



Risk loving after the storm: A Bayesian-Network study of Hurricane Katrina evacuees

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ABSTRACT

We investigate risk preferences of a sample of hurricane Katrina evacuees shortly after they were evacuated and transported to Houston, and another sample from the same population taken a year later. We also consider a third sample of resident Houstonians with demographics similar to the Katrina evacuees. Conventional statistical methods fail to explain a strong risk-loving bias in the first Katrina-evacuees sample. We utilize Bayesian Networks to investigate all relevant conditional distributions for gamble choices, demographic variables, and responses to psychometric questionnaires. We uncover surprising results: Contrary to prior experimental evidence, we find that women in our sample were significantly more risk loving in the first Katrina sample and only mildly more risk averse in the other two samples. We find that gamble choices are best predicted by positive-emotion variables. We therefore explain the risk-loving choices of the first Katrina-evacuees sample by the detected primacy of negative-emotion variables in that sample and explain the latter by traumatic and heightened-stress experiences shortly after the hurricane.

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1. Introduction

The study of demographic, psychological, and environmental conditions effects on human risk preferences has been the subject of considerable research. A prominent strand of that literature has focused on gender effects, finding that women generally exhibit higher risk-aversion than men, although the extent of this gender effect may depend on other design variables (c.f. Eckel and Grossman, 2002, 2008a,b,c; Holt and Laury, 2002; Byrnes et al., 1999; Jianakopulos and Bernasek, 1998; Levin et al., 1988; Levy et al., 1999; Shubert et al., 1999). Another strand of literature has emphasized the effects of humans psychological mindset in determining their risk preferences.

In this regard, Loewenstein et al. (2001, p. 267) show that emotional reactions to risky situations often diverge from cognitive assessments of those risks. . . [Instead] emotional reactions often drive behavior [thus explaining] a wide range of phenomena that have resisted interpretation in cognitive-consequentialist terms. This is consistent with earlier research in social psychology, such as Lopes (1987), that framed decision making under risk as a tradeoff between hope and fear. This tradeoff may produce risk-loving behavior, such as pinning ones hopes to escape poverty on playing college and professional sports or winning the lottery.

In this paper, we study the patterns of risk-preference dependence on demographic and psychometric variables for three poor populations. The first sample was taken from New Orleans evacuees who were bussed to Houston, Texas, in the

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aftermath of hurricane Katrina. The second sample was taken ten months later from the same population of evacuees. Those two samples are heretofore labeled Katrina Wave 1 and Katrina Wave 2, respectively. Concurrent with Wave 2, a third sample was drawn from resident Houstonians with demographic characteristics very similar to those of the New Orleans evacuees. This design provides us with one sample (Katrina Wave 1) of poor urban African Americans shortly after they had suffered an extremely stressful experience. The other two samples provide us with two control groups, separated from the stressful event temporally and spatially. For all three samples, we obtained three sets of observations:

1. Responses to a series of 11 psychometric questions (with 5-category discrete responses ranging from “very slightly” to “extremely”) characterizing their affective state and made up of the following items: interested, excited, upset, scared, enthusiastic, alert, inspired, jittery, nervous, determined, and afraid,
2. A choice from the set of lotteries $\{[15, 15], [25, 10], [35, 5], [45, 0], [55, -5], [60, -10]\}$, all with equal probabilities across each of the two outcomes, and
3. Responses to questions about demographic variables, including historical income, age, marital status, education level, gender, historical job status, and size of household. Katrina Wave 1 subjects were also asked if they had any missing or hurt family members.

The gamble choices used in this design are those of Eckel and Grossman (2002, 2006). They present subjects with a limited set of gambles that involve a 50/50 chance of winning a low prize or a high prize. The gambles are designed so that they increase in expected payoff and risk (standard deviation), and the relationship between expected payoff and risk is linear for all but the last gamble. An important advantage of this design is that it is easily comprehended by subjects outside the usual convenience sample of university students. Dave et al. (2007) used structural-model estimation to illustrate the usefulness of this simple design in studying risk preferences of subjects with low levels of math literacy.

Notice that the riskiest gamble $[60, -10]$ is merely a mean-preserving spread of the second riskiest $[55, -5]$. Therefore, only subjects with risk-loving preferences would rationally select the riskiest gamble in this design. Two very significant surprises were detected in the data: (1) the riskiest gamble was the modal choice for Katrina Wave 1 subjects and (2) in that sample, more women than men chose the risk-loving gamble (whereas the other two samples exhibited higher risk-aversion in women, albeit a weak effect).

Those two patterns in our data can be seen clearly in the top panel of Fig. 10. The left-most figure shows the probability distribution of gamble choices conditional on gender (male = M, female = F, not known = N). The widths of the three columns represent their ratio in our sample. For instance, there were approximately equal numbers of males and females in the Katrina Wave 1 sample, but more females and many more females in the Katrina Wave 2 and Houston sample, respectively. The column for each gender is divided into six subcolumns representing the ratio of subjects who chose each of the six gambles, starting at the bottom with the ratio that chose the safest gamble (darkest shade), and ending at the top with those who chose the risk-loving gamble (lightest shade).

We can see in Fig. 10 that the risk-loving gamble was chosen by slightly less than 40% of the Katrina Wave 1 male subjects and slightly more than 40% of the female subjects. In contrast, the risk-loving choice was chosen by slightly more than 20% of males and slightly less than 20% of females in the other two samples. This suggests that the experiences of witnessing hurricane Katrina and the stresses of evacuation to Houston significantly disturbed the normal pattern of risk-preference determination. This is not surprising in light of the accumulated literature on traumatic effects of natural disasters and their effects on human behavior. In recent decades, numerous sociological and psychological studies of stress and post-traumatic experiences have established generally accepted stylized facts with plausible implications for risk-preference determination. One may postulate a mechanism through which stress and traumatic experiences can affect risk preferences through their effect on the subject's psychological state.

In this regard, Lazarus (1999) argued that stress should indeed be studied as a subset of emotions that may have important physiological and cognitive effects. The bulk of psychological studies in this literature have dealt with coping strategies of humans under stress. Thus, Janis (1993) has argued that decision making under stress results in “hypervigilance” to some stimuli and ignoring others. This leads to “stereotyped thinking in terms of oversimplified categories and reliance on simpleminded decision rules” (p. 65). This may suggest that individuals under extreme stress are less likely to analyze the set of gamble choices before them and use instead a simple rule such as “choose the gamble that can give the highest payoff,” “I feel particularly lucky today,” or “heaven owes me for my past bad luck,” all of which would drive subjects to behave in the risky manner that we observed in the Katrina Wave 1 sample.

As mentioned at the outset, we compare revealed risk preferences and their patterns of dependence on demographic and psychometric variables in three populations. The decision to sample the population of Katrina evacuees twice was justified by the results of Weisaeth and Eitinger (1993), who have shown that “post-traumatic stress disorder” effects are strongly pronounced following a natural disaster, but their long-term effects are highly variable. Indeed, we find in our data analysis that the Katrina evacuees' sample a year after the hurricane looks remarkably similar to resident Houstonians with similar demographics, while both of those samples are significantly different from the Katrina evacuees' sample shortly following the hurricane.

Understanding how risk preferences are altered by traumatic natural disasters can lead to policy conclusions, with which we do not deal in this paper. It is worthwhile noting, however, that Bolin and Stanford (1998, p.71) have shown, despite few available studies of sheltering choices of evacuated populations, that lower socioeconomic status victims are more likely to

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