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Charity Hazard - A Real Hazard to Natural Disaster Insurance?

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Abstract

After the flooding in 2002 European governments provided billions of Euros of financial assistance to their citizens. Although there is no doubt that solidarity and some sort of assistance is reasonable, the question arises why these damages were not sufficiently insured. One explanation why individuals reject to obtain insurance cover against natural hazards is that they anticipate governmental and private aid. This problem became to be known as "charity hazard". The present paper gives an economic analysis of the institutional arrangements on the market for natural disaster insurances focusing on imperfections caused by governmental financial relief. It provides a theoretical explanation why charity hazard is a problem on the market for natural disaster insurances, in the way that it acts as an obstacle for the proper diffusion and therefore the establishment of natural hazard insurances. This paper provides a review of the scientific discussion on charity hazard, provides a theoretical analysis and points out the existing empirical problems regarding this issue.

Keywords: natural hazard insurance, market failure, governmental assistance

JEL classification: Q54, R11, G22

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1 Introduction

Damages from natural catastrophes or elementary losses are worldwide on the rise. However, insurance providers have either got problems to provide attractive insurance coverage against natural hazards or are constantly withdrawing such products from the market. In addition, individuals do not seem to demand such insurance coverage. Surveys of the insurance industry have shown that in European countries without mandatory insurance coverage a) the demand for flood insurance is very low and as a result b) the private flood insurance cover in some countries reaches a density of about 10% (Guy Carpenter 2005, Swiss Re 1998). A continuously growing number of scholars applied different approaches in order to explain the imperfections on the market for natural hazard insurances. One issue that has so far received only minor attention (e.g. Browne & Hoyt (2000), Lewis & Nickerson (1989)) is the problem of "charity hazard". Charity hazard defines individuals' tendency not to insure or take any other mitigation measures as a result of the reliance on expected financial assistance from federal relief programs or donations by other individuals. Lewis & Nickerson (1989), Prettenthaler, Hyll & Vetters (2004) and Schwarze & Wagner (2004) have already mentioned the possible negative effects of the availability of governmental and private aid on the individual's decision to obtain insurance coverage against elementary losses. Due to the complexity of the market for natural hazard insurances, Kunreuther (2001) suggests that specific programs to reduce market imperfections in this area demand a comprehensive analysis of the decision processes of all involved institutions and agents.

One approach to examine the problem of charity hazard in such a comprehensive way is an economic analysis of alternative institutional arrangements. This approach is also based on the model of the "homo oeconomicus" that maximizes its utility under certain constraints. However, additionally this approach assumes that the institutional framework affects individuals' actions and conversely institutions evolve from human activity (Frey 1990b). Moreover, it is essential to carry out the analysis on actual existing institutions and not some ideal models of institutions (Frey 1990a). Applied to

the market imperfection analysed in this paper, one can view "governmental relief" as part of the institutional arrangements in which individuals act. Depending on the degree of institutionalisation of governmental relief, individuals' decisions to obtain insurance coverage against natural hazards might be influenced. Additionally, each individual's decision to insure further affects the spread of natural hazard insurances. The analysis of the effects of certain policies on individual behavior builds a base for a) suggestions on how to change inefficient institutional arrangements and b) developing alternative financial and policy instruments.

This paper shows that failures and imperfections exist on the market for natural hazard insurances and therefore state intervention may help to overcome these problems. Specific forms of state intervention, namely governmental financial assistance after a catastrophic event, can create further distortions on the market and therefore present an inappropriate form of state intervention. So far, a lot of economic papers have been written about the potential sources of imperfections or failure of the market for natural hazard insurance. In this paper we focus on the specific issue of charity hazard. Charity hazard is a problem on the market for natural disaster insurances, in the way that it acts as an obstacle for the proper diffusion and therefore establishment of natural hazard insurance. So far the governmental budgets were roughly able to cope with the costs of post-catastrophe relief activities. Nevertheless, limited public finances and steadily increasing financial damages from natural hazards, demand a more efficient allocation of public resources. This requires in return the elimination of inefficient allocative mechanisms and policies and the replacement by more efficient and acceptable mechanisms and instruments.

The paper is structured as followed: Section 2 of the paper reviews the existing literature on possible explanations for market failure occurring on the natural hazard insurance market. Section 3 highlights the economics of governmental disaster assistance. In the section 3.2. the problem of charity hazard is introduced and analysed from a theoretical point of view. Section 3.2 gives an overview on potential solutions to the problem and section 4 concludes with a short summary and suggestions for future research.

