die drohende Klimaänderung durchaus interessante Marktchancen bieten, für die Menschheit insgesamt ist sie ein so gefährliches Experiment, daß wir als Bürger und Unternehmer alles daran setzen sollten, dessen Ablauf zumindest zu verlangsamen.”

the recorded history of the German insurance industry (for an overview of severe weather catastrophes in Germany and other European countries in the last ten years as to death toll, losses and insured losses see *Kron/Ellenrieder* [2009] VW 9).

Other than such direct effects, climate change will also affect Germany as a country of production and of exportation, being reliant on energy resources and (maritime) transportation. Hence climate change will also encroach on many industrial insurance products.

Additionally, many German insurance undertakings are not merely interested in the effect climate change would have on Germany but also about its effect on other (developed) countries. Natural disasters abroad are often equally important to German insurers as those occurring in Germany, as the German insurance industry is highly globalised be it by the economic interest a German insurance undertaking holds in foreign subsidiaries or be it that foreign insurers are reinsured by one of Germany's large reinsurance undertakings. Insofar catastrophic damages caused by a hurricane in Florida may have a more severe effect on the German insurance industry than a hail storm in Munich. In the following the answers to the questionnaire will, however, be limited to the effects on the domestic insurance market *strictu sensu*.

In specific:

a) Property

The most significant changes are to be expected in the sector of property insurance. Here weather phenomena may directly result in insured losses. One important sector would be agricultural insurances. While the agricultural sector plays only a reduced economic role in modern Germany it is far from being absolutely marginal. Climate change may bring about, other than extreme weather phenomena, more erratic seasons. As such, the average temperature and rainfall of any given month may vary largely to that of preceding decades, hail and snow season may be shifted to other months, thus requiring farmers to alter the moments for sowing or their precautionary measures. Any alteration of agricultural practices does, however, require a certain amount of regularity, which is exactly what climate change is most likely to counteract. Insofar it is to be expected that insured losses will occur more frequently at least during a certain transition period. For insurers this will mean an increase in

benefits to be paid out. The positive effect that climate change will have for German agriculture, i.e. the warmer weather will allow for different crops and probably an additional harvest, will have no direct effect on insurers.

If climate change will also touch upon livestock insurance is to be seen. The insurance of business interruption due to epidemic may see some alteration. Such is, however, most likely caused by globalisation and the quick travel of pathogenic agents and not necessarily furthered by any climatic changes. There would have to be a rather extreme alteration of weather in Germany for its typical continental European weather to be altered to a sub-tropical climate providing for a more fertile breeding ground for epizootic diseases [nevertheless some insect-transmitted diseases may more likely immigrate into Germany]. Such a radical change is not to be expected in the near future. However an increase of floods will often also bring about an increase of (animal) epidemics, as any infested standing water will serve as a hotbed for germs and viruses. Furthermore an increase of storm surges increases the likelihood of farmers losing the entirety of their stock. For example during the Allerheiligenflut of 2006 (All Saints Surge of 2006) caused by the windstorm Britta an extensive amount of cattle could only be evacuated at the last moment.

Other important, if not the most important areas that will be highly influenced by the climate change are that of building insurance and that of content insurance. The European windstorm Kyrill, for example, damaged in 2007 an extensive number of buildings. Furthermore it resulted in many areas in massive power cuts which led, other than the inconvenience of many citizens, to long business interruptions, which again led to extensive claims under such policies. While Kyrill was not an unprecedented windstorm – the windstorm Lothar caused even more severe damages in 1999 – it exemplifies what kind of events may become more commonplace in the upcoming decades. Another event demonstrating looming changes, was the Elbe Flood of 2002 (see supra), which – due to the tremendous toll it took on thousands of house owners in east Germany – has created awareness for the necessity to include a coverage for natural phenomena (such as esp. floods; so-called *Elementardeckung*).

In fact business interruption insurances is one of the products that is watched the most closely by insurers due to its inherent accumulation risk (see esp. *Kron/Ellenrieder* [2009] VW 9).

Another type of insurance that might see some change is that of fire insurance. While excessive summer droughts have not been a major issue in Germany in the last few decades,

some environmental experts believe that climate change might bring an alteration at least in some parts of Germany (esp. in eastern Germany, amongst which especially the Bundesland Brandenburg). The global increase of forest fires might thus no longer be limited to the traditional regions. Considering the proximity in which many towns are built to forests, this might have a negative effect on the amount of insured losses in fire insurance.

