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Abstract: This paper provides an overview on the existing systems of natural hazards insurance in Europe, their structural characteristics and peculiarities. It also discusses the difficulties of an adaptation of these systems to climate change and a growing number of natural disasters. Using the case of Germany as an example, the paper demonstrates that the obstacles facing system change are numerous, including failure to recognise the role of state guarantees in enabling private insurance markets, mistaken legal objections against mandatory insurance, distributional conflicts between central and state governments and re-election considerations by politicians. The adjustments to new weather conditions should reflect existing differences in the regional and national insurance systems in the EU. 'Change in diversity' is seen to offer the best chance to arrive at insurance systems which are prepared for climate change while being adapted to local particularities. Efforts to harmonise national and regional systems as well as top down EU initiatives are rejected in this paper.

Keywords: Natural Hazards, Insurance, Climate Change, Europe, Germany.

JEL-Classification: G22, Q54

1 Introduction

If one studies a map of natural hazard insurance in the EU and beyond, he is confronted with a confusing variety of products and prices. Some countries (Spain, France, Switzerland) have state or quasi-state monopoly insurance while other countries (Germany, Italy, UK) have commercially structured „free market solutions“, which are systematically coupled with state-funded ad-hoc relief. Other countries (Austria, Denmark) have public disaster funds financed by tax-payers' money and still others have various mixed solutions of private insurance providers supplemented by public disaster funds (Belgium, Holland, Norway).

The natural hazards that are covered by insurance products vary significantly. They include the common „geo-atmospheric hazards“ (storms, hail, floods, snow load, earthquake) and regionally specific hazards such as landslides in the Alps or subsidence in the Mediterranean and in England. They also sometimes include social and political risks such as civil war and terrorism, as in Spain, or general risks to buildings (fire and burst pipes) as in the U.K.. Furthermore, from country to country, the risks are pooled differently – sometimes with, sometimes without storms, sometimes including earthquakes and sometimes not.

Bearing this situation in mind, can and should one aim for a unified insurance system across Europe? The EU Commission is shying away from such an idea, although it does acknowledge the need for European reform. In the European Commission's opinion, climate change demands „innovative solutions on the financial services and insurance markets“ as well as the „further integration of these solutions into the framework of EU financial services policy“ and also a „review of the risk structure of existing public and private disaster funds including the EU's solidarity funds“ (EC Greenbook „Adapting to Climate Change“, 23). The reform of natural hazard insurance is, seemingly, becoming a cornerstone of the EU's strategy for adapting to climate change.

Under pressure from forces within the Union in favour of de-regulation and increased competition, the EU has already shaken up the European indemnity insurance landscape which includes hazard insurance. The 3rd “EU Directive on Indemnity Insurance” from 1992 led, for example in the Federal Republic of Germany, to an abolishment of all previously existing regional monopoly insurers for geo-atmospheric hazards. Other member states such as France and Spain were more stubborn. They responded with only cosmetic amendments and in actual fact have retained their national systems of insurance monopoly which developed over a long time.

Even though one has to acknowledge that the EU's efforts to unify and liberalise this sector have, for the most part, failed, a sustained pressure on all new insurance initiatives in Europe prevails. Initiatives such as the development of market-wide zone tariff schemes which could be interpreted as the establishment of cartels or arrangements similar to cartels, could, therefore, be stopped by the EU or the Commission's Cartel Regulator.

The European Solidarity Fund is also not neutral in the context of the insurance issue. Even if the Fund is supposed to stay restricted to the ‚uninsured’ sectors of public infrastructure damage and aid programmes for the chronically under-insured

agricultural sector, it does have commercial implications to the national and regional insurance systems. New private regional offers such as municipal infrastructure insurance or multi-hazard insurance in agriculture may not be able to compete as long as governmental relief is granted by the solidarity fund.

In field of natural hazard insurance in Europe we can therefore observe the classic tensions between centralisation and decentralisation, market and state, which – as in other fields of economic policy – are difficult to balance satisfactorily. These tensions are played out against a backdrop of new types of social risk caused by increasingly extreme weather patterns as the uncomfortable truth is that we may not manage to „halt climate change“ as was recently and very appropriately formulated by the head economist of the EU Commission, Klaus Gretschmann. The only response to this challenge is to increase natural disaster insurance cover and also to increase the density of that insurance[1].

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We cannot respond to the complex questions connected to these developments in this paper alone but we can lay the foundations to enable us to arrive at the answers to these questions. This requires a careful stock-check of the existing systems including a comparison of their strengths and weaknesses and an assessment of their ability to adapt to new conditions. This paper aims to contribute to this process, predominantly with reference to a case study about Germany, but also considering other European countries and the EU's political initiatives.

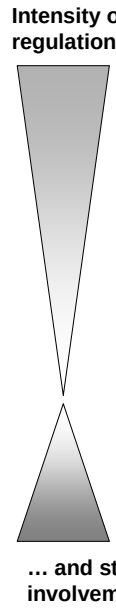
This paper is structured as follows: The following Chapter 2 stylized models for natural hazard insurance. Chapter 3 provides an overview of the existing systems of natural hazard insurance in Europe, their structural characteristics and peculiarities. This is mainly a synopsis which enables the reader to understand the variety of the current risk transfer systems in Europe. Thereafter, Chapter 4 discusses the difficulties of the transition to an area-wide insurance against the growing number of natural disasters using the case of Germany as an example. Chapter 5 then looks, once more, at the issues of integration of national risk transfer systems into European policy which was mentioned in the introduction.

2 Stylized Models for Natural Hazard Insurance

From an stylized type perspective there are four basic models of insurance against damage caused by geo-atmospheric hazards which are distinct from one another in terms of intensity of regulation and state involvement. (see. Fig. 1).

[1] The density of insurance is defined as the rate of insureds objects (buildings) relative to the total number of objects at risk (buildings in inundation areas or areas at risk of flooding).