2 Imperfections on the market for Natural Hazard insurances

Individual insurance behavior is mainly ananlysed in the context of expected-utility-theory. The work by Ehrlich & Becker (1972) provides a formal framework analysing individual insurance behavior. If insurance is available at actuarially fair premiums, the individual equalises the income in both states (no loss vs. loss) by obtaining full insurance coverage. However, reality very often deviates from this ideal model. The insurance market is strongly affected by uncertainty and the future behavior of the contract partners (insurer and insured), which do not automatically obtain all the available information they need. The individual who wants to purchase insurance cover against natural hazards has to put in effort to search for the right insurance company, gain information about the best contract conditions, compare different premiums and enforce the claim after damage occurred. On the opposite, the insurance company has to put in effort to obtain information about each of his customers risk in order to calculate the right premiums and control that his customers do not exploit the fact that they are insured and show more risk appetite. All these efforts to gain information induce transaction costs. The existence of transformation costs explains that sometimes information on the insurance market is unevenly distributed between the contract partners. This problem of asymmetric information is one of the basic explanations why the insurance market does not work perfectly or a market does not exist at all. The resulting phenomena of *adverse selection* and *moral hazard* seem to be the reason for most of the problems on today's insurance markets. Rothschild & Stiglitz (1976) analysed the former in a Nash-equilibrium model. An equilibrium on the insurance market can only exist if two types of contracts, one for the "'good risks"' and one for the "'bad risks"' yield to a separating equilibrium. Based on these assumption today's natural hazard insurance companies as well as federal insurance programs have implemented geographical underwriting and differentiate premiums by individual probability of loss. The NFIP adjusts its premiums according to flood hazard information from "Flood Insurance Rate Maps" (FIRMs) (FEMA 2002). In Germany the "elec-

tronic flood zoning system" (ZÜRS) enables insurance companies to assess flood risks to individual buildings (Falkenhagen 2002).

The theoretical model by Ehrlich & Becker (1972) builds a straightforward framework to analyse the phenomenon of moral hazard. On the one hand it shows that market insurance and activities to reduce the amount of potential loss (*self-insurance*) are actual substitutes. On the other hand, measures decreasing the probability of a damage (*self-protection*) might have a negative diminishing effect on the insurance premium (given risk-related pricing) and can thus act as a complement to market insurance. In general, they conclude that moral hazard is an "'inevitable consequence of market insurance"'. Control measures for moral hazard are for example deductibles, coinsurance or the exclusion from coverage. Apart from these basic explanations for failure of insurance markets Jaffee & Russell (2003) suggest that adverse selection and moral hazard are not sufficient in all cases to explain the failures on the market for natural hazard insurances. The insurance market for natural hazards differs in certain points from other insurance markets, like car insurances:

- the correlation between individual risks is higher
- the impact or possible loss is much higher
- as a result, the costs to keep the market running are higher

These specific features can be catalysts for further disturbances on the market for natural hazard insurances. The characteristics of the risk at hand might impede *transaction costs* on the individual. A recent publication by Kunreuther & Pauly (2004) include this idea into a formal model of decision making costs under imperfect information and show that individuals still refuse to purchase natural hazard insurance even if the premiums are attractive. The authors show that the demand-side inefficiency is a problem of a) transaction costs in order to obtain information and b) ambiguity about probability estimations by different insurance companies. The search for the optimal insurance imposes costs which are high enough to discourage the individual to engage in any further mitigation activity. Additionally the

insurance premiums are likely to be much higher, because of vagueness about the probabilities.

In general, the demand for insurances is described by the expected-utility theory. Nevertheless, individuals show different behavior in the case of natural hazards and do not follow the expected utility theory of insurances and as a result obtain less insurance coverage. A growing number of publications have developed different approaches to explain the demand for natural hazard insurances. Kahneman, Slovic & Tversky (1982) argue that individuals' decisions are subject to choice anomalies. This theory of anomalies proposes that the standard expected utility theory does not sufficiently describe and predict individual behavior under uncertainty (Frey & Eichenberger 1989). When it comes to natural hazards, individuals do not base their decisions on calculated probabilities, but rather use inferential rules known as heuristics (Kahneman et al. 1982). This suggestion can be applied on the market for natural hazard insurance as well, where the situation is called "natural disaster syndrome". This "is a term that links the lack of interest by those at risk in protecting themselves against hazards and the resulting significant financial burden on society, property owners, the insurance industry and municipal, state and federal governments when severe disasters do occur" (Kunreuther (2001) p. 301). The author points out that five heuristics are responsible for anomalies on the natural disaster insurance market. One main reason is connected to information biases. Individuals misperceive the risk of natural disasters, because of extensive media-coverage ("availability bias") or they tend to overestimate risks of being harmed by a natural hazard that has recently occurred. A second very typical heuristic in the area of natural hazard insurance is the common attitude: "It won't happen to me!". If we take the example of a mountain farmer who has been living his whole live in an area with high avalanche risk (red zone) where almost every year avalanches impact next to his farm. Nevertheless, although he would have incentives to either move away or to insure his farm against potential losses, he does not behave accordingly. The third heuristic refers to the role of emotions connected to catastrophic events. Individuals may purchase insurances because of feelings such as fear instead of weigh costs against benefits. Heuristic

number four originates during the risk communication process. The form how risks and probabilities are presented can have a huge impact on individuals' decisions. For example, the actual danger to die from an avalanche is perceived to be moderate by some people at the level 3 (considerable danger) of the European avalanche hazard scale. Information about the fact that at this stage the highest number of avalanche victims occurs, changes the individual's attitude towards avalanche risks tremendously, although the probability to get caught by an avalanche did not change at all. The fifth heuristic is concerned with the ambiguity about the probability that a natural disaster might occur. This vague probabilities lead to inefficiencies on the private insurance market.