The automobile being the German's favourite toy one may also expect some impact on automotive insurances. An increase in extreme weather activities would for example be problematic as most partial and full hull insurances cover losses caused by hail, storm or floods (provided that no warranty was breached). Another aspect may regard the blocking or rather incapacitation of transport vehicles. The higher frequency of floods (but also of low tides) may interrupt the business of inland shipping, the same is true for surges and storms for maritime, locomotive and automotive transportation, as well as storms of any kind may severely affect air transportation. Such will, hence, lead to a higher frequency and amount of claims under business interruption policies.

b) Liability

Certain kinds of liability insurance will equally be influenced by the climate change. One typical example would be, that a higher frequency of freezing rain (in German *Blitzeis*, i.e. ice formed by a rapid drop in temperature) will increase the number of claims against he who as a duty to maintain the safety for accidents occurring on his premises. Such claims will increase benefits under personal liability insurances. More importantly extreme weather phenomena will lead to more accidents in traffic. This problem is intensified by the fact that German law provides for liability without the necessity of fault for motor vehicle accidents. Insofar the number of insured events can be expected to increase. It especially remains to be seen, if certain types of weather phenomena (such as an extreme hail storm) will in the future remain to be regarded as acts of God, thus excluding liability, or if their more frequent occurrence will turn them into something that must be expected at all times.

c) Transport

The higher frequency of severe storms would increase the likelihood of averages in maritime travels. That this would be fully compensated by any technical improvement of future ships is rather unlikely. Also, other extreme weather phenomena (floods, surges, storms, hail, rain) will jeopardize the smooth transportation of goods from point A to point B. The blocking of

water ways, railways and roads due to fallen trees or poles, snow, landslides, as well as the inability to use certain means of transportation during a storm and the like may lead to delays in delivery and to more accidents. This will in return result in the distribution of more benefits.

One circumstance related with transportation has raised especial awareness: the fact that storages of automobile producers on their own premises or in dock yards are especially vulnerable. Here it is quite common that parts, being very vulnerable to hail, storm and surges, having a worth of several hundred millions of Euro are stored within an area of less than one square kilometre. Here a single event can lead to catastrophic losses (see *Kron/Ellenrieder* [2009] VW 104 at 105).

d) Life and Health

Climate change may also bring about some significant changes in the health sector and as such influence life and health insurance. For example could a rise in temperature make Germany more hospitable for certain (subtropical) diseases e.g. malaria or meningitis. On the other hand it might have a favourable effect on cold infections. It is not quite certain whether the favourable effects would be able to compensate the negative effects. This in itself is maybe the most negative effect as especially life and health insurance relies heavily on accurate predictions. Another possible effect, caused by the deterioration of the ozone layer (one of the causes of climate change), would be an incline in certain types of cancer (esp. skin cancer).

2. How are the risks linked to climate change to be defined?

Momentarily it is quite difficult to ascertain if climate change has already had an altering effect on insurance. Nevertheless such change is to be expected in the imminent future. Especially hydroclimatic insurance risks, such as thunderstorms, hailstorms and floods, are expected to increase in intensity and frequency (in fact globally 89% of the insured losses caused by natural disasters can be attributed to weather related natural disasters, *Höppe*, in: *Bruns/Grobenski* (eds.), *Die Versicherung von Umweltrisiken*, Karlsruhe 2007, pp. 1 et seq. at 16). Paired with the high population density and the very advanced economic development an increase of insured losses in numbers and amounts can be anticipated.

However, Germany is expecting a negative growth of population in the upcoming decades, so that overall no further heightening of the population density is to be envisioned. Continued urbanisation will, however, probably lead to an increase in population density in certain areas. Yet there are but limited areas (at least if compared on a global scale) that are especially prone to natural catastrophes, in many of which population density has in much likelihood already reached its climax. Such hot-spots in Germany have historically been, and are expected to remain, certain cities on the rivers Rhine, Danube, Elbe and Oder (which are especially prone to flooding), settlements lying on the coastline of the North Sea (but also, but to a much lesser degree the Baltic Sea), prone to storm surges, most of which have, however, long been protected by a very elaborate system of dikes, and some areas (e.g. the alpine regions), which are more exposed to the possibility of landslides. The risk of earthquakes has traditionally been very low, but there are some areas in which more prominent earthquakes occasionally occur (area between Cologne and Aachen and the Black Forest Region). German building regulation on earthquake prone areas has, however, helped to keep that risk to a minimum. Depending on the increase of the water level of rivers many other cities could, however, become subject to an increase of risk concerning flooding, as almost all major cities in Germany lie on the banks of a large river. Insofar climate change is expected to bring about an intensification in already existing hot-spots and may also create new hot-spots especially prone to damages caused by natural disasters.

