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# Trust, Risk, and Time Preferences After a Natural Disaster: Experimental Evidence from Thailand

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**Summary.** — Natural disasters constitute a persistent threat to economic welfare in many places, particularly in developing countries. Not only can disasters transform living circumstances, but we provide evidence here that they can lead to important changes in individual preferences. In a series of experiments that we conducted in rural Thailand, we find that the 2004 tsunami led to substantial long-lasting increases in risk aversion, prosocial behavior, and impatience. We use GIS data and survey responses to identify disaster impact, showing that both community-level and individual-level experiences appear to affect preferences in theoretically plausible ways. Our findings have important implications for public policy efforts to address natural disasters.

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*No early settlers could have been more ingenious in adapting to their purposes whatever means were at hand. . . Everyone talked to everyone else. All barriers of race and creed, color and social station were let down. In a way it was like a picnic of some vast fraternal organization.*

[Leonie von Zesch, describing her observations after the 1906 San Francisco earthquake<sup>1</sup>]

## 1. INTRODUCTION

From 1980 to 2004, direct economic damage from natural disasters was estimated to be about \$1 trillion, with over five billion people cumulatively affected (Stromberg, 2007). These events often particularly impact developing countries, where disasters ranging from droughts to floods to earthquakes constitute an ever-present threat in many people's lives. While the impact of disasters on living conditions has received a great deal of attention from economists, much less well-understood are any effects that disasters might have on the preferences of the individuals and communities that experience them. For example, as suggested by the above quote, a variety of evidence suggests that disasters can increase cooperation (e.g., Solnit, 2009), suggesting that disasters may increase prosocial preferences. More generally, any effects that disasters might have on risk aversion, time discounting, or trusting behavior, could affect substantially how people are able to recover from disasters. In other words, disasters may impact communities not only through the direct losses they inflict, but also through people's willingness to attempt new business ventures, to save, and to work cooperatively.

In this paper, we test whether a natural disaster can have systematic effects on individuals' long-term preferences relating to trust, risk, and time discounting. These kinds of preferences have long been hypothesized to be significant determinants of individual-level welfare and aggregate-level growth (e.g., Adam Smith, 2000 [1759]; Max Weber, 1930 [1905]). For example, societies with higher levels of trust have been shown to achieve higher income levels (e.g., Fukuyama, 1995; Knack & Keefer, 1997). Likewise, risk aversion has been inversely linked with investment in physical and human

capital, along with wage growth (e.g., Levhari & Weiss, 1974; Shaw, 1996). Time preferences, specifically patience and self-control, appear to have important implications for decisions regarding savings and educational investments (e.g., Meier & Sprenger, 2010; Mullainathan, 2005; Thaler & Benartzi, 2004).

Most economists, with notable exceptions (e.g., Adam Smith, 2000 [1759]), have assumed that such preferences are immutable individual characteristics (e.g., Stigler & Becker, 1977). In other words, while choices are influenced by the circumstances in which the decision makers live, the underlying preferences are not, or should not, be affected by those circumstances.

Recent insights from behavioral economics and psychology, however, suggest that individual experiences can affect preferences such as those relating to risk and patience (e.g., Loewenstein & Angner, 2003; Malmendier & Nagel, 2011).

We investigate such effects in the context of the December 2004 Indian Ocean tsunami, also known as the Sumatra-Andaman earthquake. There are a variety of plausible channels through which a disaster such as the tsunami could affect individual preferences. Disasters can make people more aware of the potential adverse events that can occur or can make life expectancy seem shorter. As a result, a disaster may cause victims to be more averse to risk or more impatient. On the other hand, experiences of generosity from neighbors and strangers

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in the aftermath of the disaster may lead to greater trust in others, while gratitude or an increased expectation of needing others' help in the future may increase trustworthiness.<sup>2</sup>

To estimate these effects, we conducted a series of three experiments with 334 Thai subjects in Phangnga, the Thai province that was hit the hardest by the 2004 tsunami. The experiments, conducted four and half years after the disaster, elicited subjects' preferences with regards to trust, risk and time. As we describe, we went to great lengths to ensure that subjects' understood the tasks. In particular, we implemented the risk task as a series of visual choices that provided data equivalent to a full multiple price list (Holt & Laury, 2002). Subjects also participated in a trust game. We conducted sessions in villages throughout the tsunami zone, some in places that experienced the most damages and others in nearby places that were largely spared. We thus obtained a subject pool that, as confirmed by the post-experiment survey, had vastly different experiences in the tsunami. Our primary concern is that, even though we compare areas that were hit to those that are nearby and spared, this natural experiment may not fully capture pre-tsunami differences between areas that were hit hard and those that were not. We take a variety of steps to address this concern. First, we use GIS data to identify plausibly random variation in tsunami experiences. Second, we consider comprehensive village-survey data to compare villages on observables according to tsunami experience. Last, we utilize survey data to test whether post-tsunami migration can explain our results. The results of the various tests all support the idea that the tsunami affected preferences rather than the composition of the sample.