Fig. 1: Stylized Models for Natural Hazard Insurance



- **Model 1** (M1)**: (Regional) public monopoly insurer of natural hazards**
- **Model 2** (M2)**: Compulsory insurance for *all* natural hazards**
- **Model 3** (M3)**: Compulsory inclusion of (all) natural catastrophies into general house owner insurance** *(„coupling of contracts")*
- **Model 4** (M4)**: Free-market natural hazard insurance with ad hoc-governmental relief programs**
- **Model 5** (M5)**: Tax-financed governmental relief fund for natural disasters**

Model 1: Public Monopoly Insurer

Public monopoly insurance is the legally binding affiliation of individuals and legal entities to a specific public insurance provider i.e. a public monopoly insurer (in most cases, a regional one). The public monopoly insurer is guided by statutory provisions in its contracts and public consultation processes. In practice these insurers often have rights of participation in public proceedings governed by public law such as planning for protection against disasters, land usage planning and building regulations. As a result of the 3rd EU Directive on Indemnity Insurance, such monopoly insurers are no longer permitted according to European law. This does not, however, affect the cantonal property insurances in Switzerland and Liechtenstein. Outside the EU they have an unique status as institutions of public service (Institutionen der Daseinsvorsorge) which, alongside indemnity insurance also have to protect from and prevent damage. This special status means that such institutions continue to be permitted according to European law, inspite of the monopoly ban.

Model 2: Compulsory Insurance

Compulsory insurance legally regulates which category of people and to what extent, must purchase insurance against defined damage caused by the natural hazards.. This compulsory purchase is almost always linked with an obligation to contract for providers of this type of insurance i.e. with the obligation of the insurer to offer such insurance to interested buyers as long as they fulfill specific conditions. In this legal framework, insurance can be offered on the market by a variety of companies i.e. competition is possible to a limited extent within the framework of compulsory insurance.

Model 3: Coupling of Contracts

The obligatory inclusion of geo-atmospheric damage into property insurance contracts e.g. insurance against fire or industrial insurance against business interruption is, in effect, also compulsory insurance as the contractual partners are unable to decide which hazards to be insured against. However, consumer sovereignty is retained since the parties are able to decide whether or not an insurance contract should be concluded at all.

Model 4: Free-market natural hazard insurance with ad hoc-governmental relief programs

Pure market solutions for risk transfer without state intervention are practically not existing in the natural hazards field. In practice, all unregulated systems are linked with some form of state assistance in the case of extreme events. The „free market“ is unable to offer extensive and comprehensive insurance against natural hazards. This is, on the one hand, due to its limited capacity and lack of ability to control adverse selection and, on the other hand, due to the fact that private insurance of highly exposed risks is simply uneconomical. State emergency and reconstruction aid in the case of extreme events or for ‘uninsurable risks’ is, therefore, unavoidable. This results in a conflict of incentives: the public no longer engages in systematic financial risk management due to their trust in state aid being granted .

Model 5: Catastrophe Fund

Catastrophe funds provide state compensation for damage caused by natural disasters as long as the person suffering damage is not privately insured. As distinct from ad hoc-governmental relief, the funds for the compensation are accumulated *ex ante*, in advance of an extreme event, based on taxation. The compensation is, however, limited to a defined maximum sum. An additional private insurance, though regularily offered as an supplement to property insurance. Unlike the aforementioned models of obligatory insurance (M1-M3), a catastrophe fund is an indirect compulsory insurance, through mandatory taxation. It is important to note that this compulsory insurance is different to the other types of insurance in that it includes no legal entitlement to risk transfer. Although every taxable person pays a compulsory contribution, if someone suffers damage, the money they receive should not be regarded as a direct quid pro quo, but rather as aid which comes as a result of a „petition“ from the person suffering damage. In addition the tax burden is not differentiated by the degree of risks one is exposed to but by fiscal criteria such as ability to pay. So funds imply no incentives for relocation from risk prone to less risky areas.

In reality, these stylized models of insurance are often not found in their pure form, as is shown by the following overview of some selected insurance systems in Europe.

3 Insurance systems against natural hazards in Europe – an overview

3.1 Switzerland

In Switzerland, there are two independent systems of natural hazard insurance. In 19 of the 26 Swiss cantons, public cantonal property insurers (KGV), as monopoly institutions, offer weather-related hazard damage coverage, whilst in the remaining seven so called GUSTAVO cantons (Geneva, Uri, Schwyz, Tession, Appenzell IR, Wallis, Obwalden), this protection is offered by private insurers. This parallelism of systems is because of differences in how the EU Council Directive on Indemnity Insurance (92/49/EWG) was adopted through referenda in the different cantons. In all cantons, however, there is compulsory insurance for house owners:, all Swiss house owners must insure against natural hazards such as storm, hail, flood, avalanche and alpine risks such as avalanche, snow loads, landslides and rock fall in addition to insurance against fire. Building insurers have consolidated into two pools: the pool of private insurers covering natural hazard damage in the GUSTAVO cantons and the Intercantonal Re-Insurance Group in the remaining Cantons with monopoly insurance institutions. These offer different unit tariffs covering natural hazard damage per sum insured where the premiums in the private insurance economy are around double of that in the monopoly insurer sector. This difference in premiums has led to a sustained debate about the relative economic advantages of monopoly insurance in the field of natural hazards (Ungern-Sternberg 2001, Kirchgässner 2007). Apart from the low advertising and other competition costs as well as the monopoly insurers' large reserves which have accumulated over the years, other reasons cited for the relative advantage of the KGV are their right to participate in the processes of the Building Codes and Land Use Planning as well as the financing of the Fire Service and Cantonal Civil Defense Services. In other words, there are economies of scope from pooling of prevention and risk transfer in one hand in the cantonal monopoly insurance (Fischer2008).

3.2 Spain

In Spain there is a comprehensive legal compulsory insurance against damage caused by geo-atmospheric hazards and other „extraordinary events“ (terrorist attacks, political unrest). It is offered by the Consorcio de Compensación de Seguros (henceforth, Consorcio) which is a state monopoly insurer. The historical roots of the Consorcio stem from the Spanish Civil War (1936-1939). The war damage in the 1930s was so great that it threatened to cause the collapse of the entire Spanish insurance market. The Spanish Government felt compelled to take responsibility for all war damage and then to divide the costs amongst the citizens of the country through compulsory contributions. To this end, when the war was over, the Consorcio de Compensacion de Riesgos de Motin was founded. After successfully tackling the war damage, this institution was then expanded to cover geo-atmospheric events, natural disasters and political unrest including terror attacks. Thus emerged the current Consorcio in 1954. Until 1990, it reported directly to the Spanish Ministry of Finance and Economy but was then outsourced as a public monopoly institution and since then has managed its own accounts. Distinct from private and some other public insurers e.g. in Switzerland, the Consorcio has an unlimited state guarantee in place of a conventional market-funded reinsurance cover. The Spanish system

survived the EU liberalisation efforts (3rd EU Directive on Indemnity Insurance) virtually unchanged. Admittedly, the Consorcio is no longer officially defined as an insurer but rather as a „government institution for the Financing of Dues for Disaster Damage“, but apart from this, everything remains as before.