Beside theoretical models and approaches empirical evidence concerning the demand for natural hazard insurance exists. Browne & Hoyt (2000) provide an econometric analysis and test several variables influencing the demand for flood insurance in the USA from 1983 to 1993. The fixed-effects model uses cross-sectional and time-series data from 50 states. Their findings suggest that the price level of the premiums has got a highly significant and negative impact on the demand for insurance cover. They also show that higher income is positively related to the demand for flood insurance. Further they confirm the hypothesis that a recent flood experience increases the demand for insurance cover. Although the study presents interesting and new results in this area, it provides no information why the demand for flood insurance is sometimes too low. Brookshire, Thayer, Tschirhat & Schulze (1985) and Troy & Romm (2004) examined how the disclosure of information on natural hazard risks influences price gradients in hedonic market analyses. Brookshire et al. (1985) compare the price gradients for earthquake safety in the Los Angeles and San Francisco areas before and after the Alquist-Priolo Act was passed in 1974 which provided the society with information concerning relative earthquake-associated risk by designating areas of elevated relative risk. Similarly, Troy & Romm (2004) compare price gradients on non-floodplain areas before and after the 1998 California Natural Hazard Disclosure Law. Both studies find no price differential between risky and safe areas before the laws have been passed, but large and

significant price differentials thereafter. The studies show importance of the distribution of information and show that biases and imperfections on the market could be an issue of transaction costs rather than heuristics.

According to Jaffee & Russell (2003) the magnitude and features of natural hazards can also lead to three imperfections on the *supply side* of the insurance market: First, the problem of asymmetrically distributed information between the insurance company and its clients as well as between the shareholders of such a company and the management. Second, bankruptcy and agency costs stemming from the bankruptcy risk and the risk-management costs avoiding prospective bankruptcies. Third, impediments to raise capital as elementary losses from a big natural catastrophe often exceed the annual insurance premiums by a factor of 10 up to a factor of 100. To cover these potential losses the insurance company is required to raise substantial capital. Existing tax and accounting laws limit the company's ability to retain earnings and thus create fundamental problems in this area. As we can see, the supply-side problems on the market for natural hazard insurance are large and can explain why insurance coverage against elementary losses is hardly offered on the market. Jaffee & Russell (2003) as well as Schwarze & Wagner (2004) provide a thorough analysis of these supply-side problems and develop concepts to counteract them.

3 The economics of governmental disaster relief

The character and magnitude of catastrophic risk in general and the related imperfections on the natural disaster insurance market in particular can be seen as a normative basis for government intervention in the area of risk transfer. Government intervention on the market for disaster insurances is found in different designs: The provision of insurance cover through the government, such as the NFIP in the U.S. and governmental financial disaster relief through ad-hoc transfers or an institutionalized catastrophe fund. One advantage of governmental insurance systems is that it can sig-

nificantly constrain the problem of adverse selection and increase the size of the insurance pool by introducing mandatory insurance. In addition, the introduction of certain command & control instruments such as mandatory building codes reduces the probability of moral hazard. For example under the mandatory insurance system in Switzerland the monopoly insurance companies in each (Kantonale Gebaeudeversicherungen) have got the power to impose conditions regarding self-protection on the private housing owners. Depending on the design governmental insurance system can also have specific disadvantages compared to private providers of natural hazard insurance (Priest 1996). The focus of this paper,however, lies on the effects and incentives of governmental disaster relief. From an economist's point of view two major problems emerge: First, costs on society emerging from the inefficient allocation of governmental disaster relief. Second, underinsurance of individuals as a result of anticipated governmental assistance - charity hazard.

3.1 Inefficient provision of financial assistance

One major problem of governmental relief is allocative failure that prevents the financial resources from reaching those who suffered the greatest damage. (Sobel & Leeson 2006) concludes that such allocative inefficiencies are simply informational problem. First, disaster victims have no incentive to reveal their preferences for disaster assistance to governmental agents. Second, as federal disaster assistance is available for free there are no prices to guide its allocation. In addition, Governmental agents have weaker incentives to carefully deal with their resources and to search for information where the disaster assistance is needed the most.

Governmental disaster relief can also be subject to political concerns e.g. re-election constraints. An econometric analysis by Garrett & Sobel (2003) finds that FEMA disaster expenditure is significantly higher in election years (around $140 million as compared to non-election years). They conclude that almost half of FEMA disaster payments are politically motivated. Besley & Burgess (2002) find similar results for governmental food distribution after

crop flood damage using panel data from India. Mustafa (2003) interviewed victims of the 2001 flood in Islamabad and Rawalpindi, Pakistan regarding their experiences with different sources of disaster relief. Support cheques for flood victims were mainly distributed to political supporters or family members of the local councilors responsible for the coordination of governmental assistance (Mustafa 2003). Shughart (2006) gives a comprehensive overview on bureaucratic waste of federal resources following hurricane "Katrina".

3.2 The problem of "Charity Hazard"

During the summer of 1997 the Polish government spent around 500 million $ (around 3 % of the polish GDP) on financial assistance to the victims of floods (Stripple 1998). In the immediate aftermath of the catastrophic flooding in 2002 the regional and central German governments provided around half a billion Euro of emergency relief to their citizens (Schwarze & Wagner 2004). The Austrian government paid around 500 Million Euro of financial relief to its citizens (Prettenthaler et al. 2004). Shortly after Hurricane "Katrina" struck New Orleans the US senate voted almost U$ 60 billion in federal disaster relief (Kunreuther 2006).

The financial assistance was helpful for the victims after this once-a-century flooding. However, this type of governmental assistance might be the reason for another demand-side failure on the natural hazard insurance market. The problem of charity hazard emerges when individuals underinsure or do not insure at all against certain losses because of expected governmental aid and private charity. For simplicity reasons this paper focuses solely on governmental aid as a source for charity hazard.