3. Insurers' measures of protection against excessive exposures

One of the most important measures that insurers must and do take is the re-evaluation of their statistical base. This means that the development of certain weather phenomena as concerning their frequency and intensity must be carefully monitored and future projections must be developed. In doing so specific emphasis must be put on elaborating a geographical and object based cartography of risks, to enable themselves to identify high risk policy holders and reflect that risk by charging higher premiums, excluding risks or not underwrite such policy holders at all. As a first step insurers will often have available public studies and cartographies of risk. For instance, are every Bundesland and its sub-units required to identify flood areas and flood-prone areas in all land utilisation and zoning plans (see *infra*), which may be used to much advantage by an insurer trying to establish the specific risk concerning a building or content insurance. Concerning flooding the insurance industry (more exactly the GDV) has already developed a very intricate system called "Zonierungssystem für

Überschwemmung, Rückstau und Starkregen” (ZÜRS; Zoning System Concerning Flooding, Backing-up and Intense Rain). All of Germany is divided into four zones, with risk class 4 representing areas with a flood every 10 years, class 3 every 10 to 50 years, class 2 every 50 to 200 years and class 1 all other areas. In the calculation of class 2 zones dikes and other preventive measures are given no regard, so that the zoning represents the risk in these areas if a dike were to break or to be flooded (cp. on ZÜRS *Falkenhagen*, in: Kleeberg (ed.), *Hochwasser-Gefahrenkarten, Beiträge zum Workshop Gefahrenkarten am 21. November 2004 in Potsdam*, Hennef 2005, pp. 85 et seqq.; *Bogenrieder*, in: Bruns/Grobenski (eds.), *Die Versicherung von Umweltrisiken*, Karlsruhe 2007, pp. 121 et seqq. at 137 et seqq.).

German insurers have a long tradition of warning about the negative effects of climate change. One very early example (1980) would be the NatCatService-Database developed by the Munich Re providing for one of the most extensive sources of climate change by compiling all major natural disasters since 1950. This instrument does not only serve insurers as a base for calculating their risk but has also provided a base for researchers which in turn have raised awareness of the climate change. There are, however, many other instances in which insurers try to raise awareness by directly addressing the public (via advertisement or other instruments) or by lobbying for alteration of legislation respectively improvement of protective measures (see *infra*).

Other than the general approach to lobby for the betterment of public prevention measures insurers already employ other methods to prevent or minimize insured events connected with weather phenomena. Especially insurers could and do require policy holders to take certain preventive measures. The breach of such warranties (*Obliegenheiten*) may result in the partial or full loss of a claim for benefits. For example are policy holders of a building insurance held to install backflow flaps into rooms jeopardised of being flooded (§ 11 lit. a) BWE 2008). Also are policy holder obligated to keep clear the drain pipe running on the insured premises (§ 11 lit. b) BWE 2008). In the case of a storm insurance the policy holder is to store all objects, situated in rooms below ground level, at least 12cm elevated from the floor (§ 11 lit. c), ee) BWE 2008) [all examples taken from the Special Conditions for the Coverage of Further Natural Phenomena developed by the GDV]. Additionally all German insurance contracts provide for an *Obliegenheit* to avert or minimize the loss. In a climate change context this could for example mean that policy holders are held – if time and situation allows – to evacuate their belongings as soon as a warning of a catastrophic flood or storm is given.

Insurers could furthermore demand of policy holders to take certain evasive action, the non-observance of which may, again, result in the partial or full loss of a claim for benefits.

In property insurance it is already not uncommon to conclude insurances for a fixed sum or, more often, to have an insurance sum (in the sense of a ceiling amount) included in indemnity insurance. Whether such has increased due to the effects of climate change is difficult to assess. However several insurers have expressed the intent to include limits of indemnity more frequently where high risk policy holders are involved (see [Ehler] [2006] VW 1978 at 1979).