The extent to which the Consorcio is essentially still today an insurer becomes clear in the „Setting of Dues“ method. Up until 1987 this consisted of a set percentage additional premium in the buildings, contents, accident, life and occupational incapacity insurance branches. In the 1980s the „income from dues“ and the disaster damage services of the Consorcio drifted tangibly from one another to such an extent that, for a while, there was both an under and then again an over capitalisation of the Consorcio. When this happened, in the 1990s the Spanish Government decided to make a transition to assessment of „Duties“ to the insurance values (as in conventional insurance contracts). Since then, the „amount of fiscal charges“ (yearly contributions) have been as follows :

- 0.092‰ of the insurance sum for buildings
- 0.18-0,25‰ of the insurance sum for interruption of operation for business or industry risks
- 0.35 – 2‰ of the insurance sum for public infrastructure (motorways, ports)
- 0.096‰ per person in accident insurance
- 4.45 Euros per vehicle in car insurance.

These „charges“ are raised by private insurers in Spain and passed on to the Consorcio. For collecting these funds, they receive remuneration which is based on their costs.

Officially, in Spain, private insurance companies can also offer insurance cover against geo-atmospheric damage (which is why there is no violation of EU Competition Law) but, given that these companies also need to include an additional premium for the Consorcio, households insured through a private company must pay double for their atmospheric damage cover. This „potential competition“ is, therefore, in practice, insignificant. Furthermore, private insurers do not have access to a state guarantee which means it must be more expensive than the Consorcio.

The density of insurance is high, due to the obligatory nature of the natural hazard insurance. It is dependent on the density in the individual insurance branches which is, for example, in the field of non-life insurance around 70 - 80%.
Those taking out insurance must pay an excess usually of around 10 % of the damage sum (at least 150 Euro) but this is, dependent on the total insurance, limited to a specific amount (1%).

3.3 France

The French natural hazards insurance model is, in many ways, similar to the Spanish model but includes certain market economy and state-controlled elements. Firstly, since 1982, also in France all private insurers (domestic and foreign) are obliged by law to provide comprehensive insurance protection against natural hazards. This insurance protection is mandatorily tied to various property insurance contracts. Every customer purchasing property, car or industrial interruption of operation

insurance is obliged to purchase this type of cover or to forgo property insurance altogether. At the same time, the further treatment of the risks is clearly differentiated between market „insurable“ risks (storm, frost, hail, and snow load) and market „uninsurable“ natural disasters (Catastrophes Naturelles, henceforth abbreviated as CatNat[2]. Market insurable risks remain for most part in the normal business of the insurer and reinsurer whereas CatNat come under a special insurance model which is legally regulated. The Government takes on the important functions of the insurance economy in this case. This begins with determining whether or not an event can be defined as a natural disaster. Whereas in Spain natural hazards are very clearly laid out in laws and contracts, in France, a Government Commission consisting of Members of the Home Office, Ministry for the Economy and the Environment decides on a case by case basis whether the conditions for a natural disaster are fulfilled. This has recurrently meant that damages in the CatNet model have been covered which were previously not at all or not entirely taken into account – most recently the damage to properties caused by subsidence as a result of the Summer drought of 2003 in Southern France.[3] In the history of the CatNat model, this has repeatedly led to a critical situation at the „Caisse Centrale de Reassurance“ (CCR). The CCR is a state reinsurance institution which offers private insurers the opportunity to buy insurance against natural hazards under special subsidised conditions. For this, the French Government gives the CCR an unlimited government bond and special tax regulations for the treatment of surpluses in insurance business. Formally, direct insurers can also purchase their insurance on the conventional reinsurance market but they would receive far worse conditions and pay more money than if they purchased from the CCR.

For the mandatory CatNat*,* legally, according to all property insurance contracts a uniform supplement of 12% of the insurance premium (6 % in the case of car insurance) must be collected. As a consequence, in France, direct insurers were able to adjust the basic premiums for their property insurance products by region and thus to achieve a selection of good risks in their portfolio. Either this, or they have outsourced regions or sectors which are particularly susceptible to damage to a special insurer which then transferred all risks to the state CCR. This resulted in an agglomeration of bad risks (adverse selection) at CCR. Today, the retention rate i.e. the rate of excess of the direct insurer, is fixed by law. The excess sum to be paid by insured persons is also fixed by law. They are comparably low e.g. 380 Euros each for damage to property and cars but unalterable in order to maintain the insurer's incentive to prevent damage. The excess sums multiply in the case of recurrent damage and a lack of municipal preventive measures. The aim of this is to increase the self-protection efforts insured parties and public institutions.

3.4 Belgium

Belgium is a country which is rarely affected by natural hazards. The most frequently occuring natural hazards are storms, floods and, to a very limited extent, earthquakes. Significant losses were most recently experienced in January 1990 during storm „Daria“ which caused damages in the region of over a billion Dollars. Significant damages were also caused by floods in 2002.

[2] http://www.CatNat.net

[3] In this decision, political-economic factors e.g. political clientele are often supposed to have played a significant role.

Since the 1970s, Belgium has had a disaster fund which provides staggered state compensation of up to 250,000 Euros with a very low excess (250 Euro) for all damage caused by extreme events. This fund has, however, proven cumbersome in practice with long waiting times for the victims and impossible to calculate because the „insurance case“ was not defined but rather, as is still the case today in France depended on the declaration of a disaster by the Belgian Government.[4] After an extreme event in 1990, therefore, the search for solutions began which would make the risk transfer calculable and, at the same time, would make the private insurance economy take on more obligations. The result was the establishment of an obligatorium which included both insurance against natural hazards and social conflicts (terrorism, political unrest). Initially, this obligatorium included only the „classic“ natural hazards (storm, hail, snow load). After the extreme floods of 2002, by royal decree the consequences of flooding, high ground water, earthquakes and subsidence were also included. The disaster fund remains subsidiary and intervenes when no private coverage is available or private coverage would be too expensive, for example for the agricultural sector. This is, therefore, a so-called „Public-Private-Partnership“. The premiums for the obligatorium are low (1,5 $‰$) and are subject to a tariff supervisory board's oversight. The government offers a guarantee for private insurance of up to 280 million Euros per insurer and event if the damage per insurer and event exceeds a maximum of 3 million plus 0.35 times the premium income.[5]

