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Framing of risk and preferences for annual and multi-year flood insurance ☆

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ABSTRACT

The decision of many individuals in floodplains to not purchase flood insurance may impair the risk-spreading function of flood insurance markets. This study estimates the effectiveness of risk communication frames and insurance policy conditions in increasing demand for flood insurance. It is examined how communication interacts with individual frames about the flood hazard that are rooted in regulatory focus theory. A choice experiment elicits willingness-to-pay (WTP) for annual and multi-year flood insurance, using of a survey of a representative sample of 1250 households. The statistical method is a mixed logit model that accounts for heteroskedasticity arising from stated choice certainty. The communication frames considerably increase WTP compared with a control group. This effect of communication is positively related to an individual's degree of prevention motivation. Moreover, we find that demand for flood insurance can be increased by introducing multi-year policies, as long as the contract duration is not too long.

1. Introduction

A challenge for traditional economic theory is that many homeowners in floodplains do not purchase flood insurance (e.g. Krantz & Kunreuther, 2007; Kunreuther & Pauly, 2004). For instance, many homeowners in the USA do not purchase flood insurance which has been provided by the National Flood Insurance Program (NFIP) at premiums that are close to, or in some cases even below, the expected value of flood damage (Browne & Hoyt, 2000; Kriesel & Landry, 2004; Michel-Kerjan & Kousky, 2010). This can be explained by the attitude of many people that "a flood will not happen to me" (Kunreuther, 1978). Economic experiments have confirmed that indeed many individuals neglect low-probability risk and do not purchase insurance, while another large group has a willingness-to-pay (WTP) that is considerably above the expected value of the loss (Laury, Morgen-McInnes, & Swarthout, 2009; McClelland, Schulze, & Coursey, 1993; Schade, Kunreuther, & Koellinger, 2011). Similar behavior has been observed in stated preference surveys of flood insurance demand (Botzen & van den Bergh, 2012a, 2012b).

☆ Wouter Botzen has been responsible for the design, the statistical analysis and the reporting of the results of the choice experiment. Joop de Boer and Teun Terpstra have contributed to the overall research strategy in which the choice experiment was embedded.

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Flood insurance purchases appear to be inconsistent with standard expected utility theory, which predicts that individuals purchase flood insurance as long as the insurance premium is not much higher than the expected value of the loss, under the assumption that individuals are risk averse and fully informed about the risk. Kunreuther and Pauly (2004) augment this standard theory by postulating that consumers incur implicit or explicit transaction costs associated with obtaining information about underlying loss probabilities. Individuals may not spend time on acquiring such information, because this is a costly activity. This relates to 'bounded rationality', in the sense that it may be a rational strategy not to pursue information because it is hard and time-consuming, and involves subjective attention costs (Conlisk, 1996). Kunreuther and Pauly (2004) show that, if the costs of acquiring information on risk are high and/or the perceived loss probability is low, then individuals can be discouraged from making rational insurance decisions, and they do not insure against disasters. A solution may entail providing information about the risk, but empirical evidence on this is largely lacking. An extensive review of the literature on perception and communication by Kellens, Terpstra, and De Maeyer (2012) concluded that very few studies have examined the effects of flood risk communication, and none of these assessed the influence of risk communication on flood insurance demand.[1]

This study examines the effect of risk communication frames on flood insurance demand, by explicitly controlling for frames that individuals have about flood risk. Individual risk frames are "organizing principles that shape in a hidden and taken-for-granted way how people conceptualize an issue" (de Boer, Wardekker, & van der Sluis, 2010), and are in this study elicited as prevention and promotion motivations related to flood-risk protection. It is the interplay of such individual and communication frames of risk that can be expected to influence individual decision making regarding insurance purchases. Communication frames are defined as 'storylines of a risk aimed at informing individuals'. Our approach to frames refers to mental knowledge structures that capture the typical features of a situation; these may include standards of reference, which are the basis of the well-known framing effects of "gains" versus "losses." However, the latter type of effects is not part of this study. We use such storylines of risk since Kunreuther, Novemsky, and Kahneman (2001) show that merely providing probabilistic information on risk does not affect individual risk judgments, while providing descriptions that allow individuals to place probabilistic information in a useful context can be effective in influencing individual risk perceptions. The storylines applied in this study emphasize either the risks or amenities associated with living in a floodplain or the ability of water managers to protect land from flooding, in the context of either high-probability/low-impact floods in unprotected floodplains or low-probability/high-impact floods in protected floodplains. These communication frames provide a realistic description of flood risks in the study area in the Netherlands (see Section 3.1). Similar typologies are applicable to other countries, such as the USA where flood-risk awareness campaigns have been proposed in floodplains with, and without, flood protection infrastructure (Ludy & Kondolf, 2012).

Demand for flood insurance has been elicited under various risk communication frames using a choice experiment that was part of a survey of a representative sample of 1250 households. An error correction mixed logit model estimates the influence on the demand for flood insurance of frames, as well as of the characteristics of the insurance policy, while taking account of model error introduced by individual stated choice uncertainty. Contract duration is one of the characteristics of the insurance since recently it has been proposed to introduce multi-year flood insurance (MYI) policies for increasing the uptake of flood insurance, in particular, in the USA (Michel-Kerjan, 2010; Michel-Kerjan, Lemoyne de Forges, & Kunreuther, 2012). A theoretical model of single and MYI policies for catastrophe risk in a competitive market by Kleindorfer, Kunreuther, and Ou-Yang (2012) shows that risk-averse individuals prefer the price stability offered by MYI policies compared with annual insurance contracts, even though MYI policies are priced at a premium mark-up due to the uncertainty of future (re)insurance costs. Our study is one of the first to empirically examine how flood insurance demand relates to the duration of the insurance policy. Moreover, the insights that our study delivers into the effectiveness of risk communication are of relevance for the Netherlands, where the introduction of flood insurance is being considered since flood coverage is generally excluded from home and contents insurance policies (Botzen & van den Bergh, 2008), and have a broader relevance for countries where the uptake of natural disaster insurance is low (Paudel, Botzen, & Aerts, 2012).

The remainder of this paper is organized as follows. Section 2 explains the adopted psychological framework of decision making under risk. Section 3 discusses the survey. Section 4 describes the methods used to model demand for flood insurance. Section 5 provides the model results. Section 6 discusses the main implications of the findings of this study and concludes.

2. Prevention and promotion motivations for individual decision making under risk

Several prominent academics have called for improving the behavioral foundations of economic choice models that go beyond standard microeconomic theory, including Nobel laureates McFadden (2001) and Kahneman (2003). Due to the failure of expected utility theory in describing decision making about low-probability risks (Starmer, 2000), it is worthwhile exploring other theoretical frameworks for explaining individual decision making, such as theories that are founded in psychology. For example, Protection Motivation Theory has been implemented in a choice model for food to explain prevention of low-probability high-consequence health risk (Scarpa & Thiene, 2011). Another example is Nocella, Boecker, Hubbard, and Scarpa (2012), who include psychological constructs of the Theory of Planned Behavior in a choice model for certified ani-

[1] For readers interested in communication of health risks we refer to the review articles by Edwards et al. (2000), Ancker, Senathirajah, Kukafka, and Starren (2006), and Dusetzina et al. (2012).