It is furthermore quite likely that many more insurers will reduce their exposure by including fixed deductibles into their contracts. Several insurers have already voiced to have such a design (see [Ehler] [2006] VW 1978 at 1979).

Another possibility by which many insurers will try to limit their risk exposure is that of including more extensive risk exclusions. This could on one hand be done by a more reductive definition of the insured risks. For example most general conditions of insurance defined a storm as a weather related air circulation with wind force 8 pursuant to the Beaufort Scale (wind speed of at least 63 km/h) (cp. e.g. Sec. A § 5 Nr. 2 GCI for Content (VHB 2008); Sec. A § 4 Nr. 2 GCI Building (VGB 2008); A.2.2.3. GCI Hull (AKB 2008)). Some have started to ponder whether or not a storm should not be defined at having higher wind speeds, as is the case for example in France and Switzerland (see *Hübner/Müller*, in: Bruns/Grobenski (eds.), *Die Versicherung von Umweltrisiken*, Karlsruhe 2007, pp. 89 et seqq. at 104). On the other hand insurers could limit risk exposure by providing for risk exclusions. One important exclusion – already in place for a long time – is that normal insurance policies that cover storm losses do not cover losses caused by floods, surges or avalanches, even though they are often caused by storms. To obtain cover for such risks the already mentioned *Elementardeckung* (see supra) must be taken out.

One certain change will relate to the amount of premium. Already many people wanting to insure a risk situated in a more exposed region were forced to accept a pronounced increase of premium. But also on a general level most experts – notwithstanding the fact that the strong competition on the German market will usually keep the premiums low and stable – expect

there to be an increase in premium for such insurance products highly influenced by climate change (see *Ullrich* [2009] VW 1710).

Cancellation of certain contracts covering inadvantageous risks is certainly an option for many insurers. In fact, momentarily there are not that many regions or rather objects in those regions that are regarded as utterly uninsurable – insofar it is most often not the question if insurance is attainable (in the sense of not being cancelled) but rather at what price it is attainable. Regarding “bad risks” many insurers, however, display some reluctance to simply cancel the respective contracts – to a degree this is caused by fear of repercussion (fear of negative publicity, fear of losing the account as a whole etc.). Most insurers have displayed much interest in the idea of developing a pool-solution for those uninsurable risks (especially for flood coverage). At the moment a concrete solution has not been advanced.

In view of this situation it could be envisioned that some insurers – this especially applies to insurers that are not able to geographically diversify the risk – are to withdraw from the market. However, at the moment no such trend can yet be seen. The number of insurers seizing to operate on a specific market is only that which is consistent with the continuing consolidation process on the German insurance market.

Another way to protect against excessive exposure would be to increase the premium income by increasing the number of policy holders. In this respect there has been discussion whether or not the cover of natural phenomena esp. against floods (*Elementardeckung*) should be turned into a mandatory insurance, thus providing for a larger pool of policy holders (cp. *Viezens* [2007] VersR 1494; *Armbrüster* per ibidem). It is, however, widely regarded that such a legal obligation to conclude such a policy (and a legal obligation of the insurer to provide cover for everyone) is not needed in Germany as currently the majority of objects may be insured even if for many high risk objects only at elevated premiums (*Chmielorz/Metzger* [1995] VW 935 at 937; *Gardette* [1997] ZVersWiss 214 at 216). Whether or not the state will nonetheless provide for such an obligation to seek flood cover remains to be seen. Seen that there are house owners that are unable to obtain appropriate cover due to their high risk exposure such is not completely unlikely. In view that to impose such high risks on insurers would to a large degree go counter the very idea of contractual freedom, it has been forwarded that the state in order to recompensate the fact that the insurers to a degree provide for a social service should than put into place a kind of public reinsurance

open to those insurers in order to diversify their risk (see *Hübner/Müller*, in: Bruns/Grobenski (eds.), *Die Versicherung von Umweltrisiken*, Karlsruhe 2007, pp. 89 et seqq. at 113; see also *Bogenrieder*, *ibidem*, pp. 121 et seqq. at 144 et seqq.).

In the same line especially insurers having a more regional focus might be inclined to spread their risk by underwriting policy holders of other (preferably low risk) regions. Such a regional diversification could to some extent be used for cross financing purposes.

3. Insurers' initiatives to develop « new products »

For quite a substantial time, German insurers have realised that while climate change is something to be dreaded by every member of society, it will also be something to create new market opportunities for the industry.