3.5 The Netherlands

The Netherlands experience frequent natural hazards, mainly consisting of storms, extreme rainfall and droughts. Until the 1990s, however, it was not possible to purchase private insurance against earthquakes The insurers, tolerated by the Dutch Government, came to an agreement that they would not offer flood or earthquake insurance. For floods caused by sea water (storm floods) and floods due to the collapse of river dikes, this agreement remains valid to today. Other sectors were transformed under pressure from the European guardians of competition (Commission Regulation EWG 3932/92 of 21/12/1992) in a ‚non-binding recommendation' by insurance sector. Insurance for damage due to extreme rainfall is generally offered since 2004. In practice, however, to this day, no national insurance market for flood hazards has emerged. Under increasing public pressure after the Roermond earthquake (1992) and the flooding of the River Maas and Rhine (1993 and 1995) the Dutch Government was moved to establish legislation (Wet Tegemoetkoming Schade bij Rampen en Zware Ongevallen in short: WTS). This legislation can be used by the central government in rare cases, to (partly) compensate losses from events that were not insurable or covered in any other way, and includes both natural and technological accidents. The compensation does not emanate from a fund, but from ex post payments from the current budget of the national government.

[4] The process is, however, still more based on regulation than in France. In order for an event to be classed as a disaster, it must be of unusual character and lead to considerable damage. The following criteria apply in this case: total damages must total at least 1,239,467.60 Euros, average damage per family must total 5,577.60 Euros and, furthermore, the event can only occur a maximum of every 20 years (according to a ministerial circular of 30th November 2001)

[5] For earthquakes, the sums are higher: 700 million Euros per insurer and event with an exceedance of damages to the sum of 8 million plus 0.84 times the premium income.

Government compensation from the WTS has been provided during a number of extreme events, such as the heavy rains of 1998 and 2002 and the dike failure in Wilnis in 2003. At the time, insurance against rainfall was not yet available. the WTS legislation leaves room for interpretation what is the definition of a disaster, and in a number of recent damaging events, the legislation was deemed by the minister of internal affairs to be not applicable. At the same time, the government attempting to limit their liability, and consequently there has recently been some movement on the Dutch insurance market. For example, a Dutch Agricultural Insurance Pool (Agriver, LTO Aquapool) was established, which provides coverage for loss of crops due to heavy rains if the WTS guarantees compensation for large catastrophes. And since 2004, damage due to extreme rainfall is often covered in content policies for households. For all other sectors, however, the market is stagnant which means that regular ad-hoc governmental relief through the TWS legislation continues to be provided.

3.6 Overview

These and other national systems of natural hazard insurance in Europe are summarised in the following table:

Table 1: *Natural Hazard Insurance in Europe*

Switzerland	Dual system of private and public insurance with monopoly character. In all cantons, fire insurance and insurance against atmospheric damage is mandatory for all buildings and household effects (value as new) with an excess of 10% per incident of damage or at least 200 CHF with a maximum value of 1000 CHF (approx. 680 Euros). Reinsurance is provided via 2 pools of direct insurers with compulsory membership. The pool system for cantonal property insurance offers unlimited cover whereas the private insurance pool for atmospheric damage only provides coverage for up to 25 billion CHF (17 billion Euros). The public insurers and the KGV link the risk transfer with the maintenance of the emergency services (fire service) and have the right to participate in Federal State Planning and Land Use Planning . Insurance density is almost 100% in Switzerland.	**M1/M2**
Spain	There is a legal obligation to insure against damaged caused by natural hazards and other „unusual events“ (terrorist attack, political unrest). Premiums are collected by private insurers as an additional premium in the following sectors: building, contents, accident, life and occupational incapacity insurance and are passed on to the so-called Consorcio de Compensación de Seguros (Consorcio) which is a state monopoly insurer. The Consorcio is subsidised by an unlimited government guarantee. Private insurance companies can formally offer competitive natural hazard insurance coverage. However, as these companies also have to pass on the additional premiums to the Consorcio, this competition is, in practice, insignificant. The insurance density is high, depending on the density in the individual sectors, up to 80%. Insurers' excess is usually around 10 % but is limited depending on the insurance sum.	**M2/M3**
France	Mandatory inclusion of all „uninsurable“ natural hazards (not including storm, frost, hail and snow load) in all contents insurance contracts by way of a uniform surcharge of 12 % on the insurance premium with a	**M2/M3**

	low excess (e.g. 380 Euros per incident of damage to buildings and cars).Reinsurance is offered at a fixed cost through the state Caisse Centrale de Réassurance (CCR) with an unlimited state guarantee. Private insurance companies can formally reinsure but, as this is not subsidised by the state, the insurance they offer is more expensive than reinsurance through the CCR which thus in reality has a monopoly over reinsurance. High insurance density of close to 100%.	
Belgium	Mandatory inclusion of all natural hazards in compulsory insurance linked with fire insurance. Private coverage is through a direct insurer. In the case of some, defined, extreme events, a state disaster fund subsidises**.** The disaster fund also covers damage which is not insurable on the private market, particularly in agriculture. The tarifs are regulated (insurance supervisory board) and are low (1.5 % of the total insurance sum) with minimal excesses (250 Euros).	**M3/M5**
Great Britain	Pure private insurance with risk-based individual premium calculation i.e. high supplementary premiums for high exposed risks. High market penetration (75% of private buildings, 95%-100% of mortgage credits) through integration of natural hazard insurance into fire insurance which is widely required when taking out a mortgage to secure credit.	**M3/M4**
Germany	Pure private insurance with individual premium calculation in the case of flood damage (ZÜRS). Insurance against storm and hail is prevalent (95 %). However, insurance density against other natural hazards is under 10%. German banks regularly require fire insurance for mortgages but no insurance against natural hazards. If an event occurs – particularly in the case of big events which are extensively covered by the media such as in 2002 – ad-hoc relief is often provided for emergency and reconstruction. Victims of damage do not, however, have a legal right to this government relief and it is subsidiary to the provisions of private insurance.	**M4**
Netherlands	There is effectively no insurance protection against damage caused by large-scale flooding, based on a ‚non-binding recommendation' by the Dutch insurance sector with one exception: loss of harvest due to heavy rains is covered by a pool insurer for the agricultural sector. A government disaster fund covers all ‚uninsurable' damage. Frequently, however, there is additional government ad-hoc relief in the case of extreme events. Legislation is currently in the process of being updated.	**M4/M5**
Austria	Insurance against storm, hail and snow load is usually by way of private contracts without government regulation. Private additional coverage against atmospheric damage is possible but is rarely used. Insurance density for protection against these natural hazards (flooding, avalanche, landslides, etc.) is under 15%. Since 1986 Austria has had a government disaster fund under the Finance Ministry financed by tax-payers. Although victims of damage do not have a legal right to access this fund, it can cover approximately 50% of damages (on average) if the claimant is not privately insured at the same time. This leads to a strong 'charity hazard' in the case of private insurance.	**M4/M5**