Basically charity hazard is just a specification of the moral hazard problem. Governmental financial relief is a premium-free insurance against natural disasters. If a catastrophe occurs individuals without insurance are better off, because of the financial support without having to pay premiums, than they would have been if the situation was left to the market (Prettenthaler et al. 2004). This discourages the purchase of insurance cover especially if the amount of post-catastrophe financial relief depends on the degree of the

insurance cover. The low demand for natural disaster insurances has also got effects on the supply-side of the market, the insurance companies. Some of the providers retreat from the market because it is unprofitable to offer insurance cover against natural hazards. The remaining providers have to increase the premiums in order to cover costs. This leads to an even lower supply at higher prices. In this situation fewer and fewer individuals tend to cover potential risks from natural disasters by insurances and rely on governmental aid in the case of emergency. Figure 1 summarizes this circular process.

Actual examples for governmental relief programs are the European Union relief fund, the disaster assistance programs in several states in the USA (e.g. California Disaster Assistance Act) or the Austrian catastrophe fund (Katastrophenfonds). The financial sources for these federal reliefs are the governments' budgets. For example, the catastrophe fund in Austria is financed through income and corporate taxes. The emergency relief provided by the German and Austrian governments after the 2002 flooding was to some extent financed by delaying planned tax reduction. An additional analysis of the allocative inefficiencies in the public sector (political failures) should be the scope of further research interest in this area.

It is perfectly rational behavior not to obtain insurance cover against potential losses, when one can expect financial support from the government in the case of natural disasters Coate (1995). Private insurance cover inflicts costs (search costs and premiums), while the support from the government is available for free. The paradox of the situation is that people often have no actual legal entitlement for any financial relief by the government. This suggests that the existence of a governmental relief fund, past personal experience and/or media reports of past catastrophes and governmental aid seem to substantiate the individuals' belief that the government will provide financial catastrophe assistance. Prettenthaler et al. (2004) further argue that the societal legitimization to rely solely on governmental relief might result from the ideas and/or beliefs that a) in general individuals can not be made responsible for natural catastrophes and their effects, b) the government has to restore social and economic order after an event, and c) the low numbers

of insured properties is not just a fault of the victims, but also of the government as it did not assure the proper supply of natural catastrophe insurances and protective measures in general.

In addition to this societal legitimization, an institutionalisation of governmental aid by politicians and the administration might even further enforce the individuals' anticipation for financial assistance from the government. Such an institutionalisation can have various characteristics:

1. The creation of a catastrophe fund that does not only provide financial relief for one specific event, but is a persistent institution that grants financial assistance for elementary losses throughout the year.

2. The governmental aid has some sort of formalisation and/or legal foundations such as specific laws. This can be laws that explicitly define the financial sources of the governmental relief and the way how the financial assistance is distributed among the victims in the case of a natural catastrophe.

3. The governmental relief is administrated by special bureaucratic identity.

4. Even if there is no particular agency, office or person responsible for governmental relief, the existence of guidelines that inform the individuals about how and where to obtain governmental aid or specific application forms for financial assistance might enforce the belief of support by the government.

This institutionalisation can support the peoples' anticipation of public charity and further impede insurance attempts and thus the diffusion of natural hazard insurances. Kunreuther (2006) argued that although studies revealed that individuals do not anticipate governmental assistance, the broad media coverage on disaster assistance following hurricane "Katrina" could change public views on this subject.

3.2.1 Theoretical background

Governmental assistance after a natural disaster basically reduces the individuals' liability for the financial damages and therefore sets incentives to underinsure or not insure at all. Various authors have developed formal models derived from expected utility theory that analyse these incentive structures and its effects on indivudal insurance behavior. Lewis & Nickerson (1989) were upon the first translating the idea that people underinsure, because of expected governmental assistance into a formal model. Buchanan (1975) showed that the government is unable not to provide financial assistance for the poor and termed this situation *Samaritan's Dilemma*. Based on this assumption Coate (1995) created a model in which the amount of public transfers depends on the degree of the potential victim's insurance coverage. An inefficient situation from the dilemma situation occurs if the government can commit not to help the victims.

Arvan & Nickerson (2000) and Arvan & Nickerson (2006) analyzed the incentive structure in a game between potential victims and a social planner who is responsible for public assistance. Similar to the work by (Coate 1995) and Lewis & Nickerson (1989) they argue that it is rational for individuals to underinsure given expected governmental assistance. Their explanation for this behavior, however, differs from earlier papers as they endogenized governmental compensation. An individual's purchase of insurance coverage creates negative externalities by reducing the uncovered part not only of the individual's wealth, but also of the uncovered property of all individuals at risk and therefore the fraction eligible for governmental compensation. Underinsurance leads to a Nash-equilibrium among all potential victims. Charity hazard can thus be explained through such an equilibrium rather than the Samaritan's Dilemma.

Kelly & Kleffner (2003) developed a theoretical framework analysing the demand for insurance and mitigation measures if individuals can expect governmental disaster relief. The numerical simulation shows that governmental aid decreases the amount spent on insurance as well as mitigation measures.

