Earthquake fatalities: the interaction of nature and political economy

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Abstract

To say that the level of fatalities resulting from an earthquake is inversely related to a country's per capita level of income is hardly novel. What makes our approach novel is that we relate fatalities to both per capita income and the level of inequality that exists within a country through their joint impact on the likelihood of collective action being taken to mitigate the destructive potential of quakes. We first develop a theoretical model which offers an explanation as to why, in some environments, different segments of society prove incapable of arriving at what all parties perceive to be an agreeable distribution of the burden of the necessary collective action, causing the relatively wealthy simply to self-insure against the disaster while leaving the relatively poor to its mercy. Following this, we test our theoretical model by evaluating 269 large earthquakes occurring worldwide, between 1960 and 2002, taking into account other factors that influence a quake's destructiveness such as its magnitude, depth and proximity to population centers. Using a Negative Binomial estimation strategy with both random and fixed estimators, we find strong evidence of the theoretical model's predictions. That is, while earthquakes themselves are natural phenomena beyond the reach of humankind, our collective inaction with respect to items like the creation and enforcement of building codes, failure to retrofit structures and to enact quake-sensitive zoning clearly plays a part in determining the actual toll that a given quake takes. And, it is through these and other examples of collective inaction that limited per capita income and inequality couple

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together with a given quake's natural destructive power in determining the actual fatalities resulting from a quake.

1. Introduction

Until recently, a country's level of inequality has been viewed as an outcome of its general economic performance, rather than an input into that performance. This began to change in the 1990s with the publication of a number of papers that addressed the impact that inequality itself might have on a country's economic performance, especially on its growth rate. Galor and Zeira (1993), Bertola (1993), Alesina and Rodrik (1994), Persson and Tabellini (1994), and Benabou (1996) have been among the frontrunners of this literature. The initial impulses in this strand of research concerned the political economy implications of inequality (especially tax selection by the median voter) and capital market imperfections (which limit the investment options for the relatively poor) as the main channels through which inequality might impact the overall efficiency and growth of an economy.

Another strand of related research extends these outcomes by suggesting that inequality can be linked to economic performance in other ways. Examples include the role that inequality can play in political instability, as evidenced by greater social conflict, which can lead to reduced investment levels (Alesina and Perotti, 1996) and limit a country's ability to effectively respond to external shocks (Rodrik, 1999). Further, such social conflict inevitably leads to increased violence and crime, which also can reduce the overall economic performance of a country through its direct costs in lives and property damaged and through its indirect costs in terms of medical resources required to treat those injured, lost productivity from those injured or killed and the resources needed for policing that must be diverted from other, arguably more productive, activities to mitigate, if not prevent, these criminal activities (see Fajnzylber et al., 2002; Bourguignon, 2001).

Social unrest and the resulting criminal activities, however, are not the only factors leading to unnecessary loss of lives and property damage. Each year, throughout the world, natural disasters claim tens of thousands of lives, injure several times more, and cause billions of dollars in property damage. Earthquakes alone claim thousands of lives a year (in some cases, more than a hundred thousand lives in a single quake). Some natural disasters can be foreseen (or predicted with some probability) and thus measures can be taken to limit their severity. In many instances, these measures require collective action by society.[1] For instance, in the case of earthquakes,

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[1] Worldwide collective action in earthquakes in the form of pooling data started as early as 1899 (Howell, 1990, p. 29). Furthermore, international relief aid following catastrophic earthquakes has intensified in the last few decades.