Sources: Ungern-Sternberg, 2002; Michel-Kerjan, 2001; Huber, 2006; Prettenthaler/Vetters, 2005, CEA 2007, Raschky/Weck-Hannemann 2007, Schwarze, R./ Wagner, G.G. 2007, Url, T./Sinabell, F. 2008, Bruggeman, V./Faure, M./Haritz, M. 2008, Fischer 2008, Huber 2008, Raschky, P. A./Schwindt, M./Schwarze, R./Weck-Hannemann, H. 2008, Bouwer (personal communication).

If one sorts the stylized type systems described above *cum grano salis* the result is in the European system ordering seen in Column 3 of Table 3 where mixed and transitional types are indicated by a slash (M_i/M_j, $i \neq j$).

The overview shows us the heterogeneity and diversity of the systems of risk transfer for natural hazards in Europe. Against this backdrop, we must ask ourselves the question: does it make sense to aim for standardization or collaborative European efforts in the field of natural hazard insurance in the context of climate change? We believe the answer is no.

The natural hazard situation in the member states are from a climatic, topographic and institutional perspective so varied, that decentralised solutions are the most appropriate approach. In Austria and Switzerland, the countries with the highest levels of regulation or government involvement, almost 10 times the number of people live in risk zones than in Germany. The hazards in the high alpine valleys during the „same“ natural events (heavy rains) are completely different to those in lowland areas – there is practically no early warning time and few retention areas to give the „rivers space“. There are also differences, grown over the years, in building methods e.g. many more wooden houses and practically no brickearth buildings like in the north European lowlands. The list of special regional and even local vulnerabilities goes on. Off the peg coverage here is in no way possible. It would destroy the human and social capital which has developed over time to combat natural hazards in Europe's regions. Furthermore, climate change has a differential impact from region to region. On the one hand, in Southern Europe, we can expect declining flood hazards but, at the same time, more frequent occurance of drought but, in the North, on the other hand, we can expect more flooding. In alpine areas the risk of rockfalls will increase with the melting of the glaciers, in Southern Europe, the risk of subsidence will increase as a result of soil dehydration.

It is a foregone conclusion that, as a result of global climate change, natural hazards will increase in severity and occur more frequently everywhere. Today, events which occur once a century will be something we see at least once every 50 years in the future. From region to region, the effects and with that the ability to adapt to this trend vary significantly. Harmonization or joint EU efforts cannot cater for the needs of such a variety of problem zones and solution strategies. We certainly need to improve awareness of natural hazards across Europe and swift steps need to be made in national policy to adjust systems of natural hazard insurance. How cumbersome these processes are and the political and economic obstacles that stand in the way of the necessary reforms can be demonstrated by the German example.

4 Difficulties in the Adaptation of Insurance Systems to the Challenges of Climate Change – the German Case

4.1 Background

In Germany, it has only been possible to take out comprehensive private insurance against atmospheric damage countrywide since 1992. Up until then, across the country, only insurance against storm (not including storm flooding) and hail was available. There were, however, differences between federal states.

In the state Baden-Württemberg for example, up until 1993 there was obligatory buildings insurance against natural hazards which included flooding. This obligatory insurance was abolished at the same time as the property fire insurance monopolies, in preemptive compliance with the 3rd EU Directive on Indemnity Insurance. The former monopolist has, since then, been offering the same damage cover, as private Baden-Württemberg Savings Bank Insurance but with more expensive premiums. The offer has, however, to a large extent (90%) been willingly taken up by those previously with obligatory insurance.
Also in the new East German federal states there are a large number of old „GDR household policies“ still valid, which from GDR times include flood damage to household contents and buildings. At least 480,000 households in the new East German states still have this insurance against flooding. Since the „once-in-a-century flood“ in 2002, the Allianz Insurance Company has increased its efforts to swiftly convert these ‚old policies' but thusfar with only limited success.

Only with the „Supplementary Natural Hazard Insurance“ (henceforth in short: ESV) are Germans able to insure against flooding, earthquake, subsidence, landslides, snow load, avalanches and volcanoes as well as heavy rains. ESV is offered as part of contents and property insurance as well as business contents insurance and insurance against industrial interruption of occupation and is only subject to a few restrictions in the industrial sector. There are, however, major restrictions in the case of recurrent damage or in regions where natural hazard damage occurs frequently.

In the case of flood risk the insurance economy has developed a „Zoning System for Flood, Backwater and Heavy Rain“ (in short: ZÜRS) which is purely for the selection of these risks. ZÜRS divides the Federal Republic of Germany into three, and since 2004, four risk classes which are subject to different insurance restrictions[6] up to „Uninsurability“ (no insurance protection) (see Table 2).

Table 2: *The changing face of ZÜRS*

ZÜRS 2001 (old)	**ZÜRS 2004 (new)**
GK 1 (flooding, less than once every 50 years): **Unrestricted insurability**	**GK 1** (flooding statistically less than once every 200 years): **Unrestricted insurability**
	GK 2 (HW statistisch 1 mal in 50-200 Jahren): **Restricted insurability**
GK 2 (flooding statistically once every 10-50 years): **Restricted insurability**	**GK 3,** (flooding statistically once every 10-50 years: **Restricted insurability**
GK 3 (flooding statistically once every 10 years: **Uninsurability**	**GK 4** (floods statistically at least once every 10 years): **Uninsurability**

[6] Restricted insurability means that an individual case check is necessary before a policy can be concluded. Under specific conditions (location, building type, precautionary measures) and damage history (no previous damage) this can lead to an insurance offer. In this case, direct insurers can agree higher excesses (> 1 % of the sum insured).