One of the most marked opportunities was that of distributing the already existing *Elementardeckung* more widely. Considering that other than Switzerland, Germany does not mandatorily require house owners to insure against floods, landslides, avalanches and the like, the insurance density for products covering such risks was traditionally rather low compared to the high number of insurance products the average German holds. In the last ten years insurers were able to supply more and more customers with cover against what is now more widely received as what it is: a severe and imminent risk.

Other than seizing the opportunity to find a new outlet for already existing products, climate change has served as a catalyst for the development of new products. One typical example would be the (more marked) emergence of weather insurance. This type of insurance was originally designed for the energy industry (as erratic weather will put especial strains on the energy sector; e.g. an especially cold winter will lead to increased energy consumption which some suppliers may only be able to satisfy by purchasing additional resources, while an especially warm winter will result in suppliers to have additional energy on their hand that they are unable to put on the market). It has, however, seen a significant spread to other weather dependent industries. Products have been designed for the tourism industry (e.g. against a snowless winter), event companies against rain, storms etc.

One indirect opportunity was created by the entering into force of the Environmental Damage Act (the German law transforming the European Directive on Environmental Liability with Regard to the Prevention and Remedying of Environmental Damage into national law). Here many insurers were able to enlarge the cover of their products (and with it increase the premium) to cover such risks of liability (e.g. D&O-Insurances, professional liability insurances but also automobile insurances). More generally said act has given new impulses to the distribution of environmental damage insurance (*Umweltschadenversicherung*) and environmental liability insurance (*Umwelthaftpflichtversicherung*).

Some German insurance undertakings have also started to develop (via their subsidiaries) micro-insurance products for developing countries. While it is yet unclear if insurers will make any substantial profits with these products, many insurers have understood that the publicity effect involved in providing the poorest of the poor with rudimentary protection may be invaluable. Firstly it will aid to transform their image at home – many customers do not have a high regard for insurers. Secondly such micro-insurance products may aid in opening up new markets – many pro bono projects of today may become cash cows tomorrow. Additionally “first movers” on a market will often be able to create such brand recognition as to make it very difficult for others to enter.

There has also been substantial movement on the market for “green” insurances, i.e. insurances that are intended to minimise some of the root problems behind the climate change. One negative example of a product that could not yet be effectively positioned was the “pay as you drive” motor vehicle policy. The biggest problem here seems to be that most Germans are very reluctant to embrace the black box model that most insurers envision. Here a fear – which might not be as ill-founded as many insurers purport – of being too closely monitored by insurers and of the gained information not being 100% confidential has prohibited any success on the market. In light of the very intense competition on the motor insurance market it seems unlikely that a breakthrough is around the corner. What has, however, emerged with some success is a so-called “CO₂-rebate”, an offering of lower premiums to owners of low-emission cars.

Other “green” products have seen some noticeable success. There are some companies that have specialized in constructing such green insurance products for insurers (e.g. Ökorenta Finanz AG). Basically those insurances work as do all other insurances with the exception

that the premiums are guaranteed to be invested in sustainable manner. It is not uncommon that insurers emit CO₂-certificates to accompany their insurance product (especially motor insurances) or that a part of the premium is used for projects designed to counteract climate change (such as afforestation of the rain forest). Properly used, insurers can gain from such approaches on three levels: Firstly such programs may in the long run help to reduce the risk by slowing down climate change; secondly a positive image is transported to the public; thirdly these approaches may serve to attract a new customer base for certain products. In addition to those green products some insurers have started to advise policy holders (professionals and private persons) on how to improve energy sufficiency (e.g. some insurers offer the service to assess energy sufficiency of buildings and aid in the financing process for favourable changes).

Regarding CO₂ emissions there has also emerged a new type of product, i.e. the CO₂ insurance (first mover on the German market seems to have been the Swiss CarbonRe AG; Allianz SE is quite active in this respect). This insurance covers the risk of companies of not having met their necessary quota of CO₂-certificates. There has not yet been a study, whether or not such an insurance product is succeeding on the market.

Very importantly climate change has led to the emergence of a new production sector. The German alternative energy industry is one of the world leaders and as every industry is in need of insurance. German insurers have provided products based on their long tested industrial products and tailored to the specific needs of the alternative energy sector. This has insofar not only been a growth sector over recent years but also an opportunity for the insurance industry to make a large contribution to help slow down climate change by advocating alternative means of energy production.