To identify the tsunami's impact, we considered whether the village was affected, whether the subject or household experienced financial damage, and whether a family member was injured or killed. We show that different preferences respond to different aspects of the tsunami experience, with the effects occurring in theoretically plausible ways. For example, it appears that being from a tsunami village predicts significantly higher levels of risk aversion afterward, with individual damage not having a significant effect. These effects are consistent with other evidence that observations of risky environments where events have turned out badly can lead to greater risk aversion (e.g., Malmendier & Nagel, 2011). In addition to an increase in risk aversion, the tsunami appears to have led to higher levels of trust. These effects seem the result, at least in part, of subjects having experienced a situation in which they received help from others, as suggested by the post-experiment survey responses.<sup>3</sup> Finally, our results also suggest that experiencing individual-level losses led people to become more impatient.

Our results provide insights into important policy questions relating to how best to help people recover from natural disasters. For example, our finding that natural disasters lead to greater risk aversion suggests a role for policy to ensure access to insurance and to small and safe loans for which people may then have a greater preference (e.g., Morduch, 1999). Also, there may be added benefits beyond the direct effects from ensuring that people receive adequate assistance after disasters. Such assistance may lead to greater trust, which may have its own positive effect on subsequent growth.

## 2. THEORETICAL BACKGROUND AND HYPOTHESES

There are several channels through which a serious natural disaster could affect individual preferences. One plausible channel would be through a large negative shock to wealth

or income, which in turn would alter preferences. A second channel would involve an increase in the perceived likelihood that other negative events would occur.<sup>4</sup> A third channel, from the psychology literature, advances that disasters elicit strong emotions, such as fear, which are likely to influence the cognitive process of decision making. Finally, people may receive help from neighbors, strangers, the government and non-governmental organizations, in addition to giving help to others. Any or all of these possibilities could lead a natural disaster to affect individual preferences. A range of research gives the expectation that natural disasters could affect preferences in these ways. Here, we review that literature as we describe our predictions for the tsunami's effects on preferences.

### H1. Trust and trustworthiness will increase after the tsunami.

A natural disaster may positively affect trust and/or reciprocity through any of the following channels: (i) longer interactions during reconstruction foster familiarity among survivors and familiarity breeds trust (e.g., Coleman, 1988); (ii) receiving help from family and neighbors increases faith that others are similarly trustworthy; (iii) an increase in the perceived probability that a similar event might occur in the future increases the potential for needing help from others in the future, which causes people to be more trustworthy; (iv) if, after the disaster, the community has a lower degree of income disparity, then trust may increase due to greater equality (Alesina & La Ferrara, 2002).

Other social scientists have usually focused on the effects that preexisting levels of trust, networks and, more generally, social capital have on recovery. Social ties and trust have been found to help with resilience and disaster recovery by providing informal insurance, in overcoming barriers to collective actions, and by mobilizing communities for effective local recovery efforts (Adger, Hughes, Folke, Carpenter, & Rockstrom, 2005; Dynes, 2005; Nakagawa & Shaw, 2004). More recent research has stressed the excludable component of such ties, describing the costs that strong ties can bring to out-group members (Aldrich, 2011; Aldrich & Crook, 2008).

The potential causal link running in the opposite direction—from disaster to trust—has received less attention, although recent research has explored the more general effect that disasters can have on social preferences. Considering subjects' decisions in dictator and public goods games, Whitt and Wilson (2007) find increased group cooperation among individuals who were evacuated from New Orleans to Houston shelters in the aftermath of Hurricane Katrina. Similarly, Solnit (2009) provides evidence that disasters are more often catalysts for social capital increase than for social order collapse. In her analysis of the 1906 San Francisco earthquake, the 1917 Halifax explosion, the 1985 Mexico City earthquake, New York City after 9/11 and New Orleans after Hurricane Katrina, Solnit reports a multitude of examples of mutual support, generosity, and greater civic participation that emerged in the communities afterward. Some evidence suggests these effects may persist beyond the immediate aftermath of disasters, as well. Andrabi and Das (2010) find evidence of increased trust—in the form of positive attitudes toward foreigners—four years after the 2005 earthquake in northern Pakistan. They attribute these results to the humanitarian assistance that the local populations received from foreigners and foreign organizations, especially American and European ones.<sup>5</sup>

### H2. Risk aversion will increase after the tsunami.

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