The background behind the new definition of the risk zones in Germany was the one-hundred-year flood in 2002. During this event, citizens in regions which were secured through protective measures (so called „Behind the Dike Zones“) which were only ever threatened by very rare extreme weather events (flooding statistically once every 50-200 years mostly through the bursting or flooding of a dike) were negligent with their preventative measures or the municipality had been generous in its use of these risk zones. Also the state of the dikes in Germany, in particular in the new East German States, gave the insurance economy reason to restrict insurability. The risk zones which emerged are, according to estimates from the German Insurance Association, in double figures (Richter 2006); no insurance protection in the strict sense (GK4) exists in Germany for approx. 4% of the populated area (Bogenrieder 2004),

The one-hundred-year flood in 2002 on the Upper Elbe and the resulting series of large and small floods showed us the type of damage we have to expect due to increasing extremes in weather in Germany. Experts of the international Intergovernmental Panel on Climate Change (IPCC 2007) link this development with climate change. We need insurance systems which can measure up to this new kind of challenge. With this in mind, already in 2002, obligatory insurance was proposed by different group. The authors of this contribution participated in this discussion by making a concrete design proposal (Schwarze/Wagner 2003, 2004). The Conference of German Finance Ministers (FMK)[7] took up this proposal in 2003 and established a working group which debated the topic of „Obligatory Insurance for Natural Hazard Damage“ in several meetings with experts and representatives of the Federal State Ministries of Justice. In February 2004, the activities of this working group were discontinued. The working group determined, „that there was no appropriate solution to provide citizens with legally binding protection against the risk of natural disasters and at the same time that the public coffers should no longer have to take responsibility for this risk“.

4.2 Reasons for the Failure to Introduce Mandatory Disaster Insurance in Germany

The reasons why the negotiations at the 2003/2004 Conference of German Finance Ministers did not result in mandatory disaster insurance will be explained in this section. In particular, we will show that the problems leading to the downfall of the proposal to introduce mandatory disaster insurance comprise of:

- Failure to recognise the role of state guarantees in enabling private insurance
- Mistaken legal objections against mandatory insurance
- Distributional conflicts between central and state governments
- Re-election considerations by politicians.[8]

[7] In Germany the central government (federal government) has one finance minister, and each of the 16 federal states have one too. All of the finance ministers meet to discuss important issues at the Conference of Finance Ministers (FMK).

[8] This chapter 4.2 is based on updated previous research published in Schwarze/Wagner 2007.

a. Failure to recognise the role of a state guarantee

The main reason given by the German finance ministers for deciding against mandatory insurance for natural disasters is the level of the state guarantee demanded by the German insurance companies. The German Insurance Association (GDV) argued in the finance ministry working group that they could only obtain coverage on the worldwide re-insurance market for damage amounting to €8 billion a year. With maximum damage expectations of €30 billion annually the state would have to provide a guarantee against losses of €22 billion.[9] The finance ministers did not see any way to fit these sums into their limited budgets.

But the argument is neither logical nor convincing. The question is not whether the state would or would not incur costs of up to €22 billion to cover the insurers' losses in the event of a natural disaster, but whether the state would be called upon to provide aid beginning with the first euro or only above and beyond €8 billion in private insurance. Thus the refusal to grant a guarantee against loss on excess claims means rejecting the first layer of private coverage. This rejection is only cheaper for the finance ministers if they discount the aid they will have to provide for future disasters. There is indeed empirical evidence that politicians and bureaucrats at state agencies systematically discount uncertain future events in such a way.

b. Exaggerated legal reservations

The main legal argument put forward against natural disaster insurance was that it would be constitutionally impermissible as an excessive state intervention into the general freedom of action. Mandatory insurance would indeed constitute a serious infringement on individual autonomy, which is only permissible under the German Constitution if

1. it is in the public interest,
2. the intervention is appropriate and proportionate, that is, there is no "gentler way" to achieve the objective.

Ad 1: Avoiding the economic strain caused by politically motivated public emergency aid programs, in our view, constitutes sufficient public interest to justify general mandatory insurance. The legislature decided in favour of mandatory insurance for similar reasons in the cases of unemployment and care of the elderly in order to limit the extent to which private needs can be passed on as a demand on public coffers (i.e. social assistance). For unemployment in Germany, a state-organised mandatory insurance scheme was created some 80 years ago, long-term care insurance was introduced in the 1990s. Then situations compare to the need for protection against

[9] This maximum level of damage was a (never fully explained) figure presented by the German Insurance Association in FMK working group negotiations. It was based on two different damage scenarios (according to GDV representatives). One is a series of two extreme events (recurring every 200 to 300 years); the other is a single "millenium event" (recurring every 1000 years). The "millenium flood event" was put at around 25 billion euros, while the "millenium storm event" was said to cause damage of up to 26 billion euros. Damage figures include losses to private and commercial buildings but not losses to public infrastructure.

natural disasters, once it is recognised that these problems are now occurring on a national scale, and that they now affect regions previously immune, as natural disasters are becoming more wide-spread and more extreme not only as a result of global climate change but also due to the accumulation of wealth and people in risk prone areas.

Ad 2: Judging from experience in other countries, a general mandatory insurance scheme is the only suitable way to meet this need. A "gentler way" would not be effective. Our Table 1 displays the diversity of European regimes of flood insurance and their effects on the density and costs of insurance. The general picture that emerges from this comparison is that flood insurance must be imposed upon consumers (either by mandate or by banks) to achieve a high density of insurance. Cost of insurance is high if the density is low.

c. Federal conflicts: not just a German problem

Natural disasters now affect all of Germany, but they affect the different regions to differing degrees. The damage from flooding along the Rhine, Mosel and Danube is naturally greater than on the Lüneburg Heath or in the Thuringian forests. It is thus unsurprising that past political efforts to create obligatory flood insurance came from the states of Baden-Württemberg, Rhineland-Palatinate and Bavaria. But unlike the "flood of the century" in 2002, these early initiatives by individual states never made it onto the federal government's political agenda.

The damage caused by the flooding in Dresden and on the Upper Elbe was so immense that for the first time it created severe problems for the economy as a whole, calling for concerted action by the central and state governments (postponement of the so-called "second stage" of tax reform in Germany). Payments of €3.5 billion made by the states and municipalities into the reconstruction fund had to be made when their budgets were already overstretched. The resulting situation seemed to be a historical opportunity to finally achieve private financial provision on a national scale. To achieve this, however, consensus would have been necessary, and this consensus failed to materialise out of the discussion over mandatory insurance against natural disasters. Instead there were the usual battles over the distribution of funds between federal and state government once it became clear that federal government alone could not provide the necessary funds for the state guarantee demanded by the insurance industry. Indeed there is no easy solution for the problem how to distribute the burden of state guarantees between federal and state governments, and it was only possible to make a rough estimate of claims that could result from flooding.