4. Reinsurance

The large reinsurance companies have long been the pace maker for the German insurance industry to adjust to the impending climate changes. The strategies by which German reinsurance has responded to climate change are manifold. First and foremost reinsurers have been one of the prime financers of climate change research and have established a far reaching data base to allow other researchers to appreciate the phenomena linked with climate change. It was also the reinsurers who first explored alternative finance measures to retransfer

the risks linked with climate change. Also, some reinsurers have at least pondered the idea of withdrawing from the market for certain insurance products (this especially applies to building and business interruption insurance). In most cases, however, reinsurers have limited that withdrawal to certain geographical areas. This applies for example to insurers of risks situated in the Caribbean, where the increasing frequency and intensity of hurricanes resulted in the fact that they ran into serious difficulties to obtain reinsurance cover, which in turn led many insurers to withdraw from those markets. In order to interrupt this “chain of withdrawal” it becomes necessary for the state to give an incentive to insurers to remain on the market. One classic example would be the Floridian Hurricane Catastrophe Fund – a public catastrophe reinsurance – which was initiated in the wake of hurricane Andrew to prevent insurers from withdrawing from the market or substantially limit their cover (cp. *Surminski*, *Der Rolle der Rückversicherung in der internationalen Klimapolitik*, Karlsruhe 2002, p. 104). This demonstrates what pivotal role reinsurance plays in keeping available insurance protection against climate change risks also for those people that represent a sub-standard risk. It is insofar reinsurance and especially their effective use of alternative risk transfer mechanisms (see *infra*) that has turned many risks that have previously been uninsurable into insurable risks even if only at substantial rates.

The reinsurers were also and remain especially active in trying to bring about a public policy change or amendment in Germany and on an international level. The most direct influence is, however, exerted by a subsequent change of the underwriting practice. By the alteration of conditions or by the refusal to underwrite certain risks reinsurance very much influences insurers and their conditions and their decisions of which risks to cover and which not.

In general one can say that due to exponential increase of extreme weather phenomena in the world, but in Germany also, reinsurance has become even more important than it has been in the past to keep certain insurance sectors up and running. It is rather difficult if not impossible to see how insurers would be able to stem such catastrophic events as the Elbe Flood of 2002 if not for an effective reinsurance system.

5. ART (Alternative Risk Transfer)

Derivatives are very widely used in the insurance industry. However the main motivations in applying derivatives are to protect against the risks of exchange rate change, stock price

change or interest rate change. Whether there is a trend to more often use derivatives to more effectively manage risks connected with climate change could not be ascertained.

Nevertheless securitisation concerning climate change risks has grown more and more important in the German insurance sector. In the past securitization was almost exclusively used for financing purposes. Such has changed over recent years. Especially German reinsurers (this particularly applies to Hannover Re and Munich Re) have pioneered the ART-sector. There has been a certain preponderance for catastrophe bonds (cat bonds). Munich Re, for example, for the first time emitted such large volume cat-bonds in 2000, back then in the volume of USD 300m, followed by another cat bonds to secure against storm risks in Europe in 2005 in the amount of € 110m. Hannover Re has also been very innovative in this sector, with particular success in the use of sidecars but also in emitting cat bonds (one could mention, notwithstanding certain troubles, the K5 emitted by Kaith in 2005 with a volume of USD 520m). Cat bonds were under much pressure in the fallout of the financial crisis, the market is, however, predicted to regain strength in 2010. The variety of cat bonds, concerning their trigger, the risks involved and their capitalization is quite broad. It is, however, to be noted that insurers other than reinsurers – differently than in some other countries (esp. the US) – have shown a little more reluctance to emit cat bonds themselves (cp. on the subject *Zhu* [2008] *ZVersWiss Suppl.* 1 113; *idem*, *Insurance Securization mit Katastrophenbonds*, Karlsruhe 2009).

One financial instrument that has gradually been gaining importance concerning weather risks is the insurance risk swap. By this way insurers can swap risks with each other and buy this way broaden their risk spread. Traditionally swaps were rather used on an international level (e.g. swapping European storm risks against Japanese earthquake risks; a very prominent example would be the K2 swap by Hannover Re and Citibank starting 1996) if they are going to be used more frequently on a purely national market level remains to be seen but can be expected. One example would be weather derivatives which have seen some increase in the agricultural sector (here some insurers have also engaged in swaps; to give a very base example one could swap a part of the risk a rainy summer represents for a café owner against a part of the risk a very dry summer represents for a farmer). Mostly, however, insurers try to spread their risk by insurance technical means.

