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## Article

# Financial Risks of Natural Hazards: Markets and the Role of the State

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## Symposium

### **Financial Risks of Natural Hazards: Markets and the Role of the State**

An Editorial by Reimund Schwarze

Rising economic losses from natural disasters are a fact in the books of insurers. They increasingly affect even large economies as macroeconomic shock. This trend is driven by both, an increasing frequency of extreme events and an increasing exposure of economic wealth to these risks. The latter is obviously true for the coastal areas of the world. Within 500 meters of the European coastline, the total economic value at risk is estimated at 500 to 1000 billion Euro (WISE 2008). The number of people living in this tiny belt is expected to rise from 2.3 to 3.6 million in next few decades (Crichton 2008). It similarly holds for the riverine regions of Europe. In Austria, for example, almost one out of ten buildings is exposed to severe risk of flooding (Url/Sinabell in this journal). In Germany, the percentage of housing built near rivers is rising faster than those being built outside inundation zones (Schwarze / Wagner 2007). This is mainly so because sites near waters are generally perceived as being more attractive. In principle, there can be no objections to this preference as long as the “costs of enjoying the river view” are not borne by the general public (after cases of extreme events), in other words, as long as all costs are internalised. The compulsory take out of flood insurance would be one way to assure that anyone who wants to live near rivers or coasts bears the financial consequences of the inherently higher risk. The free market fails on this account. In fact the flood insurance density is especially low in areas of high risks. For example, less than 5 % of all buildings in Austria and Germany are covered against floods in areas with a 1 / 50 chance of being flooded. Market imperfections are the key to understand this finding, and they are numerous: Systematic underestimation of the risk of rare disasters, the availability of aid from the state when damage is incurred, the split responsibility for the construction and ownership of properties in risk-prone areas – for just to name a few. The resulting lack of demand in turn causes a lack of supply. Like any insurance, natural disaster insurance is a business with economies of scale. A small pool makes it difficult to insurers to provide insurance against risks – and expensive to costumers. These problems are inherent in the market, but there is also a fundamental policy failure. Obvious un-

der-insurance is often the political legitimization for a policy of emergency aid. Private donations and state reconstruction programs are intended to help the victims to bear uninsured risks. But this makes the “the policy of aid” self-perpetuating, for by guaranteeing support it dampens the demand for insurance and thus reduces the number of insurance policies sold. Howard Kunreuther has labelled this downward spiral the “natural disaster syndrome” (Kunreuther 2006). It cries out for market reform and a new role of the state.

This special issue assembles selected papers of an international seminar on “Financial Risks of Natural Hazards: Markets and the Role of the State” held on May, 5–6, 2007 at the University of Innsbruck / Austria. The discussions in this seminar focussed on two key issues:

1. Strengthening the role of private parties to bear and effectively respond to natural hazards and
2. Mobilising the potential of financial markets to spread the economic risks of natural disasters.

Ad 1. Empowering people to bear economic risks, including the financial risks of natural disasters, is the priority goal of the world banks pro-active ‘social risk management’ approach (Holzmann and Jørgensen 2000). While being primarily designed for developing countries, it provides important insights for the design of social risk management schemes in developed countries. Key concept is to replace the strategy of re-distribution after a natural disaster with ex-ante strategies and mechanisms to help households anticipate and insure against extreme events through public protection, private networks, and natural hazard insurance. This strategy of increased ‘resilience’ is also promoted by the EU as part of its strategy to adapt to climate change and the increasing risk of floodings (WISE 2008). A main element of this new framework of social risk management is to find solutions to the problems of incomplete and asymmetric information. Compared to an ideal world (à la Arrow-Debreu), insurance markets for natural hazards are plagued with several market failures. I have listed a few above. ‘Charity hazard’ is one that concerned us most during our seminar. Browne and Hoyt (2000) define charity hazard as “the tendency of individuals not to insure themselves against possible natural disasters because they believe help will be available, from friends, family, the municipality, charities or state emergency programs.” Private charity and governmental financial relief are a kind of a ‘premium-free insurance’ against natural disasters. It crowds out market insurance. If a catastrophe occurs individuals without market insurance are better off, because they enjoy financial support from the government (Prettenhaler et al., 2004). James Buchanan (1975) was the first to show that the government is unable to commit *not* to help in the case of extreme events. He labelled this situation the ‘Samaritan’s Dilemma’. Based on this assumption, Coate (1995) created a model of in which he showed that it is perfectly rational not to obtain insurance cover