The volume of premiums needed for the intended obligatory insurance of buildings against flood risk was put at €1.7 – 3.1 billion per year.[10] Assuming a volume of premiums of €2.85 billion a year, there would thus be additional federal revenues from insurance tax of €0.46 billion and a reduction in regional revenue from income and corporate tax of €0.73 billion.[11] The additional tax revenues from the mandatory disaster insurance would thus accrue entirely to the federal government (insurance

[10] The following figures were presented by delegates of the federal ministry of finance in the political negotiations on a mandatory flood insurance for Germany.
[11] The effects on value added tax were regarded as insignificant.

tax), while the states would bear half the reduction in income and corporate tax revenues (42.5% and 50% respectively) in addition to the administrative costs of handling the mandatory insurance. It would have been necessary to solve the problem of distributing these gains and losses, and given the major political problems that mandatory insurance entailed, this problem finally proved insurmountable.

d. Public choice considerations

Although the discussion over mandatory disaster insurance was conducted mainly by specialists from the ministries, political (election-related) considerations played an important part in the final decision-making process.

The first of these problems was that ad hoc aid gives the decision-makers greater discretion in their response to natural disasters than regularised benefits. Second, the fear was expressed that introducing mandatory insurance against natural disasters would weaken purchasing power at an already weak point in the economic cycle.

Much has been speculated about the general political advantage of ad hoc responses to natural disasters, but few analyses are available.[12] Crisis situations, it is widely believed, benefit those in office and thus damage the opposition, for in crises "people look to their governments". The Elbe floods would appear to substantiate this, for Chancellor Schroeder's energetic and sympathetic efforts to help Saxony during the floods led to the governing party's renewed popularity, helping the Social Democrats to win the 2002 election. In the past, too, other leading German politicians have become famous through their actions as crisis managers, and were subsequently voted into top office. One example is Helmut Schmidt, German chancellor in the 70s, who gained a national reputation in 1962 during the devastating tidal floods when he was Senator to the Interior for the State of Hamburg. He later (1974) became Federal Chancellor. And the present Minister President of Brandenburg, Matthias Platzeck, became known through his energetic response to the Oder floods of 1997, when he was Environmental Minister, and thereafter was elected to the supreme state office and a high office in his party.
The political decision on mandatory disaster insurance, nearly two years after the end of broad media coverage of the floods, was determined more by the current economic situation and economic policy strategies of the federal government. The estimated withdrawal of €2.85 billion of purchasing power (the amount estimated for the premiums) was counter to the ef-forts by the federal government to strengthen purchasing power and stimulate growth, accord-ing to the final report by the Federal States' Commission.

Right as this argument was at the time the decision was taken (2004), it does not take account of the fact that a flood also withdraws purchasing power, and that in one specific case in 2002, it disrupted the government's tax reduction policy. The rule of the thumb that natural disasters are cyclically neutral (the damage equals the reconstruction costs) was not confirmed in that specific case. Nor did the Elbe flood bring a corresponding reconstruction stimulus in Saxony, as the short-term regional

[12] Notable exceptions are Downton/Pielke 2001 and Garrett/ Sobel 2003.

demand impulse in the building industry was outweighed by loss of turnover and demand in other sectors.

4.3 Lessons Learnt

What lessons can be drawn from the failure of the proposal for obligatory natural hazard insurance in Germany in the context of the adaptability of traditional risk transfer mechanisms to climate change? Several ones.

First of all: politicians are no better than other people. They discount future hazards, possibly even more than their electorate because, as politicians, they think in electoral cycles. Current economic issues are, in this context, more important now than long-term fundamental changes in the existing risk transfer system. Experiences of natural disasters can change this situation but the time window for change after such „shocks“ is short – we believe less than a year. Workable, legally checked proposals therefore have to be finished and sitting in a drawer in order to. have a chance of being politically implemented after the shock of a disaster. If such proposals only reach legal advisers long after the event, then they are „politically dead“ simply because of the duration of this process.

Another, unwritten tenet from natural hazard research goes like this: „One flood is no flood“. This means that we need a series of „small natural disasters“, large enough to shake us into action but small enough for the economy to still be able to tackle the disaster in order to drive us to make structural changes in our behaviour. Only then can we release the decision on risk transfer systems from the petty bickering between the central government, federal states, interested authorities and economic interests and arrive at the systematic risk transfer needed to tackle climate change.

5 Conclusion

Natural hazard insurance has developed over the years. It has a long history and thus changes are difficult to advance. At the same time, natural hazard insurance also has a long, difficult path ahead of it before it is reconstructed for the conditions of climate change. In order to achieve this, the very first thing that must change is risk awareness amongst citizens and politicians.

Only once mankind has acknowledged that 'one-hundred-year events' will occur once every fifty years or more in the future and will not be limited to individual problem regions, we will achieve at new forms or risk transfer. This is a protracted process which can only be sustained through credible risk studies on a sound scientific basis. However, the truth is that we will continue to need to repeat the painful experience of „small“ natural disasters in order to come up with the solutions for the big ones.

Should a new regime for natural hazard insurance be centralised at European level? Should it be national or decentralised and oriented towards the regions? The insurance system landscape in Europe varies greatly. Insurance systems in Europe have developed over long periods of time and are partially national, partially regional institutions which, to a great extent are adapted to the natural and socio-historical conditions of the regions they cover. The insurances are rooted in different society's

cultures of combating natural hazards and sometimes, as in, for example, Switzerland, they are deeply rooted in the collective ego. Calls for a standardization and optimization have to be evaluated according to the extent to which they take these differences in the natural and social conditions into consideration. But this isn't a plea for keeping the status quo.

If changes in the natural conditions resulting from climate change or changes in social conditions such as a further growth in population and accumulation of assets in the risk zones make it necessary for other new institutions then these adjustments are unavoidable. In some countries, like Switzerland, the changes are already in motion. Other countries like Germany are proving a bit more stubborn. The obstacles facing system change are, across the board, numerous. It is to be expected that the adjustments to new weather conditions will reflect the existing differences in the regional and national insurance systems in the EU in some way.

