The Journal of Socio-Economics 46 (2013) 17–24

Contents lists available at ScienceDirect

The Journal of Socio-Economics

journal homepage: www.elsevier.com/locate/soceco

Atomic bombs and the long-run effect on trust: Experiences in Hiroshima and Nagasaki

Eiji Yamamura*

Department of Economics, Seinan Gakuin University, 6-2-92 Sawara-ku, Nishijin, Fukuoka 814-8511, Japan

ARTICLE INFO

Article history:
Received 26 March 2012
Received in revised form 30 May 2013
Accepted 3 June 2013

JEL classification:
N45
N95
Z13

Keywords:
Atomic bomb
Trust
Hiroshima
Nagasaki
War

ABSTRACT

Hiroshima and Nagasaki in Japan are the only cities in the world that have experienced an atomic bomb attack. This paper explores how this devastating experience affected victims' tendency to trust others. Individual-level data were used to examine the long-term influence of experiencing an atomic bomb on individuals' trust. After controlling for individual characteristics, I obtained the following key findings. Individuals who experienced the attack were more likely to trust others. Furthermore, estimation based on a subsample revealed that victims of the Hiroshima nuclear bomb were more likely to trust others than those born in other areas of Japan before World War II. This implies that experiencing an historically traumatic event in 1945 strongly influenced individuals' trust in others even at the beginning of the 21st century. It follows from this that the effect of this devastating experience was enduring and had a long-term influence on individuals' values.

1. Introduction

On March 11, 2011, the Fukushima nuclear accident triggered by a devastating earthquake and tsunami caused tremendous damage in Japan and affected views about nuclear energy around the world (Yamamura, 2012).[1] It is the second time Japan has experienced hardship related to nuclear energy. In 1945, 65 years prior to the Fukushima accident, atomic bombs were dropped on Hiroshima and Nagasaki in the western part of Japan. Immediately after the attacks, the most terrible scenes in human history were observed in these cities. However, the shock of the bombs dissipated, and the populations of Hiroshima and Nagasaki returned to a pre-war growth trend (Davis and Weinstein, 2002) and were rebuilt during the post-World War II period. The bombings sharply reduced production factors such as physical capital and labor, hindering economic growth. There seem to be various reasons for the rebuilding of areas where the atomic bombs were dropped. For instance, there is the argument that disaster becomes the catalyst for innovation and "disasters also provide an opportunity to update the capital stock, thus encouraging the adoption of new technologies" (Skidmore and Toya, 2002; 665). Positive externalities such as agglomeration economies appeared to have contributed to growth of the bombed areas as well.[2]

Apart from these factors, trust is also considered a key determinant of economic growth (e.g., Algan and Cahuc, 2010; Beugelsdijk et al., 2004; Dincer and Uslaner, 2010; Putnam, 1993; Zak and Knack, 2001). Trust plays a critical role in making market economies function well because market transactions cannot be facilitated when sellers do not trust buyers and vice versa. Castillo and Carter (2005) found that the impact of disastrous shocks was significantly reduced by social trust, which facilitates economic recovery.[3] When closely investigating economic development, a question arises regarding how and under what conditions people have a tendency to trust others. A number of researchers have examined the determinants of trust (e.g., Alesina and La Ferrara, 2002; Bidner

* Tel.: +81 928234543.
E-mail address: cyl02111@nity.com

[1] As a result of the Fukushima accident, the future of nuclear energy became a critical political issue (Kirman, 2012). Ferstl et al. (2011) found that the accident influenced the daily stock prices of German, French, and Japanese nuclear utilities and alternative energy firms. Furthermore, disastrous events have a critical effect on the outcome of elections and policy in the United States (Eisensee and Strömberg, 2007; Kahn, 2007).

[2] In the case of Hiroshima, the head office of Mazda Motor Corporation was located in that city and grew in the post-World War II period, causing agglomeration economies.

[3] Bellows and Miguel (2009) argued that social capital such as community and political participation played a role in economic recovery from the Sierra Leone war.

1053-5357/$ – see front matter © 2013 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.socec.2013.06.001

and Francois, 2011; Bjørnskov, 2006b; Chan, 2007; Uslaner, 2002; Yamamura, 2008). However, few works have attempted to investigate the effect of traumatic experiences on trust, with the exception of Alesina and La Ferrara (2002) and Bellows and Miguel (2006).

The Nazi Holocaust during World War II was also a horrible disaster. Acemoglu et al. (2011) explored the long-run effect of the Holocaust in Russia and found that it changed the social structure, leading to worse economic and political outcomes than the collapse of the Soviet Union. In contrast, existing studies on Sierra Leone provide evidence that the experience of war has a positive effect on accumulation of social capital through, for instance, residents participating in community activities, joining local political groups, and voting (Bellows and Miguel, 2006, 2009). On the other hand, a case study of Vietnam showed that the United States bombing did not have long-term detrimental effects on economic conditions, including local poverty rates, consumption levels, and infrastructure (Miguel and Roland, 2011). Brakman et al. (2004), using historical data from Germany, showed that bombing shock at most had a temporary effect on city growth in the post-World War II period in West Germany.[4] Bozzoli et al. (2012), using data from Uganda, found that mass violent conflicts were correlated with pessimism about future prospects but had a different effect on expectations over time. The long-term influence of disastrous experiences such as nuclear bombing on trust has not been examined, although existing works have explored the effect of the Chernobyl nuclear accident on student performance (Almond et al., 2009) and individual values about the environment (Berger, 2010). Therefore, it is of value to investigate how the atomic bombs influenced the degree of trust in Hiroshima and Nagasaki, given that trust appeared to contribute to the rebuilding of those cities.[5]