against natural disasters. Compulsory insurance is one possible device for the government to credibly commit *not* to pay disaster relief. *Franz Prettenthaler's* contribution (in this journal) can also be seen as an exploration of the normative basis of such an interventionist approach: If preferences of people towards social risk management are formed by the 'promise of the social welfare state' to assure an equitable distribution of income (after a natural disaster has occurred), the state is forced to make self-insurance and self-protection (in the sense of Ehrlich-Becker) compulsory for private actors in order to achieve dynamic consistency of policies.

*Andreas Richter* and *Barbara Klimaszweski-Blettner* (in this journal) offer other options and policy recommendations to solve the problems which stop short of such an interventionist strategy (of compulsory insurance). For example, the government could incite the take out of natural disaster insurance by tax exemptions or reduced tax rates, while private insurers could cut their prices to those clients who invested in self-protection. Government-sponsored information programme for the general public might help to clarify the personal benefits of protecting buildings against floods and buying insurance for residual loss. Openly available 'flood zoning systems' (such as HORA in Austria or ZÜRS in Germany) can aid individual home-owners to better assess the flood dangers to their homes, while insurer may use them for proper risk classification. The overall picture that emerges from their discussion is that all parties involved should move to strike a new 'public-private-partnership' to solve the 'natural disaster syndrome' and be prepared for the increasing risk of natural disasters.

*Thomas Url* and *Franz Sinabell* – in a similar fashion – develop a concrete programme of 'social risk management' for natural disasters in Austria. Their most important proposal is to move away from the currently existing tax-based 'catastrophe fund' in Austria (of ex post disaster relief) to a quasi-compulsory system of private insurance, bundling natural hazards to fire risks for private buildings. This insurance scheme would be based on risk-adequate premiums and the principle of mutuality (sharing of losses in the case of extreme events). The latter is intended to minimise the need for costly re-insurance while at the same time restricting the fiscal involvement of the state. Both features would serve to make this proposal politically acceptable in Austria.

Ad 2. The issue of mobilising financial markets to spread the economic risks of natural disasters is addressed in the papers of Richter / Klimaszweski-Blettner and Härdle / Lopez Cabrera (both in this journal).

The government of Mexico was the first to go for the capital market to re-finance the costs of reconstruction after large earth quakes. Rather than buying costly reinsurance it sold CAT bonds. They selected the pure parametric type of CAT bonds where payment is based on a physical parameter of the underlying such as the magnitude on the Richter scale. The paper of *Wolfgang*

*Härdle* and *Brenda Lopez-Cabrera* describes the methodology to calibrate a pure parametric CAT bonds and apply this methodology to Mexican Earthquake data. Their results demonstrate that, under the specific conditions, a mix of reinsurance and CAT bond is considerably more efficient and therefore cheaper than relying on conventional re-insurance.

*Andreas Richter* and *Barbara Klimaszewski-Blettner* discuss the potential of CAT bonds in the light of recent market developments. While the high expectations towards CAT bonds did so far not materialise – the markets were thin, products too diverse and investors not sufficiently acquainted with this new product –, they see clear signs of change in the recent years. The market matures, products are becoming more standardized and the demand stronger due to governments (such as Mexico) experiencing the limits of keeping their role of ‘insurer of last resort’ in the face of an increasing severity of natural disasters.

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