Kim & Schlesinger (2005) introduced government-guaranteed subsistence levels to a model of insurance market with adverse selection. Governmental assistance can alter the set of separating-equilibrium contracts. Depending on the level of relief, high-risk individuals might fully insure whereby low-risk individuals might have incentives to rely on governmental aid.

3.2.2 Formal Analysis

According to the framework developed by Ehrlich & Becker (1972) and the extension by Kelly & Kleffner (2003)the individual is endowed with an initial wealth W and faces two states of the world $(1, 2)$. A determined loss L occurs with a probability π $(0 < \pi < 1)$ in state 1. The individual has got the possibility to purchase insurance cover, $V(\alpha)$, against the potential loss. The price of the insurance, P, is a function of α, the proportion of the individual's property covered by the insurance. In addition, it is assumed that the premiums for insurance are actuarially fair. Under these basic assumptions, the individual will choose that amount of insurance coverage that equalizes the incomes in both states of the world. In figure 1 this is represented by point C, which equals full insurance coverage.

In addition to this basic model, the individual can also expect that the government provides financial disaster relief θ $(0 < \theta < 1)$. Basically, the government pays for a fraction, $(1 - \theta)$, of the uninsured damage. The individual's utility function can now be derived as follows:

$$\underset{\alpha}{\text{Max}} \quad E[U] = \pi U\{W - P(\alpha)(1-\theta)(L - V(\alpha))\} + (1-\pi)U\{W - P(\alpha)\} \tag{1}$$

Differentiating equation (1) with respect to the amount of insurance coverage α and setting it equal to zero gives

$$\frac{\delta E\left[U\right]}{\delta\alpha} = \pi\left(\left(1-\theta\right)V^{'}\left(\alpha\right) - P^{'}\left(\alpha\right)\right)U^{'}\left\{W - P\left(\alpha\right) - \left(1-\theta\right)\left(L - V\left(\alpha\right)\right)\right\}$$
$$- \left(1-\pi\right)P^{'}\left(\alpha\right)U^{'}\left\{W - P\left(\alpha\right)\right\} = 0. \tag{2}$$

The utility-maximizing individual obtains an amount of insurance coverage α that satisfies the first order condition

$$\frac{\left(1-\theta\right)\left(V^{'}\left(\alpha\right) - P^{'}\left(\alpha\right)\right)}{P^{'}\left(\alpha\right)} = \frac{\pi U^{'}\left\{W - P\left(\alpha\right)\right\}}{\left(1-\pi\right)U^{'}\left\{W - P\left(\alpha\right) - \left(1-\theta\right)\left(L - V\left(\alpha\right)\right)\right\}}. \tag{3}$$

In equilibrium, the individual purchases that amount of insurance cover where the slope of the insurance line equals the slope of the indifference curve between the two states of the world. In comparison to the basic model, the amount of insurance coverage demanded now also depends on the expected financial assistance by the government, θ.

In figure 1 we consider 3 different levels of governmental assistance, $\theta_1 < \theta_2 < \theta_3$. The individual's wealth after an event occured depends now on the initial wealth, the premium paid, the insurance cover and the degree of disaster relief by the government, $W + G_i$ where $G_i = -P(\alpha) - (1-\theta_i)(L - V(\alpha))$. Assuming a governmental disaster assistance of θ_1, the individual can choose a wealth situation with no coverage at point A or a situation with full coverage at point C. Given fair insurance premiums, the individual can obtain a higher utility level by choosing full insurance cover at point C. At a higher level of governmental aid, such as θ_2, the individual is indifferent between not insuring D and full coverage. At an even higher amount of disaster assistance, θ_3, the individual is better off (utility level I_2 in figure 1) by solely relying on governmental support.