This paper explores the long-term effect on trust of experiencing an atomic bomb using the Japanese General Social Surveys (JGSS), which included more than 12,000 observations. I found that people who experienced the bomb were more likely to trust others. Field experiments are very useful in examining human behaviors and values related to social capital (e.g., Cassar et al., 2007; Castillo and Carter, 2003, 2005; Danielson and Holm, 2007; Fehr, 2009; Fehr and List, 2004). However, it is difficult for researchers to investigate the long-term effects of events such as war and bombing on trust using field experiments. Of course, it is impossible to conduct an atomic bomb experiment for the purpose of analyzing socioeconomic outcomes. Hence, survey data are very useful in analyzing the long-term effects of atomic bombs on individuals' values. Major findings of this paper through ordered probit estimation are (1) people who experienced an atomic bomb were more likely to trust others and (2) victims of the Hiroshima bomb were more likely to trust others than those born in other places in Japan before World War II.

The remainder of this paper is organized as follows. Testable hypotheses are proposed in Section 2. Section 3 provides an explanation regarding data and the empirical method used. Section 4 presents the estimation results and their interpretation. The final section offers some conclusions.

2. Conditions in Hiroshima and Nagasaki and hypotheses

According to information provided by the Hiroshima Peace Memorial Museum,[6] the first atomic bomb, which was dropped on Hiroshima on August 6, 1945, was powered by the splitting of 855 g of uranium. The energy released was the equivalent of 15 kilotons of TNT. The bomb created a high-temperature, high-pressure fireball that grew to a diameter of approximately 410 m one second after detonation. Large amounts of radioactive material fell as black rain, and a total of 350,000 people suffered the direct effects of the bombing. About 140,000 people were estimated to have died by the end of 1945 alone. All buildings in the area where the bomb was dropped were completely burnt down.

After the Hiroshima bombing, on August 9, 1945, a second atomic bomb was dropped, this time on Nagasaki. Energy emission was equivalent to 21 kilotons of TNT, which was almost two times larger than that in Hiroshima. In total, 73,884 people were dead and 74,909 people were injured as of December 1945 (Nagasaki Atomic Bomb Museum).[7] Because of the hilly topology of Nagasaki and the fact that the bomb missed its target, the damage in Nagasaki was less than that in Hiroshima (Davis and Weinstein, 2002).[8]

Disastrous events seem to have an effect on the degree of trust through two channels. First, "individuals who directly experienced violence during the recent Sierra Leone civil war are no different in terms of postwar socioeconomic status, but they display dramatically higher levels of political mobilization and engagement, as well as higher local public goods contributions, than non-victims. The gap we find between those who directly experienced violence and others provides evidence that personal experience is much more influential than mere observation in shaping subsequent behavior" (Bellows and Miguel, 2009; 1155). Similar evidence presented in an experimental study showed that individuals' own personal experiences influenced their behavior (Simonsohn et al., 2008). This suggests that individuals' preferences and values change when they directly suffer from a disastrous event such as war. Based on the argument above, *Hypothesis 1* is postulated:

Hypothesis 1. Experiencing an atomic bombing leads victims to trust others.

Second, it is possible that disastrous events reinforce the norm of trusting others within a community rather than affecting individual level of trust. For example, the percentage of households that suffered housing losses from Hurricane Mitch caused the people living in the damaged areas to trust others (Castillo and Carter, 2005). This implies that traumatic events influence the norm to trust others in the area, which in turn affects individual values. If this is true, people residing in damaged areas are more likely to trust others even if they were born after the disastrous event and thus did not personally experience it. This leads me to propose Hypothesis 2:

Hypothesis 2. Experiencing an atomic bomb forms the norm to trust others in the bombed area.

3. Data and methods

3.1. Data

Individual-level data from JGSS were used in this paper.[9] A two-stage stratified sampling method was used for the surveys. They were conducted throughout Japan beginning in 2000. The dataset

[4] Brakman et al. (2004), however, showed that bombing shock had a permanent effect on city growth in eastern Germany.

[5] Kasagi (2012) found that the atomic bomb dropped on Hiroshima had a detrimental effect on victims' mental health.

[6] See http://www.hiroshima-spirit.jp/en/museum/index.html.

[7] See http://www1.city.nagasaki.nagasaki.jp/peace/english/abm/download/leaflet_e.pdf.

[8] The damage to Tokyo caused by its firebombing is considered comparable to that suffered by Hiroshima and Nagasaki. According to the investigation of the Tokyo Metropolitan Police Department, approximately 84,000 died and 41,000 were injured in the Great Tokyo Air Raids (Shogakkan, 2003).

[9] Data for this secondary analysis, "Japanese General Social Surveys (JGSS), Ichiro Tanioka," was provided by the Social Science Japan Data Archive, Information Center for Social Science Research on Japan, Institute of Social Science, The University of Tokyo.