In this context, 'change in diversity' offers the best chance across Europe to achieve systems which are perfectly adapted to climate change within the framework of local particularities. Efforts to harmonise and EU initiatives should be rejected in this phase of uncertainty and necessary lesson-learning. For Germany, on the contrary, a pragmatic opening of the EU's 3rd Imdemnity Insurance Directive as in Spain or France would offer new scope for regional or local solutions against which previous initiatives in Bavaria, Baden-Württemberg or Rheinland-Pfalz have hit as a legal obstacle.

References

Bruggeman, V./Faure, M./Haritz, M. 2008. Schadensersatz für Opfer von Naturkatastrophen – Ein Vergleich zwischen Belgien und den Niederlanden. Vierteljahrshefte zur Wirtschaftsforschung 77 (4), 18-43.

Bogenrieder, O. (2004). Kalkulationsgrundlagen und Versicherbarkeit von Überschwemmungsrisiken aus Sicht eines Erstversicherers. Vortrag an der TU Dresden, June, 25, 2004.

CEA (European Insurance and Reinsurance Federation) 2007. Reducing the Social and Economic Impact of Climate Change and Natural Catastrophes Insurance Solutions and Public-Private Partnerships, Brussels.

Commission of the European Communities 2007. Green Paper: Adapting to climate change in Europe – options for EU action {SEC(2007) 849} COM(2007) 354 final, Brussels, 29.6.2007

Downton, Mary W. and Pielke, Roger A. 2001. Discretion without accountability: Politics, flood damage, and climate. Natural Hazards Review 2(4), 157-66.

EU Council Directive 92/49/EEC of 18 June 1992 on the coordination of laws, regulations and administrative provisions relating to direct insurance other than life assurance and amending Directives 73/239/EEC and 88/357/EEC (third non-life insurance Directive). At: http://ec.europa.eu/index_de.htm, accessed: Aug., 11, 2008.

Fischer, M. 2008. Der lange Weg zur integralen Elementarschadenversicherung und -vorbeugung in der Schweiz. Vierteljahrshefte zur Wirtschaftsforschung 77 (4), 98-103.

Garrett, T.A./ Sobel, R.S. 2003. The political economy of FEMA disaster payments. Economic Inquiry 41(3), 496-509.

Huber, M./Amodu, T. 2006. United Kingdom. In: Faure, M./Hartlief, T. (eds.), Financial Compensation for Victims of Catastrophes. Wien-New York, Springer.

Huber, M. 2008. Zur Versicherung von Elementarrisiken. Das englische Gentlemen‘s Agreement und seine Entwicklungsmöglichkeiten. Vierteljahrshefte zur Wirtschaftsforschung 77 (4), 44-52.

IPCC (2007): Climate Change 2007: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, Cambridge University Press.

Kirchgässner, C. 2007. On the Efficiency of a Public Insurance Monopoly: The Case of Housing Insurance in Switzerland. In: Baake, P. and Rainald Borck (eds.), Public Economics and Public Choice Contributions in Honor of Charles B. Blankart. Springer, Berlin-Heidelberg, 221-242

Michel-Kerjan, E. 2001. Insurance Against Natural Disasters: Do the French have the Answer? Strengths and Limitations, Working Paper des Ecole Polytechnique, Cahier No. 2001-007.

Prettenthaler, F./ Vetters, N. 2005. Extreme Wetterereignisse: Nationale Risikoausgleichssysteme im Vergleich. In: Extreme Wetterereignisse und ihre wirtschaftlichen Folgen. K.W. Steininger et al. (eds.). Springer, Berlin-Heidelberg, 91-114.

Raschky Paul A. und Weck-Hannemann, Hannelore 2007. Charity Hazard - A real hazard to natural disaster insurance? Environmental Hazards. 7(4), 321-329.

Raschky, P. A./Schwindt, M./Schwarze, R./Weck-Hannemann, H. 2008. Risikotransfersysteme für Naturkatastrophen in Deutschland, Österreich und der

Schweiz – ein theoretischer und empirischer Vergleich. Vierteljahrshefte zur Wirtschaftsforschung 77(4), 53-68.
Richter, S. 2006. Politische, juristische und versicherungstechnische Implikationen einer Pflichtversicherung gegen Elementargefahren. In: Aus heiterem Himmel? Katastrophenvorsorge: Wissen, Transfer, Praxis. Beitrag auf dem 7. Forum und Gefahrentag am 19. und 20. Oktober 2006 in der GTZ Eschborn.
Schwarze, R./Wagner, G.G. 2003.Marktkonforme Versicherungspflicht für Naturkatastrophen – Bausteine einer zukünftigen Elementarschadenversicherung. Wochenbericht des DIW Berlin, 70 (12), 183–189.
Schwarze, R./ Wagner, G.G. 2004. In the Aftermath of Dresden - New Directions in German Flood Insurance. Geneva Papers of Risk and Insurance 29 (2), 154-169.
Schwarze, R./ Wagner, G.G. 2007. The political economy of natural disaster insurance: lessons from the failure of a proposed compulsory insurance scheme in Germany. IEuropean Environment 17, 403-415.
Ungern-Sternberg, T. 2001. Die Vorteile des Staatsmonopols in der Gebäudeversicherung: Erfahrungen aus Deutschland und der Schweiz, Perspektiven der Wirtschaftspolitik 2(1), 31-33.
Ungern-Sternberg, T. 2002. Gebäudeversicherung in Europa. Die Grenzen des Wettbewerbs. Bern.
Url, T./Sinabell, F. 2008. Flood risk exposure in Austria – options for bearing risk efficiently. Schmollers Jahrbuch (Journal of Applied Social Science Studies), SJ 128 (2008), 593–614.

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Reimund Schwarze and Gert G. Wagner

Natural Hazards Insurance in Europe – Tailored Responses to Climate Change Needed

Abstract

This paper provides an overview on the existing systems of natural hazards insurance in Europe, their structural characteristics and peculiarities. It also discusses the difficulties of an adaptation of these systems to climate change and a growing number of natural disasters. Using the case of Germany as an example, the paper demonstrates that the obstacles facing system change are numerous, including failure to recognise the role of state guarantees in enabling private insurance markets, mistaken legal objections against mandatory insurance, distributional conflicts between central and state governments and re-election considerations by politicians. The adjustments to new weather conditions should reflect existing differences in the regional and national insurance systems in the EU. 'Change in diversity' is seen to offer the best chance to arrive at insurance systems which are prepared for climate change while being adapted to local particularities. Efforts to harmonise national and regional systems as well as top down EU initiatives are rejected in this paper.

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