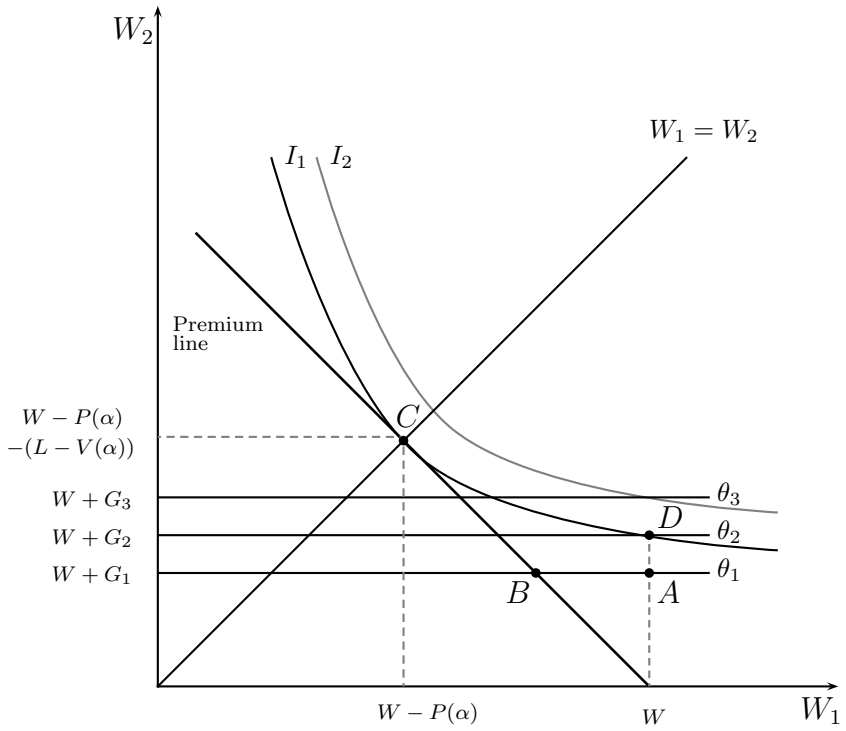

Figure 1: Individual insurance behavior and governmental relief

3.2.3 Empirical research

The problem of charity hazard and its effects on individual insurance behavior seems pretty straight-forward and convincing at least from a theoretical perspective. However, when it comes to empirical evidence for this issue, only few empirical studies exist and the results are rather ambiguous. A study by Kunreuther, Ginsberg, Miller, Slovic, B. & Katz (1978) revealed that the majority of homeowners in hazard prone areas do not anticipate federal financial disaster relief. The empirical results by Browne & Hoyt (2000) oppose the idea of charity hazard. Their findings even suggest a significant positive relation between the amount of governmental disaster relief and the demand for flood insurance in the USA. They argue that the exposure to flood risk might increase both, the purchases of flood insurance and the amount of governmental aid received. Asseldonk, Meuwissen & Huirne (2002) measured the demand for a hypothetical public-private crop insurance scheme by interviewing 305 crop producers in the Netherlands with the contingent-valuation method. The producer's belief in potential governmental disaster assistance had a significant negative impact on the likelihood to participate in the insurance program.

This short overview on studies indicates that it is difficult to support the theoretical arguments for charity hazard with empirical evidence. First, there are only few empirical studies that have dealt with this subject. Second, the main focus of these studies was on other topics related to natural hazard insurance and incorporated governmental disaster relief only as an additional control variable. Third, the results are conflicting and the majority of studies actually rejects the idea of charity hazard. Therefore, future research should a) develop theoretical models that incorporate governmental assistance in a more concise manner, b) formulate hypothesis focusing more tightly on charity hazard and c) design the econometric specifications regarding to point a) and b).

3.3 Alternatives

There are a number of options and policy recommendations available to solve the charity hazard problem: The first possibility is to introduce mandatory natural hazard insurance, a strategy already applied to counteract adverse selection in other insurance markets (e.g. car insurance). As a positive side-effect the premiums would decrease and make the natural hazard insurance more attractive. A legal intervention by the government would thus not only tackle the diffusion problem of natural hazard insurances, but also help to overcome the choice anomalies in this area (Frey 1990a).

From a theoretical point of view, Coate (1995) suggests that the government has to ensure that everyone (irrespective of personal income) has insurance cover in order to create an efficient situation. This can be achieved through in-kind transfers of insurance. Another option to avoid charity hazard would be to reduce or completely cancel governmental aid (Niederle 2003). Nevertheless it could be politically disastrous to deny financial assistance to victims of a natural catastrophe. Therefore the government should rethink its support strategy and focus even more on the prevention and thus on the mitigation of elementary losses. Additionally a redirection of governmental aid from post-event relief to pre-event subsidies for insurances would decrease the individual costs of obtaining insurance coverage and make therefore the insurance solution more attractive. For example in Austria parts of the catastrophe fund is used to subsidize insurance premiums against damages due to hail and frost. However, the subsidisation option in this respect demands a further analysis. Frey (1990a) suggests that state intervention through subsidies might even increase the existing anomalies on the market.

If public fund are collected and aggregated over time and stored on a dedicated account, this money could be used to finance a public-private partnership within the natural hazard insurance sector. The private insurance companies supply primary insurance cover, whereby the government provides re-insurance cover in the case of a once-a-century event (Schwarze & Wagner 2004). This solution would in addition tackle the problem of possible bankruptcy and the costs of avoiding it (see discussion above). The

international comparison presents a number of different solutions. Switzerland has solved the problem by introducing mandatory insurance for buildings with a dual system. In 19 cantons the property insurance is offered by a monopoly insurance company (*Kantonale Gebaeudeversicherung*), in the other 7 cantons property owners can purchase the insurance from private providers. Spain has also got obligatory property insurance (*Consorcio de Compensacion de Seguros*) against natural hazards (flood, storm, earthquakes) offered by a state monopoly (Von Ungern-Sternberg 2004). In the United States the National Flood Insurance Program (NFIP) - a legal framework for cooperation between private insurance companies and the government created in 1968 - builds the basis mandatory flood insurance for new buildings (Burby 2001).

Although superior models have been developed in economic theory and these alternative mechanisms have been successfully applied in different countries, the implementation of alternative insurance systems against the elementary losses in certain countries (e.g. Austria, Germany, Italy) still fails. Whether an alternative social risk transfer mechanism will be installed crucially depends on a) the incentives of winners and losers to support their interests and b) the position to exert influence within the institutional context. Although alternative insurance systems might be be more efficient and reduce the burden on both victims and tax-payers reforms in this area are unlikely to pass the political-process (Raschky & Weck-Hannemann 2006). A case study by Schwarze & Wagner (2006) gives a good political-economic examination how the introduction of a mandatory insurance system in Germany failed.

4 Charity Hazard - A politico-economic Analysis

The compensation of financial losses after natural disasters is essential for the social and economic functioning of a society. There is general consensus at the level of the formulation of the aim at the beginning of the political

process, when the costs of social risk transfer are only vaguely known. As soon as the costs of social risk transfer and, in particular, the groups who have to bear the costs are identified, conflicts arise. Whether an alternative social risk transfer mechanism will be installed crucially depends on

- the incentives of winners and losers to support their interests and
- the position to exert influence within the institutional context.