6. Cooperation or competition with public sector

The public sector plays a very pronounced role in the prevention of natural disasters, thus limiting the exposure of insurance undertakings to insurance claims connected with losses caused by events linked to climate change. For example it has long been the public sector that is responsible for the construction of dikes or that tries to limit the risk connected with storms or earthquakes by passing specific building regulations. One more recent measure would be the passing of the Hochwasserschutzgesetz (Flood Prevention Act) in 2005. By this Federal Act all Länder were obligated to identify pursuant to a uniform standard their flood areas and their flood-prone areas (i.e. such areas that are in danger of being flooded if safeguard measures were to fail). The Act especially provides that new construction activity should be kept to an absolute minimum especially in flood areas. Other than the positive effect to keep damages to a minimum by keeping structural development in these areas to a minimum, the identification may prove very advantageous to insurers in identifying high risk objects.

As for the more technical solutions, the public sector takes to prevent floods (e.g. building of dikes, installation of automated high water level warning systems, retransformation of rivers to their old meandering form, increasing of the drainage capacity of surrounding land) there is a legal duty for the state to take such. The German Supreme Court (BGH) has repeatedly granted citizens a liability claim against public authorities for neglecting to take appropriate measures to prevent flooding. However, it is still left open if the state must also put into effect measures that are to prevent a flood with the likelihood of occurring ever 100 years (see *BGH* [2009] VersR 219). More reasonably, the state must provide for measures to prevent a flood with the likelihood of occurring every 20 or 50 years to be exempted from liability.

It is also, in general, the public sector that organises such measures to confine the effects of a natural disaster to a minimum if it has already occurred (e.g. the *ad hoc* construction of dams, evacuation of disaster areas). Insofar the fact whether or not the public sector has put into effect an effective system of prevention and a functioning network for disaster management is an important factor in the assessment of specific risks. It is, insofar, for insurance undertakings to establish if they deem the public measures of today to be sufficient to meet the challenges of tomorrow. It is in the interest of insurers to cooperate with the public sector in this respect by pointing out some perceived shortcoming in order to initiate public action that would in return minimize the risk and thus allow for (more) stable premiums and coverage.

There have already been some initiatives by several insurers in this respect. For example some larger insurers have created some sub-units to exclusively address the challenges caused by climate change (e.g. Allianz Climate Core Group). Also, some more coordinated approaches by the insurance industry have already been instituted. Such a coordinated approach can for instance be seen in the “Projekt Klimawandel” (Project Climate Change) by the Gesamtverband der Deutschen Versicherungswirtschaft e.V. (GDV; German Insurance Association). The strategy developed by this project group is a five partite approach: 1. development of ways for the insurance industry to bear the increased risk (capital increase, risk exclusions etc.); 2. support of governmental climate and energy policy; 3. setting incentives for the use of energy saving technology (e.g. gratis inclusion into cover of energy efficient technology, lower premium); 4. reduction of CO₂ emissions of the insurance industry itself; 5. Lobbying for more effective damage prevention. Another example would be the Munich Climate Insurance Initiative (MCII) initiated by the Munich Re, which has a more global approach as it wishes to develop insurance mechanisms especially to alleviate the effects of climate change for developing countries. All in all the insurance industry has been much involved in the formation of public policy on climate change and it is to be expected that its cooperation with the public sector will intensify over the coming years.

There are only limited institutionalised public schemes dealing with the risks involved in climate change. To turn such schemes into permanent instruments of public welfare is widely regarded as setting an undesirable disincentive for citizens to provide for private protection against such risks. However, if a catastrophic flood or the like occurs the state will often set up an *ad hoc* relief fund. Such was notably the case for the people affected by the Elbe Flood of 2002. Another example would be the fund instigated by the Bundesland Bayern to aid businesses and house owners affected by the Danube Flood of 2005.

C. Any additional information or comments

There are initiatives to require insurers for certain kinds of products to invest a percentage of premiums in investments that are ecological sustainable (this could e.g. apply to occupational pension schemes). Currently some insurers are required to report the amount of capital invested in “green” investments, but there is no legal requirement to invest yet.

Notwithstanding the absence of a legal obligation to make sustainable investments, many insurers do so out of their own initiative.