Hence, the politico-economic analysis of governmental relief consists of an examination of the behaviour of the actors in the political decision making process regarding the benefits and costs of governmental relief (ad-hoc or catastrophe fund) compared to alternative solutions (e.g. a mandatory insurance system).

The relevant actors are:

- Cizitens (affected people, tax payers, voters)
- Insurance industry
- Politicians
- Bureaucrats

Citizens: Citizens in general, and in particular individuals living in hazard prone areas, have a great interest in a social risk transfer system. In comparison to a mandatory insurance system governmental relief has several advantages for citizens. The payment to victims is in general not strictly formalised and the conditions for payments are not strictly controlled, as the government wants to guarantee "fast and un-bureaucratic" help. Costs for governmental compensation are bared by the general public, through income or corporate taxes. Although a catastrophe fund is a de-facto "mandatory insurance", the costs are hard to associate. In addition, the allocation of costs of governmental relief to all citizens is perceived as just, especially after a disaster occurred. Beside the direct costs citizens have to pay, governmental

relief has got certain drawbacks in comparison to alternative risk transfer systems, such as private insurance. Firstly, the victims actually do not have any legal entitlement for refunding from the government. This creates a situation of uncertainty for affected individuals. In comparison to an insurance solution, disaster victims do not obtain any contract which could act as a security for e.g. a bank loan. Secondly, although politicians announce fast help, the actual refunding takes time as it has to pass through numerous bureaucratic hierarchies, from the municipal level to the federal level. The refunding is organized through bureaucrats who are in general not specialists for payment and refunding tasks. This puts victims in an uncertain position, because the amount of the financial assistance is unclear and the time when disaster victims receive it is not fixed.

Hence, one of the biggest benefits from the installation of a mandatory insurance system stems from a decrease in the victims' uncertainty. An insurance contract entitles the individual with the legal right for compensation of elementary losses. Even if the payment from the insurance company did not arrive, the contract enables the disaster victims to loan money for reconstruction. The introduction of an insurance system based on risk-premiums would increase the overall efficiency of the social risk transfer system. Insurance premiums that are based on the individual's exposure to flood would shift the costs of social risk transfer from the general public to the potential beneficiaries. Such a situation would accord to the principle of fiscal equivalence, where the beneficiaries of a measure also have to bare the costs. Despite the advantages of a mandatory insurance system for affected citizens and the tax payers, they only have small incentives to put their interest forward. The first reason is that there is a low degree of organisation between the citizens. There is no community of interest for the installation of a more efficient risk transfer system. Second, as the financial burden through governmental relief is perceived as rather low in comparison to other budget positions, incentives are rather low to take action. Third, the implementation of alternative risk transfer mechanisms receives only minor attention in day-to-day politics. However, it becomes relevant once a bigger disaster occurs (e.g. after the flooding in the western parts of Austria in 2005). Due

to the general context of the disaster (e.g. attention from the media) the affected citizens can put more pressure on the political decision makers and the organization of interests is more facile. Nevertheless, the installation of a mandatory insurance system is considered as an additional burden for the affected victims. In the post-disaster context, that group of citizens having the most influence on the political decision making process, the victims, has got no incentives to change the system anyway.

Insurance industry: The insurance industry is the supplier of risk transfer instruments and services. In general, insurance companies have interest to replace a governmental relief system by an alternative risk transfer mechanism. The costs and benefits of a mandatory insurance regime for the insurance companies mainly depend on the actual design of the regime. Due to the supply side failures of the natural hazard insurance market (as discussed above) a company faces certain risks by offering insurance coverage against low-probability-high-loss events. Regarding the bankruptcy risk and the associated agency costs, insurance companies might demand a guarantee that the government provides some form of insurance of last resort. Such insurance by the federal government should assure that the market does not collapse, in particular during the first years after the introduction of a mandatory insurance system. A recent study by Schwarze & Wagner (2006) about the failed implementation of a mandatory insurance system for elementary losses in Germany shows how the diverging proposals on the level of federal guarantee by the insurance industry and the government might lead to problems during negotiations. Whether proposals of the insurance industry dominate the political decision making process, depends on the degree of organization of the interests of the various insurance providers. It can be assumed, that the degree of organization of the insurance industry is higher than that of the citizens.

Politicians & Bureaucrats: Based on public choice theory, politicians and bureaucrats basically behave in the same way as other members of society. One cannot assume that their primary interest is to maximize social welfare,

as suggested by traditional welfare economics. Moreover the political and bureaucratic actors might be concerned with an increase in their own benefits. Their activities are constraint by the institutional framework and the design of the societal decision making mechanisms. Politicians and bureaucrats face three constraints: 1) re-election constraint b) budget constraint and c) administrative constraint. They evaluate the costs and benefits of different measurements and policies by the visibility and accountability.

Politicians mainly receive benefits from governmental relief systems. The provision of funds to disaster victims by a "benevolent politician" is a highly visible action. The distribution of tax-money for compensation is perceived by the general public as generous gesture. Considering the politicians re-election constraint, financial relief can also positive effects. According to the study by Schwarze & Wagner (2004) the decision by chancellor Schroeder to provide large amounts of public funds to compensate flood victims in Germany 2002, had positive effects on his re-election in the same year. Relying on governmental financial relief could, however, be a rather risky venture for the government. Simply consider the occurrence of a "big-one" in the election year, when public funds are unable to cope with the damages. Unless politicians are able to shift the blame to a bureaucratic agency ("blame-game") the ruling government would be directly accounted for a lack in financial assistance and the bad situation of uncompensated disaster victims. The introduction of a mandatory insurance system would not only insure potential victims, but also serve as an "insurance against the political side effects of low-probability-high-loss-events" for the government. As the compensation is now task of the insurance companies, they are made responsible for lacking funds. These benefits bare the costs of losing the highly visible and directly accountable relief-activity to increase the politicians' prestige and positive effects regarding re-election. In addition, the introduction of a mandatory insurance system may be perceived as an additional tax-burden and directly accounted to the government. Such a policy would have negative effects on politicians who cares about re-election.

The second important identity within the political context around governmental relief is bureaucracy. In particular the organization and maintenance

of a fixed installed catastrophe fund demand to a certain extent bureaucratic structures. An agency or at least department has to manage and assess the fund in periods without disaster and has to administrate the distribution of funds to the victims once a catastrophe occurs. Due to the complexity of the task "Natural Hazard Management" that requires expert knowledge and the societal context of a catastrophe bureaucrats responsible for relief funds have a rather good position during budget negotiations. They have only little incentives to demand fewer funds for an upcoming period. This position also equips them with a certain degree of administrative discretion for their activities. However, bureaucrats have to face certain risks and costs: First, the risk of discretionary political decisions. Reserves of a catastrophe fund could be reduced and transferred to other budget positions (compare case study in box 1), decreasing the opportunities of the bureaucratic agency. Second, given a catastrophe arises bureaucrats could become the object of blame shifting from politicians. Politicians could try to transfer responsibility for insufficient relief funds to the bureaucratic agency, which reduces the agency's prestige in the public and the lay-off of chief-bureaucrats. Despite these risks, bureaucrats might have only minor interests in the introduction of a mandatory insurance system, because this could result in the liquidation of their agency or department. Therefore they might act as a barrier against the implementation of alternative risk-transfer mechanisms. Next to politicians, their influence on the political decision-making process makes bureaucrats to a key-player when it comes to negotiations about a change in the societal risk-transfer system. Thus the design of a mandatory insurance system should include this aspect. The agency could be transformed into an agency that is responsible for federal re-insurance and other administrative tasks. This would decrease the bureaucrats' resistance (as such a change could even enlarge the agency) and reduce the overall administrative costs, due to economies of scale. Such a reduction could further lower the insurance premiums (Von Ungern-Sternberg 2004).

5 Conclusion

Economic theory and empirical evidence show that the market for natural hazard insurance does not work efficiently. A number of reasons for these market failures both on demand and supply side can be found. Beside the traditional explanations for market imperfections on insurance markets - moral hazard and asymmetric information - elementary damages feature the characteristics of low probability and high loss. These problems lead to further inefficiencies on the market which in return demands intervention by the government. The comparative institutional analysis provides a normative base for evaluating alternative approaches such as information campaigns or state intervention. However, as the analysis shows the provision of post-catastrophic financial relief by the government is not an appropriate way to intervene as it seems to be the source for another distortion on the market, namely charity hazard. This phenomenon results from the individuals' anticipation of post-catastrophe governmental and private aid. The answer to the question posed in the title, if charity hazard is indeed a real threat to natural hazard insurance can neither be answered with "yes" nor "no". Although rather logic and convincing from a theoretical point of view, certain points of critique exist. Schwarze and Wagner (2004) propose that individuals who have no insurance cover neither have information about federal relief programmes. The empirical review has shown that only a few studies exist and the majority of studies actually does not find evidence for charity hazard.

We can conclude that the scientific discussion regarding charity hazard is far from settled. Future research should thus put more emphasis on the effects of governmental disaster assistance on individual insurance behavior. A clearer picture of this issue can shed some more light on insurance behavior and provide useful suggestions for restructuring public financial relief programs. It might be prevented through some kind of mandatory insurance, the redirection of governmental funds from post-catastrophe relief to pre-catastrophe subsidies for insurance premiums or other protective measures. Nevertheless, recommendations for public policy-makers demand a prelim-

inary investigations of individual behavior under different risk-transfer and governmental assistance regimes.

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Paul Raschky and Hannelore Weck-Hannemann

Charity hazard - A real hazard to natural disaster insurance

Abstract

After the flooding in 2002 European governments provided billions of Euros of financial assistance to their citizens. Although there is no doubt that solidarity and some sort of assistance is reasonable, the question arises why these damages were not sufficiently insured. One explanation why individuals reject to obtain insurance cover against natural hazards is that they anticipate governmental and private aid. This problem became to be known as "charity hazard". The present paper gives an economic analysis of the institutional arrangements on the market for natural disaster insurances focusing on imperfections caused by governmental financial relief. It provides a theoretical explanation why charity hazard is a problem on the market for natural disaster insurances, in the way that it acts as an obstacle for the proper diffusion and therefore the establishment of natural hazard insurances. This paper provides a review of the scientific discussion on charity hazard, provides a theoretical analysis and points out the existing empirical problems regarding this issue.

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